European Monitoring Centre
for Drugs and Drug Addiction

EMCDDA

MONOGRAPHS

A cannabis reader: global issues and
local experiences

8

VOLUME I

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A cannabis reader: global issues and local experiences

Perspectives on cannabis controversies, treatment and regulation in Europe

8

VOLUME I

Editors
Sharon Rödner Sznitman, Börje Olsson, Robin Room

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European Monitoring Centre
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Introduction

Smoked, eaten, imbibed — or just talked about — it seems the world has a strong appetite for cannabis. An estimated one in five European adults have tried it. Thirteen million Europeans have consumed it in the past month. Globally, nearly 50 000 tonnes of cannabis herb or resin is produced for consumption each year. Little wonder, then, that cannabis has become a controversial cultural and commercial phenomenon. Today, cannabis has a unique ability to divide opinion among policymakers, scientists, law enforcers, drugs professionals and consumers.

This EMCDDA cannabis monograph addresses one basic question. *How can I find quality information on cannabis, amid all the bias and opinion?* During the editing of this monograph it soon became clear that the EMCDDA was entering an area crowded with general guides, even competing cannabis monographs. This is where the idea of a cannabis 'reader' emerged. Our audience — researchers, parliamentarians, drugs professionals, students, European citizens — is currently faced with an overload of professional publications. Added to this is the daily flood of information on the Internet, often crusading in nature, and sometimes misleading. This threatens to obscure the genuine progress made in cannabis research during the past two decades.

The EMCDDA cannabis reader underlines the point that cannabis is not just a static, unchanging plant, but a dynamic product that is subject to gradual evolution in potency, prevalence, cultivation, legislative and public health concerns. In this monograph, leading experts provide short, sharp insights on a range of cannabis topics while offering advice on further reading for each topic. Brief editorial notes provide concise introductions to each topic, occasionally drawing attention to political sensitivities and the need for a 'critical eye'. So this cannabis reader has a value, both as a shortcut to researchers entering the area and a synthesis for experts.

You will find a wide range of views expressed in the chapters in this monograph, not all of them in agreement. The arguments, tone and conclusion of each chapter is the responsibility of the author alone, and is not necessarily endorsed or supported by the EMCDDA. This reflects the wider discourse on cannabis where different positions and perspectives often lead to different conclusions being drawn from the same evidence. We believe each chapter represents a useful contribution to the overall debate, even if their individual perspectives differ.

Two volumes, multiple audiences: policymakers, enforcers, researchers, professionals

The monograph is divided into two volumes, each comprising three sections. There are a number of reasons for the two-volume approach. While complementary, each has a slightly different audience. The first volume centres on political, legislative, commercial and social developments relating to cannabis. Its core audience thus comprises policymakers, sociologists, historians, journalists and those involved in enforcement. The second volume is very much centred on drugs professionals working in the fields of treatment, prevention and healthcare.

Volume 1

- Cannabis in the past
- Policies, legislation and control strategies
- Supply and production issues

Volume 2

- Epidemiology
- Health effects of cannabis use
- Prevention and treatment

Changing perspectives: from global issues to local experiences

What unites both volumes is an attempt to fuse general chapters with specific case studies. Within each section, you will encounter a progression from a 'top level' to a 'close-up' view of the subject. So each section begins with chapters providing a general introduction to a single cannabis issue, often of an encyclopaedic nature, together with a summary of the current state of scientific research. The monograph then 'zooms in' with a case study about a specific aspect of cannabis.

In Volume 1 ...

In Volume 1 we can read an autobiographical article on events in the United Kingdom in the late 1960s, recent cannabis developments in the EU's new Member States, the cannabis resin trade linking Morocco to northern Europe, the closure of Pusher Street in the Copenhagen commune of Christiania, and information on how coffee shops developed in the Netherlands. While these articles focus only on smaller pieces of the cannabis puzzle, they provide insights into the many different ways Europe has dealt with cannabis.

Foreword

Cannabis is Europe's most-consumed illicit drug. An estimated 13.4 million European adults have used cannabis in the last month. Cannabis also supports a multibillion euro market across the EU, with the share of cannabis resin in many markets losing ground to herbal cannabis. Moreover, treatment demand for cannabis use is rising in many Member States. Such facts underline the importance of having a clear understanding of what is known about cannabis in Europe, for example its impact on public health, how cannabis controls are enforced and the implications of cannabis use for public health responses.

Cannabis is also, perhaps, Europe's most heavily debated illicit drug. Reviews of the health effects and legal status of cannabis have been carried out by numerous governments and agencies over recent decades. And there is frequent, sometimes heated, discussion about cannabis in the political arena, amongst others in relation to mental health problems, the therapeutic potential of cannabinoids, policing and enforcement, legislation and sentencing.

So it is with great pleasure that I introduce this important body of work on cannabis. It is the most comprehensive publication the EMCDDA has ever produced, and the first time the Centre has attempted to review a single substance in such an all-encompassing way. We must extend our gratitude to all authors who have contributed to this monograph. Excellent work was carried out by Sorad in Sweden, together with reviewers from the EMCDDA's Scientific Committee, and two independent scientific editors, John Witton and Wendy Swift. The result is a 'cannabis reader': a genuine navigational aid to research, debate and policy-making on the substance. The reader approaches cannabis from many angles, and will appeal to a wide audience, ranging from 'beginners' approaching the subject from other disciplines to drug researchers and professionals who are familiar with the literature and who may appreciate some synthesis of the state-of-the-art in current research or practice.

A cannabis 'reader'

While cannabis is the most consumed illicit drug worldwide, politically cannabis is a great divider. The illegality of the drug means that the evidence base is often patchy. Lobbyists, libertarians, prohibitionists, think-tanks and commercial interests all by definition speak to the issue from divergent positions. Even research in this area can sometimes appear to be influenced by a political as well as a scientific agenda. The information base in this area is considerable and this fact alone poses a serious challenge to any reader who attempts to navigate it. The goal of this publication is to

gather knowledge that will provide a base for improved policy approaches to cannabis in the future. In reaching this goal, leading experts have been asked to clarify what is known and what is not known about cannabis; on which issues scientists agree and which issues are still under debate.

In the development of the monograph the EMCDDA has been keen to provide a non-judgemental, non-partisan approach to the evidence. However, our aim has also been to enable each author's ideas to be fully expressed. As leading experts in the field, they are qualified to make judgements where they feel fit, and while most of the monograph is analytical and descriptive, the nature of the subject matter means that, in places, opinions and views are expressed which may be perceived as controversial. Not all the views expressed here are in agreement.

Chapters have been peer-reviewed by the EMCDDA's Scientific Committee and further edited by qualified scientific editors. The EMCDDA has introduced each chapter, and where opinions are expressed, references to counter-arguments are given, together with a reading list, for those seeking to explore the subject further. Authors have also been given the opportunity to adapt their chapters based on peer feedback. Nonetheless, the chapters remain very much the work of the respective authors. They should be read with the proviso that any views expressed should neither be considered those of the EMCDDA nor the EU institutions in relation to cannabis.

Maximising the shelf-life of the monograph

One of the challenges with working on illicit drugs is that the field is in constant evolution. Use patterns and prevalence, use context and even routes of administration and potency of product can change substantially over time. This is particularly the case for a drug like cannabis, where our understanding of the public health impact of the use of the drug is growing almost daily. Another example of this difficulty is the field of medicinal cannabis, where a number of new medicines are currently being developed in various parts of the world, with considerable uncertainty as to the scope and range of potential therapeutic applications.

What is certain is that this will not be the last monograph published on cannabis. There is a publication cycle of one governmental or think-tank monograph on cannabis every few weeks, and this is likely to continue. Around 20 major books on cannabis are produced by commercial publishers each year, in different languages, with many more in the specialised and scientific literature. So the first volume of the monograph includes an Appendix that sketches a brief history of cannabis monographs and grey literature, referring to the large range of monographs on cannabis. The EMCDDA monograph hopes to (i) identify the producers of literature on cannabis, (ii) illustrate the range in

thematic focus of publications and (iii) provide a one-stop research resource for recent major publications on cannabis. This Appendix will reside in a more dynamic form on our website. We hope it will provide an important stepping stone to information on cannabis, published at national, European and global levels.

What this reader adds to the literature

Each chapter is preceded by a section entitled 'Setting the context'. These are provided to guide readers through the monograph, to offer suggestions for further reading, and to draw attention to the cycles of reporting on cannabis — often annual — by organisations such as the UNODC, the EMCDDA and our Reitox National focal points.

Readers will be interested in knowing what they will gain from this publication. The first is the multidimensional approach to the subject matter. It describes cannabis as seen from different perspectives: historical and cultural, pharmacological, sociological, legal and policy-related, and treatment- and practitioner-related. The second is the monograph's supranational and European focus. While numerous cannabis monographs have been written at a national or multilateral level in Europe in the past decade, this one can claim EU-wide relevance. It is backed by the EMCDDA's epidemiological statistics, based on reporting from the Reitox network and the Centre's privileged position of being able to select a strong team of authors for the monograph. Thirdly, the monograph reflects emerging trends, for example in legislative approaches, treatment demand and provision and cannabis potency.

We hope you will appreciate the effort invested in this monograph. It provides a step back from the EMCDDA's annual monitoring activities. This wider perspective is both refreshing and eye-opening, even to those of us who are seasoned experts in the field.

Wolfgang Götz
Director, EMCDDA

Overview of Volume 1

Part I: Cannabis in the past

1   Cannabis as medicine in Europe in the 19th century
    Manfred Fankhauser

2   The re-emergence of the therapeutic use of cannabis products: recent developments
    and future prospects
    John Witton

3   The pharmacology of cannabis: issues for understanding its use
    Desmond Corrigan

4   Soma, the Wootton Report and cannabis law reform in Britain during the
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5   Cannabis's role in drawing attention to 'the drugs problem' in Sweden
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6   Enlargement 2005: cannabis in the new EU Member States
    *Jacek Moskalewicz, Airi-Alina Allaste, Zsolt Demetrovics, Danica Klempova and
    Janusz Sierosławski* with *Ladislav Csemy, Vito Flaker, Neoklis Georgiades, Anna
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    Marcis Trapencieris, Sharon Vella and Alenka Žagar*

Our understanding of cannabis today is bound up in an understanding of the past. We
begin this monograph by looking back on how cannabis was used and understood in
the past. Throughout human history, cannabis has been used for many purposes such as
recreation, therapy, art, religion, medicine and as a textile.

The first two chapters in this section examine the role of cannabis as a medicine in
Europe in the 19th century, together with more recent developments in developing
cannabis as a medicine. In the past two decades, great efforts have been made to
assess the usefulness of cannabis as medicine, as cannabis is currently being used in
a small way as medicine. Nevertheless, the role cannabis plays in medicine today is
modest compared with the past, and although there are reviews on the subject, well-
established and secure conclusions of the extent to which cannabis is a reliable and
useful medicine remain uncertain. Many have pointed out that there is a need for further
research on the subject.

Moving on from a historical and contemporary perspective on cannabis as medicine, a general introduction to the pharmacology of cannabis is also presented. Although the psychoactive effects of cannabinoids have long been known, it was not until the 1980s that the first evidence for the manner in which tetrahydrocannabinol (THC) acts on the brain became known and, as Corrigan's chapter highlights, important advances have been made since then.

This section proceeds to focus on two case studies that discuss the role of cannabis in youth cultures in the 1960s. As Abrams and Olsson show, cannabis became widely known as a recreational drug with the youth cultures of the 1960s. Government responses to the increased use of cannabis were probably as much concerned with a response to the youth cultures as they were a response to the substance use in its own right.

The section ends with development in the more recent past: the enlargement of the European Union in 2005, to embrace 10 countries in Eastern Europe, the Baltic States and the Mediterranean Islands. This round of enlargement is an event that remains fresh in the minds of those who will read this monograph in Europe. Yet with the subsequent addition of Bulgaria and Romania, and the welcoming of new candidate countries, these Member States are beginning to become more firmly integrated within the fabric of the EU. Time will tell whether the large variations currently seen in cannabis use across these countries will evolve to reflect those in pre-2005 Member States.

The different chapters included in this section constitute only a limited presentation of cannabis in the past. Nevertheless, we hope that the section facilitates the beginning of an understanding of present-day processes. As people living in contemporary society with contemporary concerns, we sometimes neglect the importance of the past. We hope that these introductory chapters illuminate that although much of this monograph is based on up-to-date data, our understanding of cannabis today is partly a product of its past.

Part II: Policies, legislation and control strategies

There are three main UN drug conventions, two of which are significant for cannabis. The 1961 Single Convention on Narcotic Drugs provides for controls over cannabis, as well as other drugs. The 1988 Convention Against Illegal Traffic in Narcotic Drugs and Psychotropic Substances strengthened the international scope and framework of cooperation against drug trafficking, including trafficking in cannabis. All EU members are signatories of the three UN conventions on illicit drugs, and the EU itself is a signatory of the 1988 Convention. Consequently, all countries within the EU have adopted some sort of legal prohibition against cannabis, and the UN conventions have played a role in constraining national legal experimentation on drug law and policies. The international UN conventions on drugs are unique. There is no other issue where one can find a universalised discourse translated into such similar legislation around the world.

Nevertheless, and as made apparent in this section, the appearance of harmony in the EU is to a large extent not a reality. Wide room for manoeuvre within illicit drug legislation has been taken within the EU. Individual national legislation is possible despite the UN conventions, as treaties allow for discretion. Additionally, national variations in drug use policies are accommodated within the EU organisational structure. Although the EU has launched several drug action plans, full harmonisation has not materialised. And though the EU takes complementary measures, there is no coherent holistic approach to drug issues in the EU. The EU considers drugs to be mainly an internal security concern. This implies that there is little overarching influence from the EU on national drug policies. Individual countries are relatively free to experiment with different drug-related policy regimes. Especially prominent is the case of cannabis liberalisation policies, explored by Ballotta et al. in this section. The chapter makes evident that many EU Member States have gone their own way in terms of how to interpret the UN global control regime on cannabis.

The different approaches to cannabis-related issues are often discussed in terms of a philosophical shift between zero tolerance approaches and harm reduction approaches, or in terms of criminalisation and decriminalisation or repressive versus liberal regimes. This is, however, too simplistic a notion of the issue at hand. Clearly, as shown in Ballotta et al.'s chapter, there exist multiple approaches to legislation regarding cannabis within the European Union today, and specific legislative categories are often difficult to determine. The Netherlands, for instance, which is often thought of as a liberal regime, is still a prohibitionist country. The Netherlands uses roughly two-thirds

of its budget for drug problems on criminal action. As noted in Korf's chapter, although possession for personal use and use of cannabis is decriminalised in the Netherlands, production and supply of cannabis are prohibited, and criminal sanctions are enforced. Seen from this perspective, it might be informative to think of the various issues related to cannabis control as continuous and blurred, rather than a case of dichotomy of liberal or repressive.

In terms of the effectiveness of the various cannabis policies which exist in the EU, evidence is scarce. As Room points out, the drug field has much to learn from the tobacco and alcohol fields, in which policy measures are more rigorously examined and there is a relatively well-developed evidence base on which strategies work and which are most effective in terms of reducing the harms. In comparison, the policy impact literature is relatively undeveloped with respect to illicit drug use. Indeed, different drug control regimes are rarely rigorously evaluated. Despite scarce evidence, a modest research literature exists which remains sceptical about the effectiveness of cannabis prohibition. Korf suggests, for instance, that cannabis possession laws have little influence on cannabis prevalence rates and are thereby not an effective way to deter use.

It is also generally agreed that there is a gap between formal policies and policy as implemented. As is shown by Ballotta et al., the most common penalties for cannabis possession range from fine to incarceration. Nevertheless, reports suggest that in practice most detections lead to a fine. Additionally, evidence of a 'net widening effect' exists. Researchers have noted that a relaxation of policies may not have the intended effect of less severe consequences of cannabis prosecution. Some have suggested, for instance, that cannabis reclassification in the UK might have led to offenders that were previously dealt with informally being subject to on-the-spot formal warnings, recorded as such by the police force. Since there are few long-term data on cannabis policies as implemented and the effects they have, it is difficult to determine the impact of 'decriminalisation' policies.

Researchers generally agree that the harm to the defendant in drug cases extends far beyond the cost of the actual criminal justice sentence or caution. Exactly what the impact of a cannabis prosecution entails is, however, far from clear. Administrative measures do not necessarily mean a more gentle approach than criminal measures, as administrative measures might be associated with additional costs for the individual user, for instance through a reduction or withdrawal of a student's loan or difficulties in employment opportunities. While evidence of this is available in the literature for the US and Australia, little evidence exists for European countries.

Harm reduction policies, as mentioned by Bennett, start from a recognition that substance use has been and will continue to be part of human experience. Acceptance

of this fact leads harm reduction approaches to develop strategies with the aim of moving people towards safer forms of substance use, possibly with abstinence as the ideal. In this way harm reduction is a radical move away from more traditional illicit drug strategies that solely aim at abstinence. Another distinct feature of harm reduction is its emphasis on respecting drug users and on moving away from paternalistic models of care.

A strength of harm reduction strategies is the firm focus on secondary as well as primary harms of cannabis use. In addition to the attempt to reduce primary and adverse health effects of cannabis use, harm reduction strategies recognise that harm also arises as a consequence of legislation, policies and police strategies. Unfortunately, the secondary harms are far less researched than the primary harms of cannabis use, and this poses a challenge for future research efforts. Indeed, and as pointed out already, the current evidence base on the impact of drug policy regimes is weak. In order to learn more about the relation between policies and effects, there is a need for carefully designed studies that are able to determine the impacts, primary and secondary, of cannabis use. The most appropriate way to go about such work is through quasi-experimental designs, and where possible true experiments.

One criticism of harm reduction strategies has been that it sends out the 'wrong' messages. This claim can be countered by a variety of responses, for example, that public health approaches in other fields such as sex education have adopted a harm reduction approach, that the community understands harm reduction messages, and that they are not an encouragement to use drugs. But symbolic values can be as important as evidence and the emphasis on symbolic values might be a useful starting point for reaching an understanding of how cannabis policies have developed and how they may develop in the near future.

What the future holds in terms of drug law harmonisation is, however, impossible to predict. What is clear is that a possible harmonisation, if occurring at all, is likely to be very slow, and national and regional distinctions within the EU in terms of cannabis policies are likely to continue to be the rule rather than the exception.

Part III: Supply and production issues

The market

Current research shows that the main supplier of cannabis to the EU is Morocco. This claim is based to a great extent on research efforts made by the United Nations Office on Drugs and Crime (UNODC), as shown by Pietschmann and Leggett. Gamella and Jiménez Rodrigo have provided an in-depth analysis of the cannabis trade from Morocco to Europe. As they point out, hashish is generally taken from Morocco to Spain and Portugal and is thereafter exported across Europe. This should come as no surprise in view of the geographical location of the countries. It must, however, also be noted that cannabis on the European market travels through other routes as well.

Although it is clear that Morocco plays an important role in the European cannabis market, it must not be forgotten that there are other significant supply sources of cannabis. As is mentioned by Pietschmann and Leggett, cannabis in Europe also derives from Thailand, Afghanistan and Pakistan. Various central Asian states and former parts of the Soviet Union are also suppliers of cannabis resin to the European market. This suggests that there is a strong correlation between poverty and the drug trade. In a poor region such as Morocco, cannabis production constitutes an important means for families to reach a sustainable standard of living.

It should also be highlighted that over the last decade, domestic cultivation of cannabis has started to change the shape of the cannabis market, so that home cultivation has in some countries become an important part of the cannabis supply. The Netherlands has long been known to be a producer of marijuana, or 'netherweed'. Netherweed is produced for domestic as well as international consumption, and in the last few years 'netherweed' has been seized in the UK, Scandinavia, Germany, Belgium and France. New evidence also indicates that the supply of cannabis produced elsewhere in Europe is on the rise. Switzerland has, for instance, reported a sharp increase in illegal cannabis cultivation. A 1999 Swiss EKDT report argued that in 1998 more than 100 tonnes of cannabis were harvested for the drug trade, and it was plausible that Switzerland became the second largest European exporting country after the Netherlands. An

increase in domestic cultivation has also been noted in the UK, with some arguing that cannabis cultivated in England and Wales may now make up well over half of the consumption there.

Owing to the illegality of cannabis, both use and trade are mostly hidden. Carpentier et al. demonstrate a certain degree of uncertainty when it comes to measuring and researching the cannabis market. One can never really know if seizures are indications of general trends or of the extent of law enforcement. The trend of an increase in domestically grown sinsemilla at the European level is possible, but currently relatively undocumented. While international trafficking, mainly from Morocco, evidently occurs, it is unclear what share of the market home-produced cannabis actually comprises. Although much domestic cannabis cultivation is small-scale production for personal use, it should not be neglected, as it contributes to the European cannabis market and it might make up a larger proportion in the future. Seen from this perspective, although continued attention to Morocco and other international suppliers is important, there is a need for more research on domestic cultivation. Too strong a focus on Morocco may indeed produce a partly distorted picture of the European cannabis market today.

If cannabis production is to an increasing extent produced on European soil this raises new and important questions. Apart from the issue of THC potency, as discussed above, a geographical change in the production of cannabis is also connected to questions regarding the relationship between the industrial and the developing world. As Gamella and Jímenez Rodrigo point out, the cannabis market is an important economic asset to poor farmers in Morocco. A possible turnover of the market, with a shift of production to Europe, may have negative implications for peasant farmers in the developing world. Further, European domestic cultivation has implications for national criminal justice responses. At the moment heated debates regarding cannabis are usually confined to the issue of possession and not cultivation. As the geographical production of cannabis changes it might, however, also change the focus of the public debate towards more emphasis on appropriate responses to cultivation. Indeed, EU Member States might increasingly have to deal with criminal justice issues such as cultivation for personal use, and commercial cultivation, as well as medical growers. We might expect new policy initiatives, and with these a need for scientific investigation into how the market is evolving and how it responds to new developments.

Potency

From time to time, a wave of media interest across Europe contends that cannabis in contemporary society is stronger and thus more harmful than it was in the 1960s and 1970s. Claims have been made that cannabis consumed today is 30 % stronger than in the past. This belief, though strongly held, is something of an urban myth. As King in

this section notes, the myth has been fuelled by media and politicians, and researchers have suggested that the figures come from misinterpretation of the data which, when calculated in accurate terms, actually translate to a 1% increase.

Clearly, there are controversies concerning cannabis potency, and in-depth and careful investigation is required in order to explore properly the issue of THC potency. King investigates data from seven European countries. When using potency data combined with data on resin and herbal cannabis consumption, a weighed mean potency is found. Following this strategy, King finds a potency increase only in the Netherlands and he thus concludes that no overall upward trend is found except from indoor-cultivated Dutch resin, which is thought to make up a small share of the market. But despite King's reassurance that overall cannabis potency has not increased dramatically, there is evidence which challenges this view. This is, for instance, pointed out by Leggett and Pietschmann in this section, who point towards a possible trend for indoor domestic cultivation of sinsemilla to increase in several European countries. Claims have been made that this type of cannabis is easily modified and does often imply an increase in potency. At present the size of the European domestically produced cannabis market is, however, unclear. Additionally, it is unclear to what extent domestic production actually implies an increase in cannabis potency.

Clearly, contradictions prevail, and we may conclude that at present it is difficult to gain adequate data on the issue of trends in cannabis potency. Forensic data provide only a weak basis for evaluating potency trends, largely due to problems associated with standardising definitions of cannabis products and sampling issues. Additionally, analysis based on drug enforcement seizures may be anomalous in a number of ways, including a disproportionate focus on large cultivators and seizures. Finally, it is evident that the discussion has been contaminated by scare tactics and ignoring of sound evidence. Thus, there is clearly a need to pursue these issues further in order to create an improved knowledge base from which the potency issue may be further explored and better understood.

In order to facilitate an informed policy debate, there is also a need to explore issues indirectly linked to the issue of THC potency, for instance, to investigate adverse short- and long-term health effects that might arise from a potential increase in potency. Indeed, as pointed out by King, THC potency increase does not necessarily mean that there will be an increase in adverse health effects, as an increase in potency may lead to an adaptation by the users to smoke less cannabis. In turn this would lead to less inhaled smoke in lungs and thus decreased risk of respiratory diseases.

Knowledge of potency as well as the dose consumed by individual users is an important and sometimes neglected area in the research literature. As is well accepted in the alcohol and tobacco field, the effects of cannabis must be considered in relation to type

of cannabis consumed, and pattern of consumption, and hence also THC levels. There is little disagreement that there is a difference between drinking a full glass of vodka and a full glass of wine and that intense, prolonged use of alcohol is deleterious to both physical and psychological well-being. In the case of cannabis, on the other hand, there seems to be little effort made to ascertain actual dose rates and hence lifetime intake of cannabinoids. Thus, little account is taken of the wide range of concentrations of THC and related compounds in smoked cannabis and differences of smoking habits from one individual to another. This poses a challenge for future research.

Sharon Rödner Sznitman
Sorad

Börje Olsson
Sorad

Cannabis in the past

PART I

Chapter 1
Cannabis as medicine in Europe in the 19th century

Setting the context

Cannabis has been the subject in recent years of substantial historical study. Overviews include Abel (1980), Grinspoon and Bakalar (1993), Mathre (1997), Sloman (1998), Matthews (1998, revised 2003), Rätsch (2001), Grotenhermen (2002), Wujastyk (2002), Green (2002), Booth (2003), Allegret (2006) and Russo (2007).

This explosion in historical interest is firmly rooted in the present. Reasons for this interest include: a wider vogue in historical publishing towards single product histories (cod, salt, opium, etc.); advocates of medicinal cannabis research and the hemp industry seeking historical legitimacy and lineage; cannabis use among the middle-aged (the core audience for history of any kind); cannabis' emergence as a legislative hot potato; lively debate among botanists on the classification of *Cannabis sativa* ([1]); not to mention the explosion of both encyclopaedic texts and drugs-related historical source documents on the Internet. Cannabis has even evolved to have its own portal on *Wikipedia*.

Rather than retread the all-encompassing historical scope of such studies, this chapter provides a focused view of how cannabis aroused interest among pharmacists in Europe. It also provides brief reflections on the contemporary revival in research into medical applications of cannabis over the past two decades. Analogies can be drawn with today's cannabis debate: for example, European experience of far-flung cultures — the past's Napoleonic soldiers in Egypt, today's backpackers in Thailand and

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([1]) See Watts, G. (2006), 'Science commentary: cannabis confusions', in *British Medical Journal* 332: 175–176 (available at: www.bmj.com/cgi/reprint/332/7534/175.pdf).

Morocco; availability of information — the past's national botanic encyclopaedias and pharmacopoeia, today's cannabis discussion forums and online growguides.

This chapter remains historical in scope. While mentioning recent developments, it does not explore in detail current developments in medicinal cannabis. However, a short chapter has been added by John Witton, providing a summary of recent developments in medicinal cannabis.

Further reading

Histories

Abel, E. L. (1980), *Marihuana: the first twelve thousand years*, Plenum Press, New York
    www.druglibrary.org/Schaffer/hemp/history/first12000/abel.htm
Allegret, S. (2006), 'Histoire du chanvre', in P. Boulloc (ed.), *Le Chanvre industriel — production et utilisation*, Editions France agricole, Paris.
Booth, M. (2003), *Cannabis: a history*, Doubleday, London.
Green, J. (2002), *Cannabis*, Pavilion, London.
Grinspoon, L., Bakalar, J. B. (1993), *Marihuana, the forbidden medicine*, Yale University Press, New Haven.
Rätsch, C. (2001), *Marijuana medicine: a world tour of the healing and visionary powers of cannabis*, Healing Arts Press, Rochester.
Russo, E. (2007), 'History of cannabis and its preparations in saga, science, and sobriquet', *Chemistry and Biodiversity,* 4: 1614–1646.
Sloman, L. (1998), *Reefer madness: a history of marijuana*, St. Martin's Press, New York.
Zuardi, A. (2006), 'History of cannabis as a medicine: a review', *Revista Brasileira de Psiquiatría*, 28: 153–157.

For primary historical materials, a bibliography of historical mentions of cannabis was compiled in 1951 in two volumes of the United Nations' *Bulletin on Narcotics* ([2]).
See also the grey literature list in the Appendix to Volume 1 of this monograph (p. 300).

([2]) United Nations (1951), Bulletin on narcotic drugs (available at: www.unodc.org/unodc/en/bulletin/ bulletin_1951-01-01_1_page007.html (accessed 11 October 2007)).

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Cannabis as medicine in Europe in the 19th century

Manfred Fankhauser

As in the previous centuries, hemp was predominantly used in the 19th century as a fibre material. Herbal cannabis played a marginal role as a medicinal plant, although its seeds were used medicinally, mostly in the form of pressed oils or hemp milk as medicine against gonorrhoea or cystitis. In tandem with prevailing interest in plants, products and culture from the Orient, medicinal use of cannabis arrived in Europe from the East during the 18th century.

Much has been written on the historical knowledge in Europe of the psychoactive properties of hemp prior to the 18th century: among readers of Herodotus' description of Scythian cannabis-incensed burial rites; by alchemists, in particular the herb *Pantagruelion* lauded by author François Rabelais; via knowledge of Islamic medicine via al-Andalus, and elsewhere (Bennett et al., 1995; Booth, 2003; Mercuri et al., 2002). However, widespread scientific writings on its psychoactive properties came later. For example, Gmelin wrote in 1777 of the Eastern use of *bhang* for stupefying ('etwas Betaeubendes'), mind-clouding ('Benebelung des Verstandes') and intoxicating effects (Fankhauser, 2002); and in 1786 the Comte d'Angiviller thanked a certain Boulogne for his sending of Indian hemp plants with the prophetic words '*Cette plante sera peut-être un présent intéressant pour l'Europe*'. At the end of the 18th century, the French naturalist Sonnerat informed Lamarck's 1873 *Encyclopédique de botanique* of *Cannabis indica* (Emboden, 1974) and brought Indian hemp home to France after a journey to the Orient. Napoleonic campaigns in Egypt and the Near East introduced colonial troops — notably the scientists Silvestre de Sacy, Rouyer and Desgenettes — to hashish (Abel, 1980; Booth, 2003).

European interest in this 'new', or rather rediscovered, plant grew only hesitantly. The first comprehensive description of the medical usefulness of Indian hemp in Europe was written in 1830 by the German pharmacist and botanist Friedrich Ludwig Nees von Esenbeck. Until that point in time, use of hemp for medical purposes had remained at a low level. This situation changed significantly prior to the middle of the 19th century. William B. O'Shaughnessy (1809–1889/90), an Irish medical doctor stationed in Calcutta, India, published in 1839 a comprehensive study on Indian hemp. Thanks mainly to his *On the Preparations of the Indian Hemp or Gunjah*, *Cannabis indica* now also became recognised within European-school medicine. O'Shaugnessy used various hemp compounds in his investigations, partly with great success, against the following indications: rheumatism, rabies, cholera, tetanus, convulsions and delirium tremens. With hashish he had found a well-suited medicine to give his patients relief, and in the

case of cramps, even total disappearance of symptoms. For concluding remarks, he wrote: 'The presented cases are a summary of my experience with cannabis indica, and I believe that this medicine is an anticonvulsivum of great value' (O'Shaughnessy, 1839).

Europe reacted promptly to this new knowledge from India. This is not surprising as until then no adequate treatment existed against recognised diseases such as rabies, cholera or tetanus. Great hopes were based on O'Shaughnessy's results. The French were the first to engage themselves intensively with the plant. As early as 1840, the French medical doctor Louis Aubert-Roche (1809–1874), who resided in Egypt, used hashish seemingly successfully against pestilence (Hirsch, 1884–1886). Nearly simultaneously, his compatriot and friend, the psychiatrist Jaques Joseph Moreau de Tours (1804–1884), began to experiment with hashish. He started out with experimenting upon doves and hares, giving them large doses of hashish extracts with their fodder. Then he tested hashish on friends, colleagues, patients and himself. He was convinced that hashish was the supreme medicament for use in psychiatry. His book, *Du Hachich et de l'aliénation mentale* (1845), caused a great sensation at the time, and is still understood as the origin of experimental psychiatry and psychopharmacology (Weber, 1971).

The works of Moreau de Tours had an impact not only in medical circles, but also among writers and artists. The poet Théophile Gauthier (1811–1872), for instance, received hashish samples from Moreau de Tours. In 1843 he described extensively a self-experienced hashish intoxication in the Paris newspaper *La Presse* under the title 'Le Club des Hachichins'. The club of hashish eaters, of which Gauthier was one of the founders, had regular meetings in Hôtel Pimodan on the Seine island of St Louis. He and Charles Baudelaire (1821–1867) shared a penthouse in the hotel for several years. Other prominent club members were Alexandre Dumas (1802–1870) and Honoré Daumier (1808–1879) (Moreau, 1904). Further well-known contemporaries such as Honoré de Balzac (1799–1850), Gustave Flaubert (1821–1880) and Victor Hugo (1802–1885) participated occasionally (Behr, 1982).

Inspired by Moreau de Tours and later by pharmacy professor Eugène Soubeiran (1797–1859), the pharmacist Edmond de Courtive published in 1848 his widely noted dissertation, *Haschish*. In addition to chemical analysis, he carried out self-experiments with miscellaneous hashish compounds and gave exact descriptions of their physical and psychic effects (De Courtive, 1848).

Many medical doctors took advantage of the promising results of the pioneers O'Shaughnessy, Aubert-Roche and Moreau de Tours and used these new drugs for therapeutic purposes. Initially, primarily doctors from the colonial powers of England and France showed interest in the use of compounds made of Indian hemp. The necessary commodities or compounds were imported in great quantities to Europe from the colonies, especially from India (Smith and Smith, 1847). Hemp was in this period sold to Europe primarily in three commercial variations:

- *Ganjah*: consists solely of the blooming tips of the female, carefully cultivated plant. Mostly 24 blooming tips are bundled in a length of approximately 1 m, and 11 cm thickness.
- *Charras*: consists of the resin, which is extracted foremost from the blossom, but also from leaves and stalks of the female plant. Today, the extracted resin is called hashish.
- *Bhang*: extracted from the leafless stalks of the female hemp plant. Bhang was predominantly exported to Europe in powder form.

In Europe *ganjah* was the first to be pharmaceutically exploited. Initially, the fields of application known to O'Shaughnessy were adopted. Later on, the therapeutic application of hashish was considerably extended. In particular, the English and French medics applied this new wonder drug against tetanus (Martius, 1844). Encouraged by many positive reports, especially from England, the Bulgarian medic Basilus Beron intensively engaged in this problem in a dissertation. His work concludes:

> I was so contented that, after having used almost all known antitetanic drugs without result, the sick person that had been assigned to me was totally cured after use of the Indian hemp (...) wherefore the Indian hemp is strongly recommended against tetanus.
>
> (Beron, 1852)

Homeopathy, founded by Samuel Hahnemann (1755–1843) and rapidly advancing in this period, was also quick to include Indian hemp in its medical catalogue. Towards the middle of the 19th century, in addition to the illnesses already mentioned, Indian hemp was mainly used against neuralgia and other pains, chorea, hysteria, insanity, haemorrhage and insomnia. Since prepared products did not yet exist, cannabis extracts and tinctures were mostly used.

The real success story of cannabis as a medicine began in the second half of the 19th century after the publication of Beron's dissertation in 1852. In the same year, Franz von Kobylanski published a dissertation on the effect of cannabis as an oxytocic (1852). Four years later, the German Georg Martius wrote his comprehensive work *Pharmakognostisch-chemische Studien über den Hanf*, which attracted much attention. Interest was also aroused by the experiments of the Viennese Carl Damian Ritter von Schroff (1802–1887). Martius was among the few who did not deem cannabis compounds as harmless. He wrote that:

> the Indian hemp and all its compounds show great diversity concerning the degree and type of effect according to individual differences in healthy as well as in pathological conditions. It therefore belongs to the unsafe agents, and the medic should under all circumstances use it with great care.
>
> (Von Schorff, 1858)

At the same time, Ernst Freiherr von Bibra (1806–1878) published his standard work, *Die narkotischen Genussmittel und der Mensch*. Here, he discussed hashish for over 30 pages. In addition to experiences of others, he describes a self-experiment with hashish. His concluding judgement was as follows: 'Recent experiments and experiences made on the medical effect of the hemp plant and its compounds very much point to their advantage' (von Bibra, 1855).

In this period, most European countries, as well as the USA, included Indian hemp in their national pharmacopoeia. The monographs *Herba Cannabis indicae*, *Tinctura Cannabis indicae* and *Extractum Cannabis indicae* enjoyed increased prominence, whereas *Semen/Fructus Cannabis* and *Oleum Cannabis* became more and more rare. It was first of all France and England, and to a lesser extent the USA, that significantly contributed to the definitive breakthrough of the drug into Western medicine.

The study of Indian hemp was even pursued in Germany. A comprehensive work of Bernhard Fronmüller, written in 1869, is frequently cited. He had studied the qualities of the hemp plant for a long time, and carried out cannabis experiments within the framework of 'clinical studies on the euthanising effect of the narcotic drugs' with exactly 1 000 test patients. These test patients suffered from heavy insomnia due to various illnesses. The results of his investigation were positive. Thus, he concluded in his work: 'The Indian hemp is, among the known anaesthetic drugs, the narcosis which most perfectly achieves a replacement of natural sleep, without particular repression of expulsions, without bad repercussions, without paralyses' (Fronmüller, 1869).

Well-known medical experts or pharmacologists of the time wrote more-or-less comprehensive essays on *Cannabis indica*. Some of these articles criticise the unreliability of hemp compounds. Indeed, the standardisation problem continued to be an issue for cannabis compounds until they disappeared. Kobert is one of very few who discussed the dangers of long-term consumption: 'The habitual consumption of any effective hemp compound deprives the human being and brings him to a mental institution' (Kobert, 1897).

The period 1880 to 1900 can be considered a peak in the medical use of cannabis. The use of hashish compounds had become commonplace in almost all European countries and in the USA. Nonetheless, it was still scientists from England, France, Germany and the USA who persistently continued cannabis research. It is, therefore, not a coincidence that most of the products on the market ('specialities') originated in these countries. It is first of all through the contribution of the company E. Merck of Darmstadt, Germany, that cannabis compounds became more widely used in Europe towards the end of the 19th century. One of the preferred source materials in the production of cannabis compounds in this period was *Cannabinum tannicum Merck*. In addition, the company Burroughs, Wellcome & Co. in England produced cannabis compounds. In

the USA, cannabis compounds were manufactured by Squibb and sons in New York ('Chlorodyne and Corn Collodium'), and, later, Parke-Davis & Co. in Detroit ('Utroval' and 'Casadein') and Eli Lilly ('Dr Brown's Sedative Tablets', 'Neurosine' and 'The One Day Cough Cure'). These companies delivered sufficient quantities of high-quality raw materials and produced compounds for the market. Probably the most-used hemp compound was the sleeping pill *Bromidia*, of the American company Battle & Co. This was a combined drug, that is, in addition to cannabis extract it contained bromine potassium, chloral hydrate and henbane. While single compounds dominated during the 19th century, combination compounds were preferred in the 20th century. Most cannabis drugs were for internal use, but there existed topical compounds, for instance, creams or the common clavus tinctures.

In the meantime, France continued its 50-year tradition and honoured medical doctors and pharmacists with doctoral degrees based upon works on hashish. In 1891 Georges Meurisse (born 1864) published his work *Le Haschich*, and five years later *Le chanvre indien* by Hastings Burroughs (born 1853) appeared. The latter is strongly based on Villard's work, but also upon his own therapeutic experiments. He summarises: 'In therapeutic doses, the Indian hemp is safe and would deserve to be more frequently used' (Burroughs, 1896).

In Germany, the PhD students H. Zeitler ('On Cannabis indica', 1885) and M. Starck ('How to apply the new cannabis compounds', 1887) first wrote their graduation dissertations, before the pharmacist Leib Lapin in 1894 published his dissertation, 'A contribution to the knowledge of *Cannabis indica*', under the guidance of the leading figures Johan Georg Dragendorff (1836–1898) and Rudolf Kobert (1854–1918). In the first part of his work, he gives an overview of 'common, manufactured and officinal hemp compounds' in use at the time. In the second part he describes the pharmacology of 'cannabindon', a cannabis derivate first studied by him. In the preamble of his investigation, he makes a remark which shows the uncertainty that existed regarding the medical safety of Indian hemp:

> Had it been so simple to solve the hashish question, it would certainly have been solved by one of the numerous previous investigators. I believe that I have contributed to the definitive resolution, and this belief gives me the courage to publish the following as a dissertation.
> (Lapin, 1894)

A scientific contribution of extraordinary importance within the cannabis research of the 19th century was the so-called *Indian Hemp Report* of 1894. This census, carried out by Great Britain in its colony India, primarily studied the extraction of drugs from cannabis, the trade in these drugs and the implications for the total population. Additionally, the study set out to clarify whether prohibition of the compounds might be justified, and an expert commission was established for this purpose. Its report impressively shows the significance of the stimulant and drug cannabis in India towards the end of the 19th

century. The main conclusion of the commission was: 'Based upon the effects of the hemp drugs, the commission does not find it necessary to forbid the growing of hemp, nor the production of hemp drugs and their distribution' (Leonhardt, 1970).

Towards the 20th century, Indian hemp enjoyed an important position in the *materia medica* of Western medicine. Evidence of misuse of cannabis compounds was practically non-existent until then. Kunkel writes:

> The chronical misuse of cannabis compounds — cannabism — is believed to be widespread in Asia and Africa. It results in chronic, heavy disruption of the entire organism, especially mental disorder — attacks of raving madness and a subsequent condition of weakness. It is not observed in Europe, Indian doctors report however daily frequent cases of this disease.
>
> (Kunkel, 1899)

To sum up, hashish played a significant role as a medicine in Europe and in the USA towards the end of the 19th century. The most important applications were against pain, especially migraine and dysmenorrhoea, pertussis, asthma and insomnia. Additionally, hashish was relatively frequently used as an additive in clavus supplements. Rare applications were stomach ache, depressions, diarrhoea, diminished appetite, pruritus, haemorrhage, Basedow syndrome and malaria. Cannabis compounds were also used in numerous single cases, partly with good results. These were, however, of smaller significance.

Typically, doctors who worked intensively with cannabis drugs for years would classify them as valuable medicines. Others criticised them, and frequently looked upon them as worthless or even dangerous. However, both groups agreed on the unpredictable effect of cannabis compounds.

After keen use of cannabis compounds around the turn of the century, they disappeared completely in the middle of the 20th century. The main reasons for the disappearance of hashish medicaments are medical developments. Even before the 20th century, new, specific medicines were introduced for all main applications of cannabis compounds. Vaccines were developed for the treatment of infectious diseases (cholera, tetanus, etc.), which not only fought the symptoms as cannabis did, but also gave protection against infections. Other bacterial illnesses, such as gonorrhoea, that were frequently treated with cannabis could somewhat later be treated successfully with chemotherapeutica. *Cannabis indica* received competition as a sleeping and tranquillising drug in the form of chemical substances such as chloral hydrate or barbiturate. Contrary to the numerous opium drugs, cannabis compounds were also replaced as analgesics by chemical substances. In this area, aspirin achieved great importance shortly after its introduction in 1899.

Another reason for the decline of cannabis as medicine was pharmaceutical instability. The varying effectiveness of the hashish compounds has often been noted. Very different factors, such as origin, age, storage and galenic preparation, affected effectiveness of the medicine. Unlike, for instance, alkaloid drugs such as opium, the isolation of active ingredients was not successful until the middle of the 20th century. This resulted in standardisation problems. There were also legal constraints. The use of cannabis compounds became more and more restricted in international and national law. Hashish compounds were defined as anaesthetics some time in the 20th century. This complicated their use enormously, until finally a general ban made it impossible to apply them.

Finally, economic aspects contributed to the decline in use of medical cannabis. Import into Europe of high-quality Indian hemp became more and more difficult due to constraints in the producing countries (mainly India) and the influences of the two world wars. Laws of supply and demand also applied to cannabis, resulting in a massive price increase for raw materials (e.g. herba Cannabis indicae) as well as for compounds (e.g. extractum Cannabis indicae).

Cannabis as medicine — the contemporary situation

As already mentioned, hemp compounds were still frequently used at the beginning of the 20th century, and scientific research on the plant was promoted. However, its standing declined rapidly, and towards the middle of the 20th century cannabis as a medicine gradually faded into insignificance. Finally, the use of cannabis was prohibited worldwide through international agreements.

In particular, use of cannabis as a medicine was made impossible by the Convention on Narcotic Drugs of 1961 (see Ballotta et al., this monograph). Only lately have individual countries begun to stretch the application of this regime, as in Holland, where since September 2003 cannabis can be bought in pharmacies on prescription. In specific cases, cannabis can be used as medicine in Canada and in some US states without sanctions against the patients. In Canada, the cannabis medicine *Sativex* as a spray was licensed for treatment of neuropathic pain for multiple sclerosis patients in April 2005. Until then, only the two cannabinoids, THC and Nabilon, had been legally traded since the 1960s (IACM-News, 2005). Other European countries, such as the United Kingdom, Spain, and more recently Switzerland and Italy, have for some time undertaken efforts to explore possible benefits of cannabis for medical purposes (see Witton, this monograph).

In spite of the ban on cannabis, research on the medical effects of this ancient drug plant has not stood still. In many countries, scientific work with cannabis was and is allowed. The discovery of Δ^9-tetrahydrocannabinols (THCs) in 1964 and the cannabinoid

receptors (CBs) in 1988 are important milestones in cannabis research. Four years later, the existence of endocannabinoids was proven, that is substances produced by the human body that function as agonists to cannabinoid receptors. Presently, the first selectively working CB1 receptor antagonist rimonabant is being clinically tested (phase III). It seems that this receptor may be used against overweight and metabolic risk factors, as well as with tobacco withdrawal (Heinzl, 2005).

Since the cannabinoid system was discovered, agents that make use of the therapeutic effects of the cannabinoids have been intensively searched for, thereby avoiding the psychotropic side-effects. Just in the years following the discovery and investigation of the chemical structure of THCs until 1986, approximately 6 000 scientific studies of the chemistry, pharmacology, clinical properties and metabolism of the THCs have been published (Mechoulam, 1986). During the last 20 years, research on the hemp plant has intensified. It is hardly possible to provide an overview the abundance of data and scientific publications. Presently, various clinical studies of the effects of hemp on certain illnesses are being undertaken.

A summary of research focal points and possible fields of cannabis application is given below. According to Grotenhermen (2004), therapeutic effects of cannabis or segregated THC (or dronabinol) may, based on current science, be divided as follows:

1 Established effect: nausea and vomiting, anorexia and loss of weight.
2 Relatively well-proven effect: spasms, pain conditions, movement disturbances, asthma, glaucoma.
3 Unproven effect: allergies, itchiness, inflammations and infections, epilepsy, depressions, and anxiety disturbances.
4 Basic research: auto-resistant diseases, cancer, neuroprotection, fever and blood pressure disturbances.

As previously mentioned, some of these applications had already been in use for a long time based on experience. Interestingly, long-proven indications have more recently been scientifically documented. In spite of the ban on cannabis, it is frequently used by patients in the form of tea or tinctures and sometimes recommended by medical doctors against the law. In practical terms, some multiple sclerosis patients successfully use cannabis as an antispastic, and some migraine patients frequently use it as a pain reliever.

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Chapter 2
The re-emergence of the therapeutic use of cannabis products: recent developments and future prospects

Setting the context

The previous chapter looked at the history of medicinal use of cannabis. It is interesting to consider that, a century ago, the patent medicine J. Collis Browne's *Chlorodyne* (a mixture of laudanum, tincture of cannabis, and chloroform) could be purchased at chemists and was marketed as 'the most wonderful and remarkable remedy ever discovered' [1]. Yet historical anecdotes about medicinal use of cannabis are gradually being displaced by a wealth of international research on cannabinoids and their role in therapeutics. This brief chapter — which may be perceived as a postscript to the previous one — provides a summary of recent developments in medicinal cannabis.

Researchers in this area are highly productive, and so this chapter is likely to suffer from almost instant obsolescence. Nonetheless, the chapter reveals that, at the time of writing in late 2007, there are relatively few cannabis-derived medicines that have received regulatory approval. Forecasts dating from the early 2000s that cannabinoids may become the new blockbuster branch of the pharmaceutical industry seem to be premature. Yet a recent market report by Visiongain [2] remains upbeat, valuing the global cannabis medicines market at USD 700 million. Besides interest from the pharmaceutical industry, there is an increasing body of research on 'self-medication' using herbal cannabis. The knowledge base is increasing, following relaxation of legislation relating to medicinal use of cannabis in some US states and the Netherlands, together with grassroots organisations focusing on medicinal use of herbal cannabis in Canada and several European countries.

[1]   Advertisement for J. Collis Browne's Chlorodyne, 1891.
[2]   www.visiongainintelligence.com/reportDetail.aspx?reportId=1359

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See also the grey literature list in the Appendix to Volume 1 of this monograph (p. 300).

The re-emergence of the therapeutic use of cannabis products: recent developments and future prospects

John Witton

The past two decades have seen renewed and concerted interest in the therapeutic potential of cannabis. Tetrahydrocannabinol (THC), the active and most significant constituent of cannabis, and other closely related compounds were identified in the 1960s. However, it was not until the mid-1980s and 1990s that research accelerated, when understanding increased of the biology of the body's endocannabinoid system and how cannabis works on the brain. These discoveries opened up possibilities to exploit cannabis-based products for medical use. This renewed scientific interest in the cannabinoids is evidenced by (i) the increase in the number of research papers on the biology of cannabinoids, from 200–300 per year through the 1970s to nearly 6 000 in 2004, and (ii) the number of cannabinoid drugs under pharmaceutical development, rising from 2 in 1995 to 27 in 2004 (Pacher et al., 2006).

The identification of a natural cannabinoid receptor–neuromodulator system in the body was the key to pharmacological and therapeutic developments. Receptors are the sites of action for brain chemicals, called neurotransmitters, and often the sites of action of drugs. Binding of the neurotransmitter or drug to the brain cell receptor causes a response in the cell. Two cannabis receptors (termed CB1 and CB2) have been found (Pertwee, 1997). CB1 receptors are distributed in discrete areas of the brain, particularly concentrated in the hippocampus and cerebral cortex (areas concerned with memory and cognition), olfactory areas, basal ganglia and cerebellum (areas concerned with motor activity and posture control) and the spinal cord. CB2 receptors are found peripherally and are closely linked with cells in the immune system (Kumar et al., 2001). With the discovery of cannabis receptors it became possible to develop cannabinoid agonists or antagonists — that is, agents that activate or bind but do not activate the receptors — that might act as therapeutic tools or help determine the roles of the cannabinoid receptors and the body's own endogenous cannabinoids (British Medical Association, 1997). Two major endocannabinoids have been identified and isolated: anandamide and 2-arachidonoyl glycerol. This endogenous cannabinoid system is

involved in analgesia, cognition, memory, locomotor activity, appetite, vomiting and immune control (Kumar et al., 2001).

As the structure–activity relationships of the cannabis receptors and endocannabinoid system unfolded, the potential for cannabis-based medicines became clearer. But in a review of these developments, a leading neuropharmacologist, Professor Leslie Iversen, suggested that pharmaceutical companies faced a range of substantial obstacles in developing cannabis-based medications. These obstacles were: development costs would be high; only synthetic cannabinoids could be patented rather than the natural product; products would be likely to be niche drugs rather than 'blockbuster' drugs used to treat common health problems; there were already medicines available to treat the problems that cannabinoids might be used for; and finally, the vast US marketplace would be difficult to enter, with the US having strict regulatory requirements to introduce a drug that is derived from or chemically related to a prohibited substance (Iversen, 2003).

Over the last 30 years, widely reported use of illicitly smoked cannabis for self-medication for a range of illnesses has brought normally law-abiding citizens into conflict with their country's legal system. Surveys have found that the common indications for cannabis use include depression, multiple sclerosis, pain, migraine, asthma and cancer-related anorexia/cachexia (Schnelle et al., 1999; Gorter et al., 2005). The ethical dilemmas surrounding this issue were among the factors that led to a number of enquiries examining the therapeutic potential of cannabis products. The British Medical Association's 1997 report *Therapeutic Uses of Cannabis* and the 1998 report *Cannabis: the Scientific and Medical Evidence* from a Select Committee of the House of Lords both called for the setting up of clinical trials to evaluate the potential therapeutic use of cannabinoids. The prestigious US Institute of Medicine published its report *Medical Use of Marijuana* in 1999. Together, these reports established the evidence base to support the further examination of cannabis products for medical use. Medical and political interest intensified in several European countries and the medical use of cannabis was legalised in the Netherlands in 2003 (Grotenhermen and Russo, 2002; Gorter et al., 2005) and extended for a five-year period in 2007.

Naturally, cannabis products are subject to the same rigorous clinical testing and regulatory processes as any other potential medicine. Clinical trials for new medications normally follow three phases. In phase I the safety of the drug is established. In phase II the efficacy of the drug is established through giving the medication to a small group of potential patients who have the condition targeted by the medication. Finally, phase III trials use large studies involving hundreds of patients.

Two synthetic cannabinoid receptor agonists, dronabinol and nabilone, have already passed these stringent tests. They have been available and approved for medical use since the 1980s. However, neither has been widely prescribed. The effective dose for these cannabinoids is close to a dose that causes sedation or intoxication, limiting the amount of the drug that can be given to patients (Iversen, 2000). Moreover, their therapeutic potential has been superseded by more powerful medications.

Dronabinol is the non-proprietary name for tetrahydrocannabinol. Marinol capsules containing dronabinol were approved for use by the US Food and Drug administration for nausea and vomiting associated with cancer chemotherapy for patients who had not responded to conventional antiemetic medications. Marinol was also approved for use in anorexia associated with weight loss in patients with AIDS. Dronabinol is also available on prescription in a number of countries outside the USA. Dronabinol is manufactured by two German companies, THC Pharm and Delta 9 Pharma, and may be bought by pharmacies to produce dronabinol capsules or solutions. The second cannabinoid receptor agonist, nabilone, a synthetic derivative of dronabinol, was also approved by the FDA in 1986 for use in treatment of nausea and vomiting associated with chemotherapy. It is delivered in the form of Cesamet capsules. Nabilone was originally developed by Eli Lilly in the USA but was not marketed there, but is available in the UK and other European countries.

Two more cannabis-related drugs have become available more recently. The British biotech firm GW Pharmaceuticals has developed Sativex, a cannabis plant extract, consisting of equal amounts of dronabinol (THC) and cannabidiol, another important cannabinoid. Sativex is delivered as an oral spray. Using a spray for delivery provides a consistent quality to the medication and enables doctors to set standard dosages. The spray technique also avoids the carcinogenic smoke normally associated with cannabis use. It also allows for flexible dosing, important when people with MS experience variable amounts of pain.

In 2005 Sativex received approval as an adjunctive treatment for the relief of symptomatic pain related to muscular sclerosis in Canada through the governmental Health Canada's Notice of Compliance with Conditions policy. This policy is applied to products which Health Canada considers as addressing a serious medical condition for which there are no currently approved products and where data from clinical trials to date appear to be promising. The condition to be satisfied is a need for confirmatory phase II study to further verify the clinical benefit of the product. In June 2007 Sativex was approved by the Canadian regulatory authority for use in cancer-related pain. More recently, GW has reached an agreement with the Japanese pharmaceutical firm Otsuka to develop and market Sativex in the USA, where it will be initially trialled for cancer pain.

In Europe, in November 2005 Sativex and the Catalan Health Authority reached agreement to supply Sativex to up to 600 patients suffering from multiple sclerosis under a compassionate access programme. Initial results from a patient study suggested that 65% of the patients had experienced an improvement in quality of life and a decrease in pain. In the UK, the Home Office permitted the prescription of Sativex to individual patients as an unlicensed medicine. Thus, Sativex can be supplied on a named patient basis from the drug's manufacturing site and dispensed by local pharmacies to patients. At the time of writing (end of 2007), Sativex is awaiting approval as a prescription drug for multiple sclerosis in Spain, Denmark and the Netherlands.

The second new drug, the cannabinoid receptor antagonist rimonabant, received a positive recommendation for approval by the European Medicines Agency in 2006. Available in the United Kingdom for the treatment of obesity under the name Acomplia, a Cochrane review found rimonabant use with diet and exercise led to modest weight loss at one year follow-up in the four studies under review. However the review authors suggested caution in interpreting the results of their review because of methodological shortcomings in the studies reviewed, high drop-out rates among participants and the need for longer term follow-up (Curioni and André, 2007). In the USA, rimonabant (planned to be marketed under the name Zimulti) was rejected by the Food and Drug Administration in June 2007. The FDA cited concerns on side-effects such as depression, anxiety and sleep problems when taking the drug.

Another cannabis-related product under investigation in clinical trials is Cannador, containing dronabinol and other cannabinoids. Studies have examined Cannador's value in treating spasticity and other symptoms related to multiple sclerosis and post-operative pain (Holdcroft et al., 2006; Zajicek et al., 2006). Further trials with Cannador have been undertaken at the Institute for Clinical Research in Berlin. There has been some interest in investigating the potential of cannabidiol as an antipsychotic (Zuardi et al., 2006).

Away from pharmaceutical cannabis-related preparations, the use of its natural form for medicinal purposes has also progressed recently. While cannabis remains illegal under federal law in the US, 13 states have made available the medical use of cannabis under their state laws. The latest to legalise medical use of cannabis is New Mexico, where 1742 patients are authorised to possess dried cannabis as a medication. 1040 are licensed to grow their own cannabis and 167 people are licensed to grow cannabis for the use of authorised patients. Here the state's health ministry buys the cannabis from these licensed growers and sells it on to the patient.

In terms of very recent developments, in Finland the Ministry of Social Affairs and Health in December 2007 sought to clarify legislation on prescribing cannabis to sufferers of chronic pain, based on the implications of a test case involving an individual who had obtained special permission from the ministry for using cannabis for pain relief. A Canadian pharmaceutical research company called Cannasat Therapeutics is developing three candidate medicines, named CAT 210, CAT 310 and CAT 320, for which it forecast Phase II testing for the lead candidate, CAT 310, 'by the end of 2008'. In late 2007, a Dutch company called Echo Pharmaceuticals, based in Weesp, announced funding aimed at developing a cannabis-based pill called Namisol, targeting numerous therapeutic applications. The company is partnering with the cannabis grower Bedrocan, as well as the companies Farmalyse and Feyecon, to develop a pill.

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Chapter 3
The pharmacology of cannabis: issues for understanding its use

Setting the context

To understand cannabis, it is helpful to have a knowledge of the pharmacology of the drug. What are the psychoactive effects of the substance, and what physical and neurological changes are brought about by the product? What can be said about the varying effects of dosage, route of administration, the type of product (herb, resin, oil), and the use environment?

Scientific knowledge about the pharmacology of cannabis has seen substantial progress in the last three decades. In addition to substantial work in neuroscience, cannabinoid research accelerated following the discoveries in the late 1980s of cannabinoid-like chemicals produced by the body, known as 'endocannabinoids'.

As with much science, much of the literature on cannabis is technically challenging, especially for those approaching drugs from disciplines such as sociology and political science. In addition, there is a glut of information in the scientific journals: a Medline search on 'cannabis pharmacology' reveals over 3 500 articles, and many more are published each month. Meanwhile, users seeking to explore the science of cannabis are likely, sooner or later, to encounter disinformation and inaccuracy. User reports are by nature subjective, and growshop information is compromised by the incentive to sell. Pro-cannabis lobbying information is skewed towards innocuous and euphoric effects or favourable comparisons with alcohol. Prohibitionist literature emphasises the risks of cannabis smoking without placing sufficient emphasis on the sought-after effects of cannabis.

Fortunately, help is at hand for those first approaching the subject. A number of initiatives have sought to provide information that is simultaneously accurate and

Table 1: Summary of the effects of cannabinoids	
System	Effect
Central nervous system (CNS)	
Psychological effects	Euphoria, dysphoria, anxiety, depersonalisation, aggravation of psychotic states
Effects on perception	Heightened sensory perception, distortion of space and time sense, misperceptions, hallucinations
Sedative effects	Generalised CNS depression, drowsiness, sleep, additive effect with other CNS depressants
Effects on cognition and psychomotor performance	Fragmentation of thoughts, mental clouding, memory impairment, global impairment of performance
Effects on motor function	Increased motor activity followed by inertia and uncoordination, ataxia, dysarthria, tremulousness, weakness and muscle twitching
Analgesic effects	Similar in efficacy to codeine
Antiemetic effects	In acute doses, effect reversed with larger doses or chronic use, increased appetite
Tolerance	To most behavioural and somatic effects, including the 'high' with chronic use
Dependence, abstinence syndrome	Rarely observed but has been produced experimentally following prolonged intoxication or administration of antagonists
Cardiorespiratory system	
Heart rate	Increased with acute dosage, decreased with chronic use
Peripheral circulation	Vasodilation, conjuctival redness and postural hypotension
Cardiac output	Increased output and myocardial oxygen demand
Cerebral blood flow	Increased in the short term and decreased with chronic use
Breathing	Small doses stimulate, larger doses depress coughing but tolerance develops
Airways obstruction	Due to chronic smoking
Eye	Decreased intraocular pressure
Immune system	Impaired activity of bactericidal macrophages in lung and spleen
Reproductive system	Decreased sperm count and sperm motility in males, suppression of ovulation, complex effects on prolactin secretion, increased obstetric risks

Source: R. Kumar, W. Chambers, R. Pertwee (2001), 'Pharmacological actions and therapeutic uses of cannabis and cannabinoids', *Anaesthesia* 56(11): 1059–1068.

accessible, and valuable publications exist for a variety of audiences (see *Further reading*, below). One of the products of a more didactic approach is the simplified summary above by Kumar et al., republished in a number of government monographs since its first appearance in 2001 (Table 1). The chapter that follows, by a leading authority based at Trinity College Dublin, provides a short summary of what is known to date about the pharmacology of cannabis. A glossary is provided to assist non-specialists.

Further reading

Handbooks for research scientists

Di Marzo, V. (ed.) (2004), *Cannabinoids*, Kluwer Academic/Plenum Publishers, New York.
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Reviews for practitioners and clinicians

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See also the grey literature list in the Appendix to Volume 1 of this monograph (p. 300).

The pharmacology of cannabis: issues for understanding its use

Desmond Corrigan

Abstract

The drug products obtained from the plant *Cannabis sativa* contain many different chemicals. The most active are the phytocannabinoids, such as THC, which exert their psychoactive effects by binding to specific receptors within the brain and other parts of the body. The existence of a complex endocannabinoid system within humans and other animals and the interaction between the phytocannabinoids and this system explains many of the rewarding, dependence-producing effects of cannabis drugs as well as their influence on movement, coordination, reactions, memory and learning, especially since the brain regions implicated in these effects are richest in cannabinoid receptors. Cannabinoids are highly fat-soluble and their metabolism and slow excretion from the body distinguishes them from other drugs, such as alcohol. The slow elimination of THC explains the low intensity of withdrawal symptoms and also why urine tests following consumption test positive for cannabinoids for much longer than for most other psychoactive drugs (up to two weeks).

Cannabis drugs

The plant *Cannabis sativa L.* is the source of a number of drug products. While herbal cannabis (or marijuana) consists of dried plant parts, the main ingredient in cannabis resin (or hashish) is the resin secreted by the glandular hairs found all over the plant but mainly around the flowers. In addition to these two kinds of preparation, which have been used since time immemorial, hashish oil is extracted by use of a solvent (e.g. acetone) and evaporated. In addition, the cannabis plant can be used as a source of hemp fibres, as well as hemp seeds and fatty oil.

The flowering tops and leaves of the plant *Cannabis sativa* secrete a resin containing about 60 terpenophenolic compounds which are called cannabinoids, to distinguish the plant compounds from the endogenously occurring *endocannabinoids* found in most animals, especially humans. The highest amount of cannabinoids has been found in the flowering tops, followed by the leaves, whereas only small amounts are found in the stem and roots. While for many years herbal cannabis typically showed a lower cannabinoid content than preparations (resin and oil), innovation in cultivation techniques, pruning and seed selection have enabled marijuana growers to match or exceed the potency of resin (see King, this monograph).

Glossary

Endocannabinoids	Cannabinoids produced by the body, such as anandamide.
Free radical	An atom or group of atoms with at least one unpaired electron; in the body it is usually an oxygen molecule that has lost an electron and will stabilise itself by stealing an electron from a nearby molecule.
Ganglia (singular: ganglion)	Tissue mass which provides relay points and connections between different neurological structures in the body, such as the central nervous system.
Neurones	Nerve cells found in the brain, spinal cord and peripheral nerves. They communicate with one another using a complex of chemical and electrical signals.
Neurotransmitters	Chemicals which are used by neurones to communicate or signal to one another. Examples include dopamine and serotonin.
Phagocytosis	The ability of certain white blood cells (leucocytes), especially macrophages, to scavenge foreign material (especially bacteria) within the body as a first-line defence against infection.
Pharmacodynamic effects	What the drug does to the body, its organs, tissues and cells.
Pharmacokinetics	What the body does to the drug, that is, the speed at which it is absorbed into the bloodstream, transported to the site of action, metabolised and excreted from the body.
Phytochemical	A chemical compound containing carbon, hydrogen, oxygen and sometimes nitrogen produced by plants. Some are ubiquitous, such as starch. Some are pharmacologically active, such as morphine. Some are restricted to just one plant species, for example tetrahydrocannabinol in cannabis.
Receptors	Drugs act by binding to specific proteins located on the surface of cells. Once bound they can elicit a response (agonist effect) by causing an electrical impulse to be generated or the release of a signalling chemical within the cell. Sometimes drugs can prevent a response from the receptor, that is, act as an antagonist.
T lymphocyte	A small lymphocyte developed in the thymus; it orchestrates the immune system's response to infected or malignant cells.

Phytocannabinoids

The main cannabinoid is Δ^9–tetrahydrocannabinol (THC), which is recognised as the major psychoactive euphoriant responsible for the characteristic intoxication ('high') which follows the smoking or ingestion of cannabis. High THC doses produce hallucinogenic effects. In addition to THC, several less potent metabolites and related compounds, such as the also psychoactive Δ^8-THC and cannabinol are found in the cannabis plant. Another major compound is cannabidiol (CBD), which has antagonistic effects to THC because it is a sedative compound. The ratio of THC to CBD in the plant is significant in terms of psychoactivity and is genetically determined.

A number of chemotypes exist within cannabis. These are plants which are visually and botanically identical but which are chemically dissimilar. One type referred to as the fibre- or hemp-type contains predominantly CBD and only trace amounts of THC (less than 0.3% THC according to Commission Regulation (EC no. 327/2002)). Conversely, drug-type plants produce predominantly THC with trace quantities of CBD. The issue is further complicated by the existence of an intermediate plant which contains approximately equal amounts of both THC and CBD. The concentrations of these and other cannabinoids vary enormously in practice depending on plant breeding and cultivation techniques and on post-harvest handling. The question of the potency of cannabis drugs, usually expressed in terms of THC content, is dealt with in the chapter by King (this monograph, p. 239). THC is a highly unstable compound, breaking down in air and light to a number of inactive molecules, one of which, cannabinol (CBN), is commonly found in cannabis products as they age. Other relatively abundant cannabinoids include cannabigerol (CBG) and cannabichromene (CBC) but in general little is known about the biological activities of these and the remaining less frequently occurring molecules.

Most pharmacological research has focused on THC and CBD. However, while THC is responsible for many of the effects of cannabis drugs, it is important to bear in mind that THC and cannabis are not synonymous for a number of reasons.

Firstly, THC does not exist as such in the plant material but rather it is found as an acid (THCA), as is CBD. These acids (THCA and CBDA) decompose slowly during storage to the corresponding chemically neutral but pharmacologically potent THC and CBD. This conversion is speeded up by the high temperatures involved in smoking and to a lesser extent by cooking or baking the drugs. Secondly, the THC/CBD ratio can markedly alter the effects of the drugs. Thirdly, some of the non-cannabinoid compounds from the plant may modulate the pharmacological effects of the cannabinoids. Terpenoids, which are responsible for the characteristic smell of cannabis, have been postulated as influencing the effects yet experimental evidence is scarce. Some 1% by weight of the plant is composed of a mixture of 20 flavonoid compounds which are well known as

antioxidants and which also scavenge damaging free radicals. Whether the quantities which survive the pyrolysis reactions involved in smoking cannabis are sufficient for activity is unknown (Musty, 2004).

Pharmacokinetics and metabolism

The dose of THC needed to produce effects in humans ranges from 2 to 22 mg (Adams and Martin, 1996). It is estimated that only 1% of the THC content of a 'joint' is found in the brain after smoking; hence, only 2–44 µg of THC enters the brain in humans. Given the significant variation in cannabinoid content in the crude drugs and also in the weights of those crude drugs incorporated into 'joints' (Buchanan and O'Connell, 1998), there is little comparability or standardisation of dosages of THC and the other cannabinoids in practice.

THC is rapidly absorbed after inhalation of cannabis smoke and it is detectable in plasma within seconds. Between 10 and 50% of the THC in the drug reaches the bloodstream. Losses due to burning account for 30%, while sidestream smoke, incomplete absorption and retention within the cigarette ('joint') also produce significant losses. Inexperienced and infrequent smokers absorb approximately 10–14% of the available THC whereas regular users absorb double that amount, probably because their more efficient smoking technique allows them to hold the smoke longer in their lungs. For the other major cannabinoids, the amounts absorbed range from 31% for CBD to 38% for CBN.

When cannabis is smoked, the effects start within seconds, reach a peak around 20 minutes and last for two to three hours (Figure 1). In contrast, if the drug is eaten, the effects are delayed and last longer, reaching a maximum about 3–4 hours after drug ingestion, and lasting for six to eight hours (Grotenhermen, 2003). After smoking, THC is detectable in the plasma only seconds after the first puff of a cannabis cigarette, with peak plasma level being measured 3–10 minutes after the first puff. This reflects the conversion of THC to its metabolites. This metabolism takes place in the liver and involves different enzymes, some of which are inhibited by CBD, which can thus affect the metabolism of THC. THC is further metabolised to a non-psychoactive molecule, which is excreted in urine as its glucuronide, although more than 100 different metabolites of THC have been identified (Hawksworth and McArdle, 2004). Only traces of the original THC are found in urine.

Because THC is highly fat soluble (lipophilic), plasma levels of THC fall rapidly after 30 minutes. However, its many metabolites are only slowly eliminated from the body as they are stored in fatty tissues. Complete elimination may take up to five weeks. So repeated cannabis use leads to an accumulation of cannabinoids in lipid-rich tissues including

Figure 1: Distribution of THC in the body over time
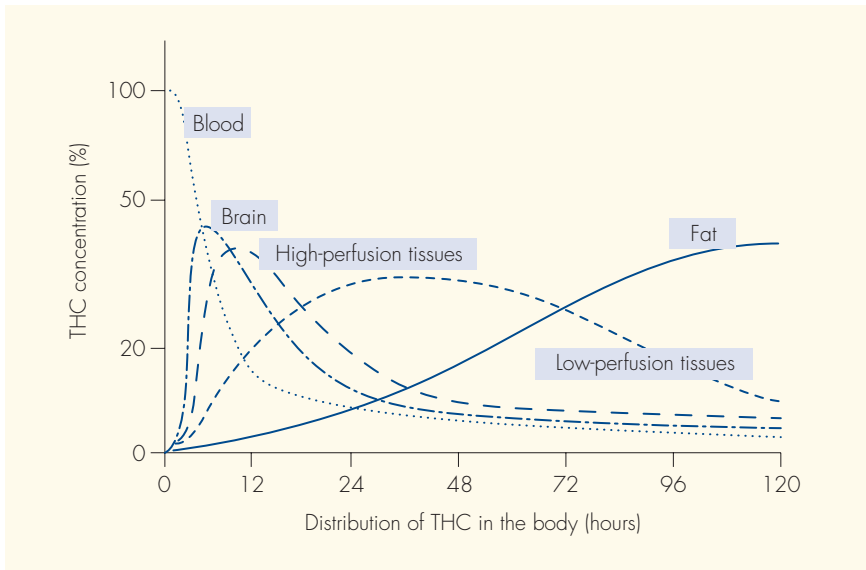
Source: Nahas (1975), quoted and commented in Ashton (2001).

the brain. THC is slowly released from fatty tissues into the bloodstream. There is, however, no simple relationship between the level of THC and its metabolites in blood and behavioural effects, such as psychomotor impairment (Agurell et al., 1986). This is because there is a delay between the subjective 'high' and THC in blood, and there are also large variations in individual psychoactive effects experienced at the same THC level in blood (see Figure 1).

The endocannabinoid system

THC and other cannabinoids act by binding to specific cannabinoid receptors found on the surface membranes of various cells located chiefly in the brain and in the immune system. Two receptors have been identified. The first cannabinoid receptor, CB1 (Matsuda et al., 1990), is expressed in the brain, in nerve cells, the reproductive system, some glandular systems and the microcirculation (Howlett et al., 2002, 2004; de Fonseca et al., 2005). The second cannabinoid receptor, CB2, is expressed in the peripheral tissues, principally in the immune system (Munro et al., 1993; Felder and Glass, 1998; Pertwee, 1999).

The discovery of these receptors — and there may be others in the body — led to the identification of a family of 'endocannabinoids'. These molecules are arachidonic acid derivates which have potent actions at the cannabinoid receptors. The discovery of

cannabinoid receptors and their endogenous ligand, the endocannabinoids, suggested the existence of an endogenous cannabinoid system. Subsequent elaboration of the biosynthesis, release, transport and degradation of these endocannabinoids within the body led to the realisation that they formed part of a new signalling system within the body termed the 'endocannabinoid system'. This has interactions with other neurotransmitters including gamma-aminobutyric acid (GABA), the opioid receptors and the dopamine system. The endogenous cannabinoid system seems to act as a neuromodulatory system, generally inhibiting the release of other neurotransmitters. CBD, on the other hand, does not bind to the CB receptors but may exert its sedating, hypnotic effects through other cannabinoid receptors which are believed, but not proven, to exist.

Cannabinoid receptors control cell differentiation in the developing brain. One of their most remarkable features is their high concentration within the brain, with densities 10–50 times greater than those of the classical neurotransmitter receptors, for example those for dopamine and opioids. CB1 receptors are expressed at particularly high densities in the cerebellum, hippocampus and in the basal ganglia (striatum, globus pallidum and substantia nigra). The presence of cannabinoid receptors in the hippocampus and the cortex suggested their involvement in the learning and memory process, whereas cannabinoids appear to mediate effects on motor activity, coordination and reactions through receptors in the basal ganglia and cerebellum. CB1 receptors are also found in the nucleus accumbens and frontal cortex, which is believed to account for the reinforcing effect of cannabinoids. Indeed, the endocannabinoid system controls the motivation for appetite stimuli, including food and drugs. Drugs of dependence tend to activate dopamine-producing nerve cells in the ventral tegmental area (VTA) and THC is no different because it increases dopamine release in the nucleus accumbens and prefrontal cortex.

The numerous investigations into the endocannabinoid receptor system and its interactions with other neuronal systems have resulted in a large body of scientific evidence which indicates that CB1 receptors, especially in the striatum, nucleus accumbens and the prefrontal cortex, mediate virtually all of the behavioural and neurochemical properties of THC and other cannabinoids. In particular, rewarding effects, tolerance and physical dependence have been ascribed to the brain endocannabinoid system and its interactions with the opioid, glutamate, GABA and especially the dopaminergic systems (Tanda and Goldberg, 2003). Gardner (2002) concluded that cannabinoids act on brain reward processes and related behaviours in ways that are remarkably similar to other addictive drugs. Studies with CB1 antagonists have shown the importance of these receptors in the whole phenomenon of craving. Ongoing studies highlight the significance of the endocannabinoid system in alcohol dependence, smoking cessation, weight loss, and self-administration of cocaine and opioids.

The CB1 receptor has also been identified in both male and female reproductive systems including the ovaries, the uterine endometrium, the testis, sperm, vas deferens and urinary bladder. Recent studies reviewed by Park et al. (2004) have demonstrated that marijuana, THC and other exogenous cannabinoids exert potent effects on the endocannabinoid system in both the gonads and during pregnancy. Current understanding indicates that endocannabinoids may be critical for embryo implantation and miscarriage.

The CB2 receptor has been detected in the spleen, tonsils and thymus gland, which are the major tissues involved in immune cell production. Cannabinoids including THC — which activate these receptors (agonists) generally — suppress the functions of lymphocytes, natural killer cells, macrophages and mast cells. Roth et al. (2002) summarised knowledge concerning CB2 receptors and cells involved in the immune system. They suggest a dynamic interaction between the receptors and the immune system, particularly leucocytes. Receptor expression is markedly altered in habitual cannabis smokers and the pattern of T lymphocyte responses to THC and the resulting immunological events may explain epidemiological reports linking cannabis use to opportunistic infections, AIDS and respiratory tract cancers. Nevertheless, as Witton (this monograph) points out, the evidence is not conclusive. Roth et al. (2002) observe that the most convincing evidence of immunosuppression comes from examining the antimicrobial activity of alveolar macrophages. Those from herbal cannabis smokers exhibit defective phagocytosis, are impaired in their ability to produce key immunological chemicals (interleukins, tumour necrosis factor, etc.) and in their ability to exhibit effective antibacterial activity when challenged with pathogenic bacteria. Because cannabinoid receptors are not found in significant numbers in the brain stem, cannabis is not considered to be a drug with fatal overdose risks.

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Chapter 4
Soma, the Wootton Report and cannabis law reform in Britain during the 1960s and 1970s

Setting the context

This chapter provides a first-person account of a significant event in the history of cannabis policymaking in Europe: the publication of the UK's Wootton Report in 1969. There was some debate about whether to include this chapter in the monograph. The chapter is self-evidently personal in tone. Yet it is also interesting and anecdotal, and we believe the monograph benefits from its inclusion with few significant editorial changes. However, it should be read for what it is: an oral history, told from an individual's standpoint, with which others might disagree.

Recent literature has tended to play down the level of drug use in the 1960s. Prevalence statistics are not available, but cannabis use was likely much lower than today. A recent survey suggests that today's 50-somethings exaggerate their participation in 1960s counterculture in order to appear cool to their offspring. Nonetheless, several decades on, there is little doubt that the high-profile celebrities of the late 1960s still hold cultural resonance in today's global cannabis culture.

Nostalgia, anachronisms and the Beatles aside, Soma in many ways established the prototype for contemporary, often more fragmented, cannabis advocacy groups. It was a well-organised, erudite and media-aware pressure group. It had a talent for both publicity and linking debate to other contentious issues. Moreover, it was able to leverage the polarisation between political liberals and hardliners in the 1960s. Similarly, today there is sometimes political capital to be won from taking an extreme view, be it for or against cannabis use (see Hall, this monograph). The Soma campaign thus remains relevant to contemporary debate on cannabis.

In recent years, the nature of pro-marijuana activism and lobbying has been subjected to some study, amongst others by Calafat et al. (2000), Matthews (2003) and Iversen (2004). The key pro and con arguments have been summarised by Scheerer (1993) and Wodak et al. (2002). An analysis of recent government reports on cannabis, with specific reference to European legislative reforms, is provided by Ballotta et al. later in this monograph. Most recently, considerable discussion has focused on the potency of 1960s and 1970s cannabis vis-à-vis that available today. King explores this issue, and suggests that some of the more outlandish claims made of today's 'skunk' should be viewed with a critical eye.

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Soma, the Wootton Report and cannabis law reform in Britain during the 1960s and 1970s

Stephen Abrams

In April 1970 the British government introduced legislation which sharply reduced the penalties for simple possession of cannabis. This was done to implement a proposal by the Home Office Advisory Committee on Drug Dependence (the 'Wootton Report') that casual users of cannabis should not face the prospect of imprisonment. This reform, under new legislation (The Misuse of Drugs Act 1971) was a step in the direction of decriminalisation and marked a limited toleration of cannabis smoking.

Declaration of interest

The author of this chapter was head of the Soma Research Association (Soma ([1])), which campaigned from 1967 for cannabis law reform. The article therefore expresses an insider's perspective on the reform process. On 24 July 1967 Soma set out its proposals for decriminalisation in a full-page advertisement in *The Times* (Figure 1). The issue was debated in Parliament and referred to the Hallucinogens Sub-Committee (the so-called 'Wootton Committee'([2])) of the Advisory Committee. In January 1969, the Home Office published the Advisory Committee Report on Cannabis, the so-called 'Wootton Report'. The report endorsed the proposals in the advertisement. The Home Secretary of the day denounced the report and the advertisement. However, a year later he introduced legislation to implement the main proposals of the report. This article describes the background to the appearance of the advertisement and describes the subsequent reform process up to 1979, when the Home Office advisors proposed the 'reclassification' of cannabis.

A brief history of cannabis convictions in the United Kingdom

Cannabis was prohibited in Britain in 1928 under the Dangerous Drugs Act, which remained in force during the 1960s. Under the Act, cannabis was classified as a

[1]   Soma was chosen to have associations with the soma of the Rig Vedas, the nectar of the gods and the problematic tranquilliser in Aldous Huxley's novel *Brave New World*.
[2]   The Advisory Committee on Drug Dependence was headed by Sir Edward Wayne, Professor of Practice of Medicine at the University of Glasgow. The 'Wootton' subcommittee on hallucinogens was led by Baroness Wootton of Abinger, a sociologist.

Figure 1: Advertisement in *The Times*, 24 July 1967

narcotic and offences were subject to penalties essentially identical to those for heroin and cocaine. The maximum penalties were one year on summary conviction and 10 years on indictment ([3]). No distinction was made between possession and supply, and most offenders were sent to prison. On the other hand, up to the mid-1960s enforcement was lax and directed mainly at black immigrants from the Caribbean. The first year in which a minority of offenders (48%) were imprisoned, 1964, was also the first year in which white offenders outnumbered black offenders (UK Home Office, 1968).

During the 1950s there was little evidence of increased use of cannabis in the United Kingdom. In 1951 there were 127 convictions and this figure was not exceeded until 1959, when it rose to 185. A plateau of about 600 convictions was reached in 1962 and not exceeded until 1966, when a figure of 1 119 was reached. In 1967 convictions doubled again to 2 393. That year the total seizures by police and customs amounted to 295 kg and 457 plants. For a comparison, 30 years later, in 1997, the year of peak enforcement, seizures amounted to about 150 000 kg and 115 000 plants (The Police Foundation, 2000), an increase by a factor of 500 and 250 respectively.

1967: a watershed year for cannabis

Witnesses heard by the Wootton subcommittee in December 1967 variously estimated the prevalence of cannabis use at between 30 000 and 300 000 persons. Perhaps the lower figure corresponds roughly to the number of regular users at the beginning of the year. However, there must have been a very dramatic increase in cannabis smoking in 1967, when the subject was widely and favourably publicised. By the end of the decade, a government-funded study indicated that nearly a million people had tried cannabis ([4]). The scale of cannabis use had by then probably reached a level where it was self-sustaining and could not be moderated by widespread enforcement. The sanction of imprisonment was still applied in a quarter of cases heard in 1967, the great majority of them for simple possession of small quantities. Seventeen per cent of first offenders were imprisoned (UK Home Office, 1968). The possibility of jailing tens, if not hundreds of thousands, of people for minor cannabis offences was both unthinkable and quite impractical.

In the first half of the 1960s in the United Kingdom, cannabis smoking was a feature of the half-world, where it was used by jazz musicians, artists and writers and, increasingly, in the universities. In January 1967 an article estimated that 5 % of Oxford

[3] 'Summary conviction' means conviction in a magistrates court. Cases of possession for personal use would normally be heard in a magistrate's court. If the accused elected trial by jury the case would be heard in a Crown court and higher penalties would apply.
[4] A survey by Market Advertising and Products Study Ltd (MAPS), commissioned in 1969 by the Home Office and the Registrar General's Office of Population Synthesis and Survey.

undergraduates smoked pot from time to time (Abrams, 1967). This converted into a figure of 500 and was debated in the broadsheet newspapers. At the instigation of the Oxford Committee on Student Health, the Vice Chancellor wrote to the then Home Secretary Roy Jenkins on 28 February, asking him to commission a national inquiry into cannabis and LSD (UK Home Office, 1968). This led to the appointment on 7 April of the Hallucinogens Sub-Committee (the so-called 'Wootton Committee') of the Advisory Committee on Drug Dependence.

Up to the beginning of 1967, cannabis received little publicity and nearly all of this was negative. Though prevalence remained low, cannabis use among 1960s celebrities and pop stars served to publicise the substance. For example, the arrest of the Scottish singer Donovan in mid-1966 was widely reported. Following a denunciation in the mass circulation newspaper *the News of the World*, Mick Jagger and Keith Richards of the Rolling Stones were arrested in February 1967 and sent for trial at the end of June for minor drugs offences. On 1 June 1967 the Beatles, at the zenith of their creative power and influence, released their *Sgt. Pepper* album, which was saturated with references to cannabis and LSD. The last track, 'A Day in the Life' [5], was banned from airplay on the BBC. The Beatles, and Paul McCartney in particular, were advocates of LSD: a serious confrontation was brewing between fashionable alternative society and the Establishment.

Soma was looking for a way to put the topic of cannabis law reform on the political agenda, and also to influence the terms of the deliberations of the Wootton Committee. In particular, the aim was to persuade the subcommittee to report on cannabis alone, rather than in conjunction with LSD. This in turn was based on the assumption that there was a consensus of informed opinion that cannabis was less harmful than stimulants, sedatives and alcohol and confidence that the committee would discover this for themselves. The gesture which occurred to me was to take a page of *The Times* newspaper for a paid advertisement in support of the decriminalisation of cannabis. The advertisement would draw its force from a number of influential people who would put their names to it. Barry Miles [6] mentioned this proposal to Paul McCartney on 2 June. McCartney immediately realised that the advertisement would have the effect of switching the focus from LSD to cannabis and associating the Beatles with prominent authorities in a legitimate protest 'within the system'. Following a meeting between McCartney, Miles and myself on 5 June, the Beatles agreed to add their names to the

[5] The song's lyrics include the lines 'Found my way upstairs and had a smoke/Somebody spoke and I went into a dream'.
[6] Barry Miles was an author and co-runner of London's Indica bookshop and gallery, later biographer of Allan Ginsberg and Paul McCartney.

advertisement and McCartney guaranteed the funding, finally credited to a Beatles advertising account ([7]).

At the end of June, as the preparation of the advertisement neared completion, Mick Jagger and Keith Richards were convicted and sentenced to imprisonment. There was a public outcry, including three nights of demonstrations in Fleet Street against the newspaper *the News of the World*, who were accused by Michael Havers, Jagger's counsel, of sending in an agent provocateur. After spending two nights in prison, Jagger and Richards were released on bail on 30 June. Jagger had been sentenced to three months for possession of amphetamines and Richards was sentenced to a year for the 'absolute' offence that cannabis had been smoked at his home, with or without his knowledge ([8]).

On the following day, 1 July, *The Times* published a famous leading article with the felicitous title, 'Who breaks a butterfly on a wheel?'. This leader has been much misunderstood, not least by its author, William Rees-Mogg, who claims that it 'helped to get Jagger out of prison on a minor drugs charge' ([9]). Also, the official history of *The Times* says that the leader was delivered to Jagger in prison by a warder with the advice that he would soon be freed on bail ([10]). As mentioned above, Jagger was freed a day before the leader appeared. Many, if not most, accounts of the case, including the most recent one in *The Times* and others in *The Guardian*, *The Independent* and on the BBC, assert that Jagger was convicted of possession of cannabis ([11]). Rees-Mogg's leader made it clear that he considered amphetamine to be a 'soft' drug and Jagger's offence to be trivial. However, he seemed to regard cannabis as a dangerous narcotic and was not, therefore, prepared to question the sentence of a year in prison for Richards. *The Times* got cold feet and postponed the publication of the advertisement, which finally appeared on 24 July. In the interim, a *Legalise Pot Rally* was held in Hyde Park on 16 July, attended by 10 000 people, marking the colourful advent of 'flower power'. Most national newspapers covered the event with a two-page spread. There were no arrests.

[7] B. Miles, *Paul McCartney: many years from now*, Secker & Warburg, London, 1997, pp. 386–395; S. Abrams, 'The Wootton Retort'; D. Taylor, *It was twenty years ago today*, Bantam Press, London, 1987, pp. 122–127.
[8] T. Hewat (ed.), *Rolling Stones file: the trials of Mick Jagger and Keith Richards*, Panther Record, London, 1967, p. 128.
[9] In a news article, 'We've got to face it, Britain's gone to pot' (*The Times*, 2 July 2001), Lord Rees-Mogg finally expressed the view that 'prohibition has not proved to be the answer'.
[10] John Grigg in *The Times Magazine*, 30 October 1993, p. 39.
[11] Lewis Smith in *The Times*, 2 August 2005: [Jagger was] convicted of possessing cannabis in 1967 in a case that became a cause célèbre when first he was jailed for a year and then freed on appeal three days later after a leading article in *The Times* headlined 'Who breaks a butterfly on a wheel'.

Paragraph 2 of the Wootton Report reads:

> Our first enquiries were proceeding — without publicity — into the pharmacological and medical aspects, when other developments gave our study new and increased significance. An advertisement in *The Times* on 24th July, 1967 represented that the long-asserted dangers of cannabis were exaggerated and that the related law was socially damaging, if not unworkable. This was followed by a wave of debate about these issues in Parliament, the Press and elsewhere, and reports of enquiries, e.g. by the National Council for Civil Liberties. This publicity made more explicit the nature of some current 'protest' about official policy on drugs; defined more clearly some of the main issues in our study; and led us to give greater attention to the legal aspects of the problem. Government spokesmen made it clear that any future development of policy on cannabis would have to take account of the Advisory Committee's Report. Accordingly, we decided to give first priority to presenting our views on cannabis.

The advertisement in *The Times* (Figure 1) was published by the Soma Research Association and signed by 65 people, including the Nobel Laureate Francis Crick, novelist Graham Greene, 15 doctors of medicine, one member of the Wootton Committee, members of Parliament and the Beatles ([12]). The advertisement was the subject of an adjournment debate in Parliament in the week of its appearance (on 28 July), when the Minister of State referred the issue to the Wootton Committee ([13]). The Wootton Report was submitted on 1 November 1968 and published in January 1969.

The advertisement in *The Times* described the existing law as 'immoral in principle and unworkable in practice' but it stopped short of advocating the legalisation of cannabis. Instead, it proposed that users of cannabis should not face the prospect of imprisonment. Specifically, the advertisement said that possession of a small amount should not be punished by anything more than a relatively small fine of £25. The question of supply was ignored. This position has become known as 'decriminalisation'.

The Advisory Committee Report included many echoes of the advertisement, that:

> (…) The long term consumption of cannabis in *moderate* doses has no harmful effects (…) Cannabis is less dangerous than the opiates, amphetamines and barbiturates, and also less dangerous than alcohol. (…) An increasing number of people, mainly young, in all classes of

([12]) The Soma Research Association was founded in January 1967, incorporated in 1969 and disbanded in 1971. The directors were Dr David Cooper; Francis Crick, FRS; Francis Huxley; Dr R. D. Laing; The Rev. Kenneth Leech; Dr Anthony Storr; Professor Norman Zinberg and the present writer. The secretary, from 1968, was Don Aitken. Staff included Adam Parker-Rhodes, pharmacologist; Dick Pountain, chemist; Derek Blackburn, psychologist; and Sam Hutt and Ian Dunbar, physicians. Premises (in London) were at 438 Fulham Road (from 1968) and 4 Camden High Street (from 1969). Soma was funded by private donations and subscriptions. The total expenditure did not exceed £5 000. This figure does not include the cost of advertisement, which was £1 800.

([13]) On 31 July the Court of Appeal quashed Richards's conviction. This was remarkable because Richards had no case to argue. However, the court ignored the fact that the premises offence was 'absolute'. Jagger's conviction was upheld but he was let off with a conditional discharge.

society are experimenting with this drug, and substantial numbers use it regularly for social pleasure. There is no evidence that this activity is causing violent crime, or is producing in otherwise normal people conditions of dependence or psychosis requiring medical treatment (…) there are indications that (cannabis) may become a functional equivalent of alcohol.

The burden of proof thus passed from the campaigners to the government's own expert advisors; and this was regarded by many as a green light for the consumption of cannabis. The Advisory Committee appeared also to accept the principle of decriminalisation. The main proposal in the report was that 'possession of a small amount of cannabis should not normally be regarded as a serious crime to be punished by imprisonment'. The accompanying letter of submission to the Home Secretary said: 'The committee is generally of the view that imprisonment is no longer an appropriate punishment for those who are unlawfully in possession of a small amount.'

The Home Secretary of the day, James Callaghan, suggested he would reject the report. He told Parliament that on his reading, the committee had been 'over-influenced' by the 'lobby' for 'legalisation' responsible for 'that notorious advertisement', adding, 'it was wrong for the committee to report on one drug in isolation in the way that it did' ([14]). However, a year later he introduced comprehensive new consolidating legislation that had the effect of implementing Wootton's proposal ([15]).

Callaghan's Misuse of Drugs Bill increased the penalties for most drugs offences, including trafficking in cannabis. However, this legislation introduced a distinction not drawn by Wootton between penalties for use and supply. The penalties for possession of cannabis were sharply reduced, by 50%, to five years on indictment and six months on summary conviction. The Wootton Report noted that offences with a maximum sentence on summary conviction of six months or less were not normally punished by imprisonment, and that such sentences as were passed were suspended as a matter of routine. They opted for a maximum sentence on summary conviction of four months.

Callaghan's legislation perished in the General Election of 1970. However, it was soon reintroduced by the incoming Conservative government and became law as The Misuse of Drugs Act (1971). When the act received the Royal Assent in 1973, the Lord Chancellor, Hailsham, instructed magistrates on sentencing. He said, 'Set aside your prejudice, if you have one, and reserve the sentence of imprisonment for suitably flagrant cases of large scale trafficking' ([16]).

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[14] *Hansard*, 27 January 1969.
[15] One account suggests James Callaghan got cold feet and tried at the last moment to alter the legislation, but he was outvoted in cabinet: entry for 26 February 1970 in A. Howard (ed.) (1979), *The Crossman Diaries*, London.
[16] *The Times*, 12 October 1973.

The operation of the new law in its first four years was made the subject of a special in-depth statistical analysis by the Advisory Council on the Misuse of Drugs (ACMD), prepared in December 1978 and published in 1979 ([17]). This study showed that the law was working as intended and that, with a handful of exceptions, the courts had abandoned custodial sentences for cannabis users. During this period, there was a further reduction, under the Criminal Justice Act (1977), of 50 % in the maximum sentence on summary conviction, to three months' imprisonment, one month *less* than the maximum proposed by the Wootton Report.

Subsequently, in 1978 the Advisory Council on the Misuse of Drugs (the successor to the Advisory Committee) proposed to 'reclassify' cannabis, moving it to the weakest of three punishment regimes. It took 25 years to implement this recommendation. However, in the 1980s the Thatcher government moved sharply in the direction of decriminalisation by introducing 'cautioning': an offender who was cautioned would escape without a fine or a criminal conviction. By the beginning of the 1990s, the majority of minor cases were dealt with by means of the caution, so that in 1992, when *The Times* itself came out in support of legalisation, on the 25th anniversary of the Soma advertisement, the leader could conclude that the law was 'all but unenforced'.

In 2000 the question of reclassification was revived in the Report of the Independent Police Foundation Inquiry. In response, the Home Secretary sought advice from the Advisory Council and from the House of Commons Select Committee on Home Affairs (see Ballotta et al., this monograph). The interesting point, perhaps, is that all three bodies stressed that the importance of reclassification (which did not directly affect the penalty on summary conviction) was that it demonstrated the fact that cannabis is less dangerous than amphetamine. With the reclassification of cannabis — where there is a 'presumption not to arrest' reasonably discreet adult users of cannabis — there has thus been a complete reversal of the assessment of the relative dangers of these two drugs in the 1960s. It is worth adding, perhaps, that Paul McCartney and Mick Jagger were both eventually convicted of cannabis offences, for which they received small fines. Today, Sir Paul McCartney and Sir Michael Jagger have received knighthoods.

([17]) Advisory Council on the Misuse of Drugs (1978) – *Report on a review of the classification of controlled drugs and of penalties under schedules 2 and 4 of the Misuse of Drugs Act 1971, 15 December 1978*. This proposal also called for the law to be recast to remove the sanction of imprisonment on statutory conviction for possession of cannabis.

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Chapter 5
Cannabis's role in drawing attention to 'the drugs problem' in Sweden

Keywords: cannabis – jazz musicians – media coverage – moral panic – Sweden

Setting the context

In many aspects of government the 'Swedish model' is held up as a paradigm. Sweden is often cited as proof that a distributionist welfare state can co-exist with a strong market economy. Although Sweden is not immune to social problems, the country's 9 million inhabitants are able to boast an impressive record within EU countries on many health indicators.

So how does Sweden look in terms of cannabis and illicit drugs? Sweden promotes a vision of a 'drug-free society' at policy level. It recently appointed a National Drug Policy Coordinator to espouse what it terms a 'restrictive and humane strategy', and in September 2006 its drug policy was singled out for praise from the UNODC in a report which concluded that the country's vision of a drug-free society 'has not been found to be obsolete or misdirected' (UNODC, 2006).

Cannabis prevalence rose in Sweden in the early 2000s, particularly among youths, and was reported as 'very worrying' in a Swedish government report (Ramström, 2004). Reported last month prevalence among young people rose from 1.3 % in 2000 (16- to 34-year-olds) to reach 5.3 % in 2004 (18- to 34-year-olds) and dropping to 4.8 % in 2005 (16- to 34-year-olds) (EMCDDA, 2006). Sweden has also observed a general increase in the tested potency of cannabis, and anxiety has been expressed about increases in treatment admissions. In 2007, the Swedish Rikskriminalpolisen published a report that suggested that the cannabis market is larger than previously thought: 25–30 tonnes per year, with around 140 cannabis smuggling networks operating. Nonetheless, at 2.9 %, cannabis prevalence among young people in Sweden (15- to 24-year-olds) remains the third lowest in EMCDDA reporting countries, after Greece and Lithuania.

This chapter studies cannabis's cultural role in what sociologists term a *moral panic* about drug use in Sweden. It examines the evolution of drug use from almost a non-issue to a highly debated cultural construct. Its extracts from contemporary media reports with a salacious tone suggest that Europe was no stranger to the much-ridiculed 'reefer madness' campaigns of 1930s America.

It is interesting to note how responses to drug use evolved to embrace a moral and welfare-related approach as opposed to a medicine- or psychotherapy-based focus. While in Sweden the vision of a drug-free society has been able to gain political legitimacy, in many other countries more pragmatic approaches have been adopted. Today, decades after the reports quoted in this chapter, stories about drug use — particularly among youths, celebrities, musicians, criminals and clubbers — still retain a hold over the public imagination.

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Cannabis's role in drawing attention to 'the drugs problem' in Sweden

Börje Olsson

World illicit drug consumption has increased substantially since the beginning of the 1990s. The annual number of users of all illicit drugs ([1]) in 2007 was estimated at about 200 million people. For cannabis, the corresponding number is 158.8 million, compared with 24.9 million for amphetamines, 15.6 million for opiates, 14.3 million for cocaine and 8.6 million for ecstasy (UNODC, 2007).

Even if cannabis is by far the most frequently and widely used drug, the bulk of problems related to illicit drug use is linked to other substances, such as heroin and cocaine. In this respect, cannabis use is a subordinate issue, but in present and past policy controversies cannabis plays, and has played, a central role. Why is this so? This chapter focuses on the role of cannabis in the 'cultural construction' of the modern drug problem in Sweden. It aims to discuss cannabis's central role, and to provide tentative answers.

The modern idea of 'a drug problem' developed fairly simultaneously in many Western societies in the late 1960s. It was characterised by an increased prevalence in groups not previously associated with drug use, and as a particular phenomenon that was distinct from previous, medical drug use. While historically cannabis experienced some pharmaceutical usage, it largely disappeared from legal medical practice in Western Europe before the Second World War (see Fankhauser, this monograph). A number of factors contributed to drugs being viewed as a problem: (i) recreational cannabis use as an intoxicant among 'exclusive' or 'deviant' groups as jazz musicians and other artists; (ii) claims that cannabis caused crime, mental illness and in severe cases even death; and (iii) the fact that synthetic preparations considered more effective than cannabis were invented, for example barbiturates and painkillers such as aspirin (Russo, 1998; Mack and Joy, 2000; Grotenhermen, 2002). Compared to many other substances which today are common on the illicit drug market — for example morphine and other opiates — cannabis was fairly easily ruled out from legal medical practice. Yet these medicinal substances continued to experience extensive, often highly praised use in

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([1]) The number of people who have consumed an illicit drug at least once in the 12 month period preceding the assessment.

regular medicine and as long as the users were seen as patients in need of treatment, drug use as a social problem was not an issue (Olsson, 1994; see also Fankhauser, this monograph).

Cannabis use played an extraordinarily important role in the process where drug use developed into a social problem in modern societies. This might seem odd considering its relatively mild effects and limited harms vis-à-vis opiates. As will be discussed, this paradox can be explained. In fact, it is doubtful whether our views on drugs and the policies developed upon them would have looked the same if cannabis had not existed. This general question will be discussed by taking its point of departure at the time of the Second World War and in one specific country, Sweden.

Though a prerequisite, the mere existence of drugs is not sufficient to create a drug problem. But to understand the roots of the 'modern' drug problem in Sweden, it is nevertheless a good starting point to turn to the introduction of amphetamines as pharmaceutical preparations towards the end of the 1930s. They were introduced for medical purposes and, as usual, the new medicament was praised as efficient, without side-effects and suitable for a variety of problems, such as narcolepsy, epilepsy, depression, psychosis, fatigue, excessive weight and obesity (Goldberg, 1944).

Amphetamines or similar drugs that stimulate the central nervous system rapidly became popular and their use spread to a significant proportion of the Swedish population. It has been estimated that in 1942–3 there were about 200 000 users of amphetamines in the country, corresponding to 3 % of the adult population (a proportion that exceeds today's amphetamine prevalence by 5 to 10 times). Even if the majority were occasional users, nearly 10 000 used them as frequently as between once a week to several times a day, and many in the latter group did so in extremely high dosages (Goldberg, 1968). Despite this, there were no signs of constructing drug use as a social problem. On the contrary, the privilege to formulate drugs as a problem was still solidly contained within the medical field. When drug use was perceived as a problem, it was as an individual disease suitable for the family doctor to treat (Olsson, 1994).

Multiple Swedish government investigations during the 1950s concluded that drug use offered little cause for alarm. Conclusions were drawn that there was appreciable prevalence in amphetamine (3 %, Goldberg, 1968) and opiate use, although these were predominantly used by well-adjusted citizens for medical or therapeutic purposes (Medicinalstyrelsen, 1956). Moreover, incidences of opiate addiction could be best treated by a family doctor (Olsson, 1994). Although there was some acknowledgement of the threat of amphetamines, heroin (Bejerot, 1969) and cannabis, particularly to young users, reports on 'societal risks' — for example those associated with intravenous heroin use — drew predominantly on case studies outside Sweden. Furthermore, attempts to link problem drug use to subcultural groups by the Liberal Party MP

Rimmerfors were met with scepticism (Rimmerfors, 1954, 1958). In short, drug problems were generally perceived as alien to Swedish society. Swedes were using drugs for medicinal, not mind-altering, effects.

However, towards the end of the 1950s discussions appeared in which drug use as a social problem started to be identified and defined. The reasons behind this had little to do with the extensive oral use of amphetamines or morphine among well-integrated persons. What the public discourse started to pay attention to were three other phenomena: (i) drug use among musicians and artists; (ii) the link between these groups and youths; and (iii) a few years later drug addiction among marginalised groups. The first two received the most attention in the media. Amphetamines and cannabis use among musicians and other artists were perhaps the most frequently highlighted in the press. Limited use of morphine was also reported. Half a century after these reports and descriptions were published in newspapers, it is evident that one of the most distinguishing features in them was a strong tone of moral condemnation. This is true not only for drug use and drug users but also for the kind of lifestyle these artists represented. The following article illustrates this.

> A lot has been written about the historical roots and developments of American jazz music. Unfortunately, the historical writing has been blind to the dark sides of jazz music and only focused on its charming, exciting and positive aspects (…) but the rush, stress and the increased competition between top musicians and, not least, unscrupulous managers have provided musicians and artists with an illusory substance that overcomes fatigue, increases the performance capacity at the same time as it turns them into slaves under the most dangerous vice that exists, drug addiction. (…) Youths talented for the profession as musicians worship the American stars as they were gods, and they try to imitate them at any prize. They make contacts at frequent guest performances and young Swedes get enthusiastic descriptions of how improvisation and other forms of liberation is amplified simply by smoking one joint of marihuana.
>
> (*Aftonbladet*, 11 April 1954: author's translation)

The article highlights several aspects of the drug problem that were important in forming the general perceptions of drug use/misuse/addiction. In absolute numbers, the groups referred to involved only a few persons frequenting certain clubs and bars in the 'Old Town' of Stockholm, while the much larger group of persons using amphetamines were hardly given any attention. The quotation also indicates one of the main reasons why anxiety about drugs was soon to escalate, namely the clear link that was established between this exclusive group of American musicians and young Swedes. The anxiety was further increased through repetitive descriptions in other articles that appeared concerning promiscuous young girls and drugs.

> It is well known to social workers that the mean age among female prostitutes in Stockholm is constantly decreasing. The influx of 16 to 20 year old girls is presently big. It involves teenage girls who have a history of being regular frequenters of obscure dance halls where they have established contacts with mediocre artists who have provided them with drugs.
>
> (*Aftonbladet*, 7 November 1954: author's translation)

From 1954 onwards, the link between drug use and youth in media becomes more and more evident. Also, well-adjusted young people are described in the context of drugs and drug use, making it possible for any parent to identify with the narratives presented.

> Daily, dozens of teenagers hang out at cafés. It is schoolchildren, often from well-off families, who without further ado skip school and homework, who drift about in gangs, who pretend they are Bohemians, poets, and drug users. Among the most advanced groups of youth in Stockholm, it has come into fashion to smoke hashish or marijuana or to get high on Phenedrine and sleeping-pills.
>
> (*Arbetaren*, 24 February 1954: author's translation)

Certain important features that have become central to how the Swedish drug problem later was conceived and defined were thus already present in 1954. Among the most important were the dominant perception of drugs as something alien to Swedish culture ([2]) and drugs as a serious threat to young people. At the same time, less attention was paid to the medically initiated use of drugs among somewhat older, ordinary citizens, and the fact that amphetamine use was already spreading among older criminals was not yet noticed. In other words, the portrayal of cannabis as a threat was both pronounced and distinct, but in reality did not yet live up to the legend. Even if jazz musicians, certain other groups of artists and a number of young people in their circles were given a prominent place in media narratives of drug use, their numbers were still very limited and an overwhelming majority of Swedes never had any contacts with drug users.

A simultaneous development took place which eventually would develop into the factual core issue in the Swedish drug problem: amphetamine use — in particular, amphetamines used intravenously — among established criminals. Due to reasons which are beyond the scope of this chapter, this unique form of drug use became extremely widespread in criminal circles. To some extent this process started already during the early 1950s, but it was not until the end of the decade and during the early 1960s that this pattern, peculiar to Sweden, really took off. As increased amphetamine use among criminals became evident, the controls of these substances also were made more stringent. Amongst other developments, by 1960 all amphetamine-like substances were included in the national list where narcotic drugs were classified. The legal channels to obtain access to these drugs were successively blocked, which led to an increasing number of drug crimes as the number of misusers and addicts continued to increase. This triggered a series of control measures such as, for instance, the setting up of a specific drug prosecutor and a police drug squad, together with a successive sharpening of drug legislation. At the same time, the legal consumption of narcotic drugs dropped to a fraction of its previous levels (Olsson, 1994).

([2]) Drugs as an alien element in Swedish society and culture has later been analysed by Tham (1995).

To summarise, taken together these three phenomena had a great impact on how the definition of the 'modern' drug problem developed and which drug policy was to be implemented. A crucial factor was that drug use (outside legal medical use) was something novel and unknown to Swedish society and culture, and to which frightening properties were attributed through references to intravenous heroin addiction in other countries. The image of drugs as a serious threat increased significantly due to the links made to ordinary youths running the risk to be drawn into the slavery of addiction. Also, and in sharp contrast to earlier images of the more familiar and legal medical use of drugs, clear links were outlined between drug use at the one hand and criminality and marginalisation at the other, as a result of the actual, visible and widespread amphetamine use among criminals.

As far as cannabis is concerned, thus far we can draw a tentative conclusion. Seen in isolation the actual prevalence of the substance played only a limited role in how basic perceptions and definitions of the drug problem originally were formulated in Sweden. Cannabis instead played an important role in adding strong moral and legal 'spin' to Swedish drug policy. It was portrayed as strange, unknown, alien, exotic and frightening and, in contrast to, for instance, opiates, there was hardly any lingering 'normal' medical use of cannabis after the Second World War. This concept of deviance was strengthened by the fact that people had almost solely to rely on illegal channels to obtain cannabis. Furthermore, the mind-altering effects of cannabis were unfamiliar to the 'normalised' intoxication culture in Sweden, that is to get drunk on alcohol. Empirical definitions of the substance in the medical field were held back by the absence of reporting of negative effects of cannabis in the medical literature. Such a 'knowledge vacuum' enabled moralists to step in and approach cannabis in alarmist terms. So public interest was weighted towards moral, legal and social aspects of cannabis use and the threat to young people that cannabis was seen to constitute. This weighting had a great impact on the process where not only cannabis, but drugs in general, grew to become a disproportionate public problem that required a response at the policy level.

By 1965 the situation around drugs had matured to the extent that all necessary prerequisites were at hand for the government to delineate what was to become a fundamental aspect of Swedish drug policy. A government commission was appointed to conduct the first comprehensive investigation into the drug situation in Sweden. The commission worked for four years and published four thick volumes ([3]) in which, apart from the articulation of negative moral perceptions, priority was given to the legal and social aspects of drug use. Control, prevention and treatment were from the beginning the main pillars in the model which later became one of the most restrictive in Europe. It is interesting to note that the legal and social aspects were not only dominant in the two first pillars, but also in the third, treatment. In contrast to many

[3] SOU 1967, 25; SOU 1967, 41; SOU 1969, 52; SOU 1969, 53.

other countries, the Swedish drug treatment system was built outside the medical sphere and to a large extent based on principles that do not constitute medical treatment. The overall responsibility for providing drug treatment was placed upon the social welfare system and many of the specific treatment methods utilised had strong moral and social components. Apart from a small experiment with methadone treatment, all treatment activities were drug-free and aimed at total abstinence from drugs. The role of medical authorities was limited to handling complications related to drug use and to providing detoxification before the patients were transferred to long-term treatment provided by the social welfare system, which was preferred to institutional treatment. A distinctive feature of Swedish drug treatment was that, at least during its first 15 years, drug use was perceived as a symptom of severe social and psychological problems and that treatment, therefore, should focus more on what caused the symptom than on the symptom itself. Both laymen and non-experts were given an important role in treatment, reflected by the very strong influence of treatment institutions run by NGOs (Socialstyrelsen, 1973).

A striking example, which serves to illustrate the strong legal, moral and social dimensions of drug policy, is the development of an influential form of institutional drug treatment model for youths in Sweden, which has become known as the 'Hassela pedagogic' (named after the village where the first institution was set up in 1969). This model — where one of the foundations is 'medlevarskap' (living together), meaning that clients and staff live together round the clock — put young addicts for a considerable period of time in a permanent and stable group of adults to work and study. Such firm fostering is a key concept in the model: adolescents are strictly reminded of 'forgotten basics' such as good friendship, solidarity with the group and respect for work. The 'Hassela pedagogic' goes against the grain of the concept of therapy in the sense that treatment is explicitly rejected and the focus is instead on education and fostering pupils (the term used instead of clients or patients) into decent, well-integrated and hard-working citizens (Tilander, 1991). It should also be noted that the majority of young addicts in this form of institution are treated compulsorily as a result of a legal decision (Bergmark et al., 1989).

This particular form of treatment had a significant impact on treatment models and methods for adults when they were designed and it is one of many examples of the strong legal, moral and social dimensions of Swedish drug policy. As has been shown, this architecture was rapidly constructed once drug use was recognised as a public problem and already before the advent of the 1970s, the foundation was laid for a policy that has remained unaltered if we consider the basic perceptions of drug use. It is true that drug policy became gradually more restrictive over the years and that numerous repressive measures were introduced, but this cannot be seen as a redefinition of the perceptions, but rather as a quantitative change where more weight was placed on the control side of drug policy (Lenke and Olsson, 2002).

Some of the conclusions, at least tentatively drawn in this chapter, contradict popular understandings of how drug use developed in Sweden and how the drug problem was formulated. Maybe the most popular belief is that the Swedish drug problem took off when different youth cultural trends (hippies, flower power, etc.) spread around the world towards the end of the 1960s (see Abrams, this monograph). In these cultures drugs, and especially cannabis, played an important role. A closer look at the Swedish situation shows that drug use related to these types of youth cultures was hardly a new drug epidemic. Certainly, cannabis use among young people became more common from about 1965–7, but the prevalence figures which were reached were still modest and restricted to limited circles, in particular the major cities. Furthermore, for a vast majority of young people drug use was confined to trying cannabis once only or experimenting with the substance a few times (SOU, 1969: 53). Prevalence peaked only a few years later, after which a rapid decrease occurred (CAN, 2003). Later analysis shows that most of those who experimented with drugs in a more serious way, almost exclusively cannabis, only did so for a short period of time, after which they returned to a 'normal' life without drugs (Solarz, 1990). Those making up the group of problem drug users in Sweden were recruited through completely different channels, where the common denominator was the marginal position which preceded their drug use (Bejerot, 1965, 1969; Olsson, 1994).

The Swedish hippie era, if it is possible to talk about such an era at all, and the radical youth movement around 1968 were important to conceptions of the drug problem. However, they added little in terms of originating or redefining 'the drug problem'. The hippie era simply allowed media and other actors to revitalise the public discourse on youth and drugs that had already started some 10 years earlier but which, as with most discourses, had stagnated. In particular, two dominant aspects of the discourse in the mid-1950s were revived around 1968: firstly, the idea of youth oppositionism or rebellion, which was attributed to both the youth movements of the mid-1950s and those of the end of the 1960s; secondly, the idea of danger, in terms of the grave risks that were associated with drug use, with no exception made for cannabis. Since cannabis prevalence in the hippie era surpassed by far that in the 1950s, the effect was to 'upscale' the problem with little change to its key qualitative features. Again, we see portrayals of drug addicts as persons without will power who have become slaves to a lethal vice compelled to act as chemically driven 'crime machines' (Winsløw, 1984). Again, we see the factual domestic situation where amphetamine use rapidly spread to become an integral part of an established criminal sub-culture.

In short, the main effect of the 'drug wave' towards the end of the 60s in Sweden was to revive dormant anxieties of an impending social catastrophe and at the same time provide fertile soil for a drug policy with strong moral, legal and social dimensions.

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Chapter 6
Enlargement 2005: cannabis in the new EU Member States

Keywords affordability – availability – cannabis use – EU enlargement – herbal cultivation – law enforcement – public debate – social representations – social responses – supply routes

Setting the context

This chapter examines cannabis use in the 10 Member States which joined the European Union in May 2004. It attempts to identify patterns in a cluster, and aims to increase our understanding of cultural, social and economic issues which are deeply embedded in cannabis use patterns and social responses.

More time will be needed to grasp the full impact of how drug use is affected by such a root-and-branch political shift as EU membership — if indeed any generalisations can be made in what remain, even after EU membership, very diverse countries. Will cannabis use patterns in EU Member States converge or continue to differ? To what extent does changing affordability, or the geographical proximity to supply routes, affect cannabis consumption? Will new EU members also experience the shift to herbal cannabis cultivation, as witnessed in a number of EU countries? Can country peculiarities, such as the high prevalence of cannabis in the Czech Republic, be easily explained? After EU membership, how does drug use interact with other social, economic and health indicators?

This chapter offers some thoughts, impressions and observations on early experiences. These experiences invite further validation and consideration as the drugs data for these countries mature. Moreover, since this article was written the European Union has further grown: two new Member States, Bulgaria and Romania, joined in January 2007. Drug use in two candidate countries, Turkey and Croatia, has also begun to be monitored directly by the EMCDDA. As the Centre is increasingly sought to comment on drug use among its new members and near-neighbours, this chapter emphasises the value of expert local insights: the voices behind the statistics.

Further reading

European Union enlargement

European Commission enlargement website
> http://ec.europa.eu/enlargement

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Drugs and the new Member States

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Websites of Reitox national focal points
> www.emcdda.europa.eu/index.cfm?nnodeid=403

Enlargement 2005: cannabis in the new EU Member States

Jacek Moskalewicz, Airi-Alina Allaste, Zsolt Demetrovics, Danica Klempova and Janusz Sierosławski, *with* Ladislav Csemy, Vito Flaker, Neoklis Georgiades, Anna Girard, Vera Grebenc, Ernestas Jasaitis, Ines Kvaternik Jenko, Richard Muscat, Marcis Trapencieris, Sharon Vella and Alenka Žagar

Introduction

The 2004 enlargement of the European Union (EU) covered 10 countries of very different size, population and culture, spreading from the Baltic to the Mediterranean. Considering existing commonalities and differences, three broad groups may be distinguished: the Baltic States (Estonia, Latvia and Lithuania); the Central European countries (Czech Republic, Hungary, Poland, Slovenia and Slovakia) and the Mediterranean islands (Cyprus and Malta). The number of their inhabitants ranges from just over 400 000 in Malta to over 38 million in Poland. Altogether, close to 80 million people live in the new members of the EU, sometimes referred to as the EU-10.

Significant differences exist in economic development and wealth among the EU-10. Gross national product (GNP) per capita adjusted for purchasing power varies from well below EUR 8 000 in the Baltic states to over EUR 15 000 in Cyprus, Malta and Slovenia. The new EU Member States are also very different in terms of political history. For about a half of the last century the Baltic states were part of the Soviet Union, and Poland, the Czech Republic and Slovakia, as well as Hungary, belonged to the bloc of socialist countries bound militarily and economically to the Soviet Union. Slovenia was part of socialist Yugoslavia, while Cyprus and Malta experienced market economies and more pluralistic political systems after rejecting the colonial power of the United Kingdom about 50 years ago. Eight out of 10 new EU members have been affected, then, by root-and-branch social change in the last 20 years.

Introduction of multi-party political systems and reinforcement of the market economy have resulted in more personal freedom and economic growth in recent years. On the other hand, a sense of everyday security has deteriorated. According to the participants of the project, security deteriorated the most, followed by housing security. Cannabis has been an illicit drug of choice for relatively large segments of young people in Western Europe. After the fall of the Iron Curtain cannabis use has rapidly increased in prevalence in Central and Eastern Europe as well, both in terms of physical presence and as a symbol of affiliation to the Western youth cultures.

This chapter is co-authored by individuals from 10 countries. In the first stage of its preparation, representatives of each country produced a detailed inventory of available cannabis data in standardised format. The inventories served as background material that was used extensively during a two-day workshop with the aim to write a first draft of the chapter. The participants, divided into three groups which focused respectively on epidemiology, social perception and social responses, outlined three sections of the chapter which were then elaborated by three individuals: Airi-Alina Allaste (social perception), Zsolt Demetrovics (social response) and Danica Klempova (epidemiology). Finally, the chapter was combined and edited by Jacek Moskalewicz and Janusz Sierosławski. Support and encouragement was offered by Linda Montanari and Sharon Rödner Sznitman.

Epidemiology

History of cannabis in the region

Origins and industrial use of cannabis in the new EU Member States

Cannabis sativa was thought to be brought to Southern Europe by Scythians in the 7th century BC. After that it gradually spread to other parts of Europe (Booth, 2004; *Encyklopédia Slovenska*, 1979). During feudalism, it was grown in central Europe, including the present territories of the Czech Republic, Hungary, Poland, Slovenia, Slovakia and possibly also other new EU Member States (e.g. Cyprus), usually in small-scale production by farmers, who processed it to make fabric, ropes and oils. The appearance of cheaper materials led to the replacement of hemp and decline of its cultivation. After the year 1945 the small-scale production of hemp almost disappeared. The industrial cultivation of hemp was, however, still present in some countries in the 1980s. Main products made from it included fabrics for clothes, ropes, sheets, bags, cords for tyres, upholstering materials, oil used to make lacquers and varnishes, soap, materials for the food industry, animal foods, medications, materials for the construction industry, cellulose, etc. The contents of THC in the hemp grown for industrial purposes was low — about 1 %. At the end of the 1980s, growing and cultivation of cannabis was entirely stopped or heavily reduced due to stricter controls imposed by international conventions.

History of use of cannabis for its psychoactive properties

In Cyprus, cannabis as a psychoactive substance had culturally determined roots: both from Turkish culture present on the island, where cannabis resin used to be smoked in water pipes, and via Cyprus's central location in historical Eastern Mediterranean cannabis trading routes (Egypt, Greece, Lebanon, Syria, Turkey). In Slovenia, the use of

cannabis for its psychoactive and hallucinogenic attributes is also believed to have been known to its inhabitants for centuries.

In Malta documented evidence of cannabis dates back to the early 1980s. During this time herbal cannabis was grown locally, mainly during the summer months. Between 1985 and 1990 an increase in trade between other countries resulted in an increase in the importation of cannabis oil, which is quite rare today, and Lebanese and Moroccan cannabis resin. The latter remains the most common type of imported resin in Malta.

In the Czech Republic, Hungary, Poland, Slovakia and Slovenia anecdotal evidence exists about cannabis use during the revolt of the 'hippie generation' from the late 1960s on, although prevalence was rather low. This can partly be explained due to low THC content in domestic cannabis and low availability and relatively high prices of cannabis sourced abroad. In Slovenia, with its warmer climate, cannabis use was supported from home growing during the 1980s. In that period, often referred to by the users as a golden age, cannabis supply was based on principles of reciprocity, barter and gifts, and not based on a criminal black market (Flaker, 2002).

In Estonia, Latvia and Lithuania, cannabis for psychoactive purposes is anecdotally reported to have been brought by soldiers serving their compulsory military service in Central Asian republics in the 1970s and 1980s. Herbal cannabis known as 'anasha' was consumed and brought home to some extent, especially by young soldiers (Kärdi, 1993: 54–61, 58–63).

However, the history of the use of cannabis for its psychoactive properties in the 10 new EU Member States is only documented anecdotally, and historical sources in most of the countries are scarce. With the exception of Cyprus, and perhaps Malta and Slovenia, before the 1990s the psychoactive properties of cannabis went either generally unrecognised or its use was very rare.

Contemporary prevalence of cannabis use

European School Project on Alcohol and Drugs

The most consistent data source for country comparison of cannabis use among teenagers is probably the *European School Project on Alcohol and Drugs* (ESPAD, see Hibell, this monograph). This survey took place in all of the 10 new EU Member States in the years 1995, 1999 and 2003 (Hibell et al., 1997, 2000, 2004).

Figure 1 shows trends in lifetime prevalence of cannabis use among 15- to 16-year-olds, according to the ESPAD survey in the 10 new EU Member States, while Figure 2 presents differences between lifetime, last year and last month prevalence, as recorded in 2003 (Hibell et al., 2004).

Figure 1: Lifetime prevalence of cannabis use among 15- to 16-year-olds (ESPAD, 1995, 1999, 2003)
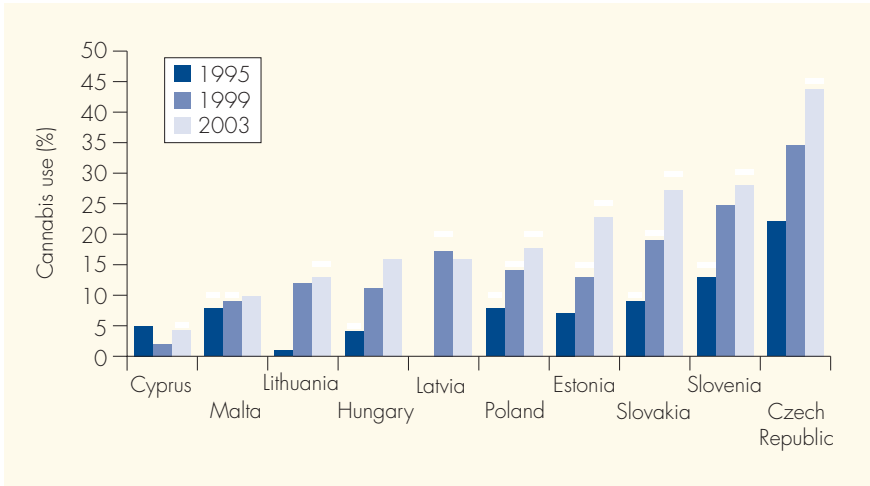
Figure 2: Lifetime, last-year and last-month prevalence of cannabis use among 15- to 16-year-olds (ESPAD, 2003)
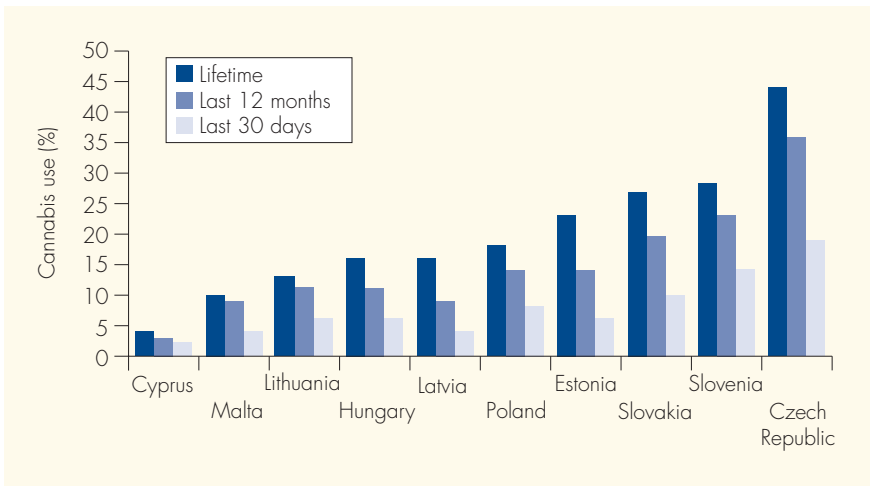
The reported lifetime prevalence of cannabis use among 15- to 16-year-old ESPAD respondents increased in the years 1995–2003 in all new EU member countries except Cyprus, where it remained approximately stable at a relatively low level (2–5 %). The increase in the years 1999–2003 was smaller in most countries than in 1995–1999. Among the 10 countries, a medium level of lifetime experience with cannabis can be found in the Baltic countries (Estonia, Latvia and Lithuania) and in Hungary, Malta and

Poland (10–18 %). The highest lifetime cannabis use prevalence is reported in the Czech Republic (44 %), Slovakia (27 %) and Slovenia (28 %).

Last year and last month prevalence of cannabis use among 15- and 16-year-olds show similar time trends. Last year prevalence is lower than, yet mostly close to, lifetime prevalence in this age group. Last month prevalence, as an indicator of regular cannabis use, is much lower. In the three countries with the highest prevalence, regular use ranges from 18 % in the Czech Republic through 14 % in Slovenia to 10 % in Slovakia. The range of the remaining seven countries is narrower and it varies from 2 % in Cyprus to 8 % in Poland. As a rule, prevalence of cannabis use during last month constitutes about 50 % of the last year prevalence, while last year prevalence is 15–40 % lower than lifetime cannabis experience. In effect, the wide gap among countries with regard to lifetime use tends to narrow with increasing frequency of use (Figure 3).

Figure 3: Inter-country variation in lifetime, last-year and last-month prevalence of cannabis use among 15- to 16-year-olds (ESPAD, 2003)
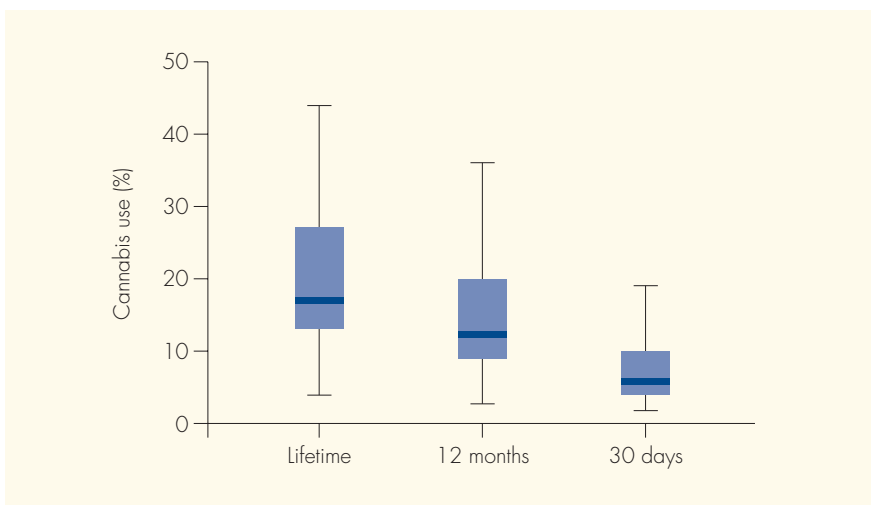
The three syringes above show inter-country ranges in lifetime, last year and last month prevalence of cannabis use. Each cylinder represents two quartiles of respondents spread either side of the median and, finally, a horizontal pusher indicates a median value of prevalence among all countries. The declining values of all three indicators confirm that the cultural gap in cannabis use tends to close with growing frequency of use.

General population surveys

The general population surveys provide a picture of cannabis use among the young population (15–34), which is slightly different from the ESPAD results (see Figures 4 and 5). In Latvia, general population prevalence is similar to ESPAD survey results. In Lithuania, Slovakia and Hungary, the ESPAD results show similar values for lifetime prevalence, but indicate higher last year and last month prevalence. In the Czech Republic, Estonia, Malta and Poland, cannabis use among 15- to 16-year-olds surveyed by ESPAD is markedly higher than in the general population. Cyprus is the only country where general population data indicate higher prevalence than ESPAD data. There is a sharp contrast between figures for 15- to 16-year-olds — ranging from 1 to 5 % — and those for young adults aged 15–34 — ranging from 13 to 25 %. Data from Cyprus also show smaller gaps between lifetime experience and last year and last month use.

General population surveys across all 10 countries confirm that cannabis use is not only a matter of teenager behaviour, but is also prevalent among young adults up until their early 30s. Similarly to ESPAD, general population surveys show that while cannabis has been tried by a substantial proportion of young people, regular cannabis use is still only represented by small percentages of young adults.

Figure 4: General population survey results from 2001 or 2002 about the prevalence of cannabis use among the young population (15- to 34-year-olds)
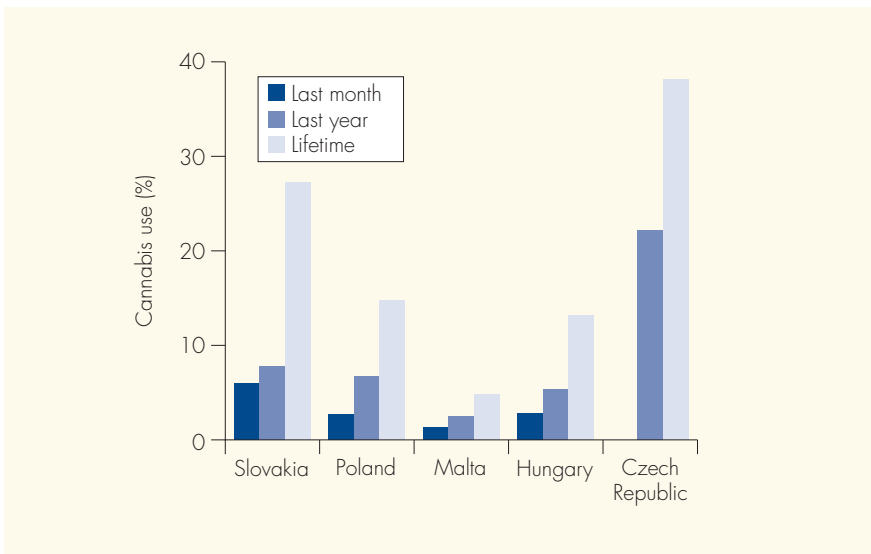
Figure 5: General population survey results from 2003 or 2004 about the prevalence of cannabis use among the young population (15- to 34-year-olds)
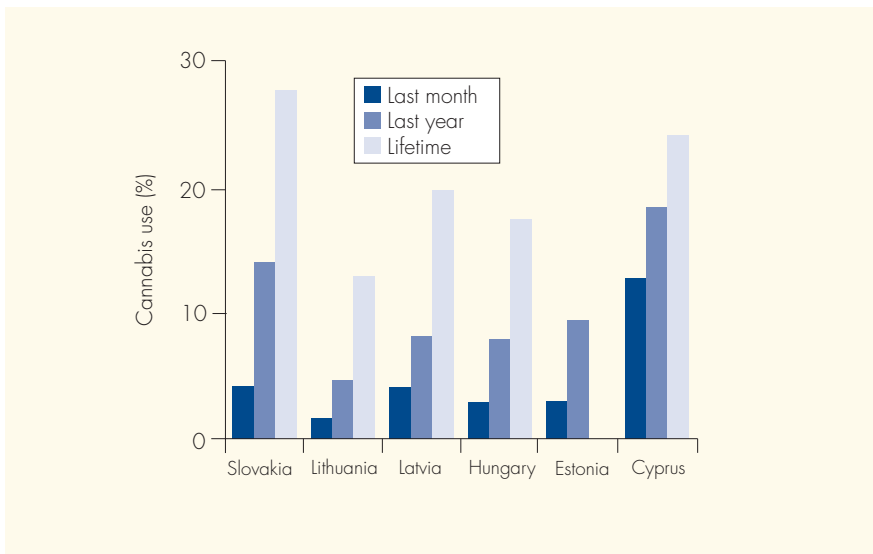
Differentiation in cannabis use

Gender

Although in all countries cannabis use is higher among males than females, the size of the gap between the genders differs. Among 15- to 16-year-olds in 2003 there were five males to one female using cannabis in Cyprus, and two males to one female using cannabis in Latvia, Lithuania and Poland. The ratio ranged between 1:3 and 1:4 in Estonia, Hungary, Malta and Slovakia, and it was very small, at just below parity, in the Czech Republic (1:1) and Slovenia (1:1) (Hibell et al., 2004). It is worthwhile noting that a trend towards a more narrow gender gap was reported in most of the countries between 1995 and 2003.

Urban versus rural areas

All of the countries which explored the difference between rural and urban areas found a higher prevalence of cannabis use in the larger cities, for example Estonia, Lithuania, Poland or Slovakia (see Figures 6 and 7). In some countries, this difference between urban and rural areas is levelling off (e.g. in Poland) while in others (e.g. Slovakia) it remains stable.

Figure 6: Lifetime prevalence of cannabis use (%) by level of urbanisation in Lithuania among 15- to 64-year-olds
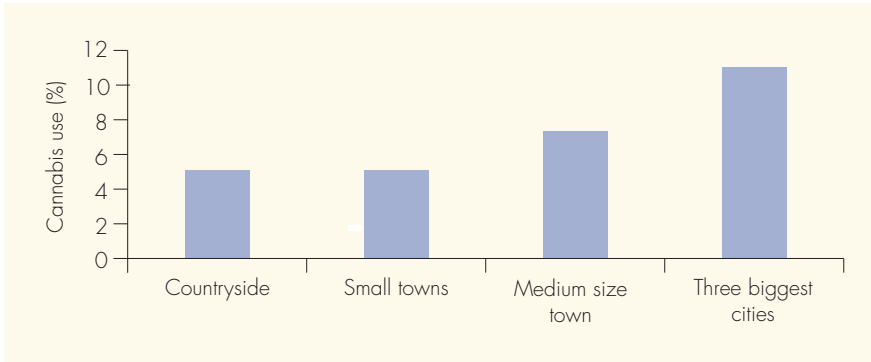
Source: General population survey 2004.

Figure 7: Lifetime cannabis use (%) among 17- to 18-year-olds in the capital of Poland, Warsaw, compared with national data
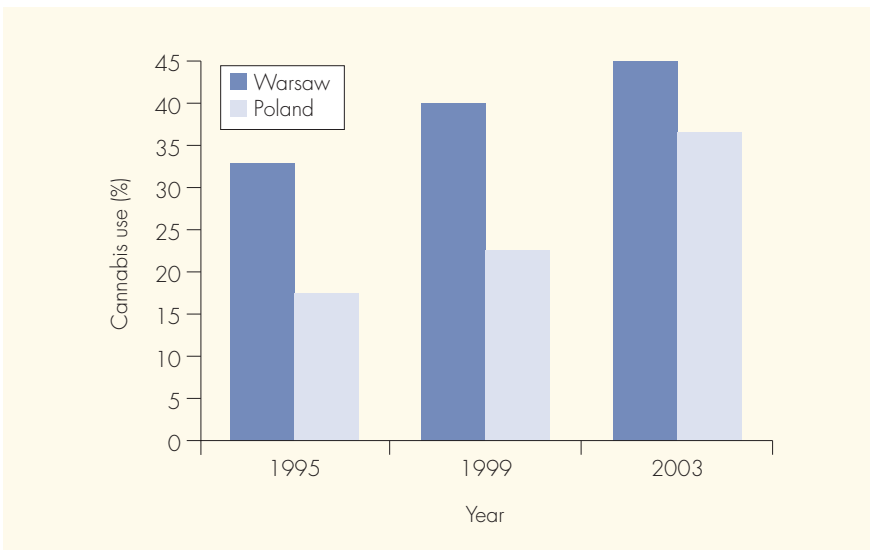
Source: ESPAD.

Other socio-economic factors

Data from the ESPAD survey in most countries revealed a clear association between cannabis use and truancy, sibling substance use and parents not knowing where the student spends Saturday night. A slightly weaker, yet still significant, association in most countries was living in a non-intact family structure. The association is unclear or non-existent in the cases of parents' education and the economic situation of the family in which the respondent lives (Hibell et al., 2004).

Figure 8: The difference in lifetime prevalence of cannabis use according to ESPAD surveys 1995, 1999 and 2003 by working language at school in Estonia
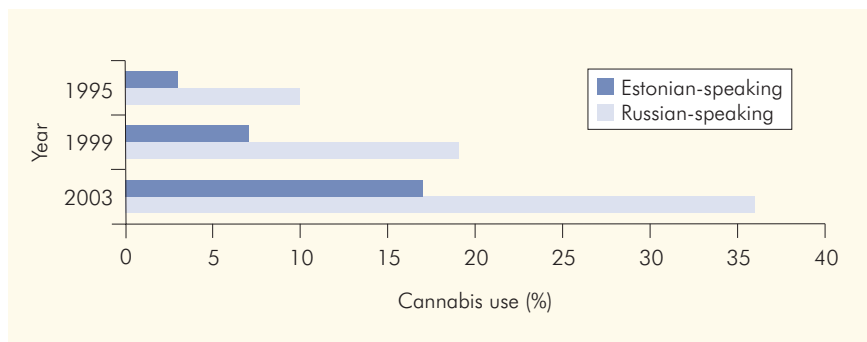
In Estonia, analysis of the available data also revealed higher cannabis use among the Russian-speaking part of the population. This discrepancy, which has slowly tended to narrow, can be attributed to a number of factors. First of all, Russian-speaking schools are mostly located in the cities where drug use is more widespread. Secondly, the Russian-speaking population lives in the north-western part of Estonia, which suffers from a higher level of social exclusion, including high unemployment and criminality, as well as alcohol and drug use (Allaste and Lagerspetz, 2005: 267–285) (Figure 8).

Patterns of cannabis use

Description of the patterns of use

In all new EU Member States, cannabis is found in all forms with various levels of THC concentrations: herbal cannabis and cannabis resin, both imported as well as grown indoors or outdoors. The general pattern of smoking cannabis herb or cannabis resin dominates, with herb dominating in some countries and resin in others. In those countries where the traditional consumption mode was the water pipe, this is fading and hardly exists among youngsters.

In most countries cannabis use has become more or less normalised among youths. This does not mean that all young people use cannabis, but that the drug is fairly available and the majority of youths are 'drug-wise' and tolerate cannabis use among others, even if they themselves do not use the substance (Parker et al., 1998). According to qualitative data, cannabis use does not increase the social status of the user, nor does it benefit from aggressive marketing. Cannabis has emerged simply as a part of the culture of young people, who want to have fun with their friends (Fatyga and Sierosławski, 1999).

Polydrug use

Users of cannabis usually have a higher probability to have experienced other drugs, in particular stimulants and hallucinogens (e.g. Zimmerman et al., 2005; Milani et al., 2005; Butler and Montgomery, 2004). This relationship also appears to hold true for the new EU Member States. According to secondary analysis of ESPAD data, last year prevalence of marijuana use in new EU members highly correlated ($P < 0.05$) with the prevalence of the use of ecstasy and any illicit drug other than marijuana and hashish ($P = 0.722$ and 0.691 respectively).

According to Slovenian qualitative research (Kvaternik, 2004), young people in the age group 15–25 (pupils and students) usually engage in more risky behaviour than their older peers while using drugs. They consume more drugs (polydrug use) and larger quantities in any one occasion. Although being reasonably informed, it seems that in practice they do not seriously consider potential health risks.

Figure 9: Last-year prevalence of other drugs use among last year cannabis users (Poland 2002, general population, aged 16- to 34-years old)
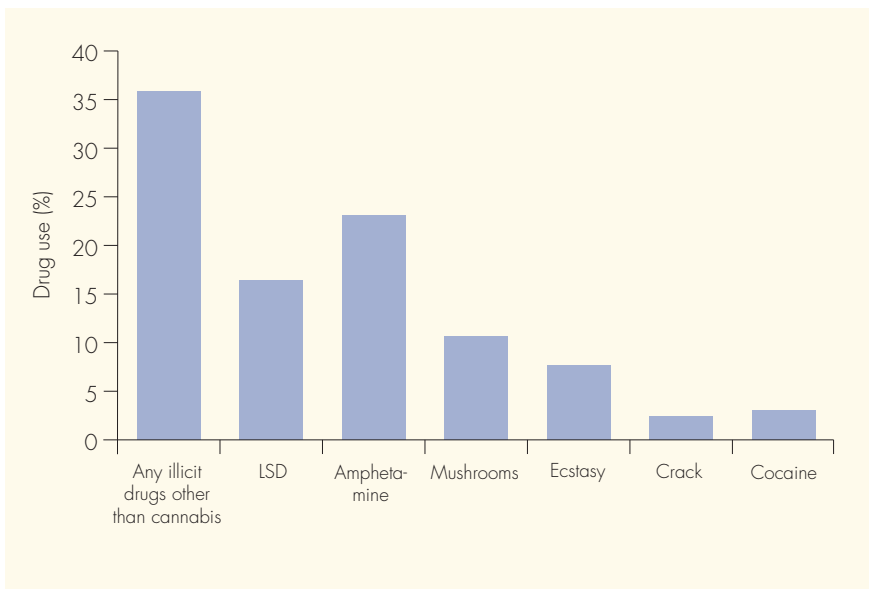
Users of 'harder' drugs are more likely to have used cannabis too. Practically all ecstasy users use cannabis to recover from a night of exposure to ecstasy and noise (Demetrovics, 2001; Moskalewicz et al., 2004). On the other hand, the majority of cannabis consumers do not use other drugs, as documented by the Polish survey data. As can be seen from the graph, under one-third of cannabis users combine cannabis with other drugs, mostly with stimulants and hallucinogens, while 65% of them use only cannabis. It must be stressed that the vast majority of cannabis users never use opiates (Figure 9).

The role of social networks

According to ESPAD, in all of the 10 countries except Lithuania, the illicit drug first used, usually cannabis, is typically obtained from a friend, or shared in a group (ESPAD, 2003). Polish qualitative research has revealed that the pressure to use cannabis when peers are using is not perceived to be strong by young people. They argue that they are free not to use when they choose not to (Fatyga and Sierosławski, 1999).

Availability of the drug

Subjective availability

Availability of cannabis can be indirectly inferred from the data on perceived availability, police seizures data and also prices of the drug on the street as they indicate economic accessibility of drugs if related to incomes.

A few conclusions can be drawn from Figure 10. First, cannabis seems to be fairly easily available for a substantial proportion of students in all countries under review — from

Figure 10: Perceived availability of cannabis among 15- to 16-year-olds: percentage of students who perceive cannabis as 'very easy' and 'fairly easy' to obtain
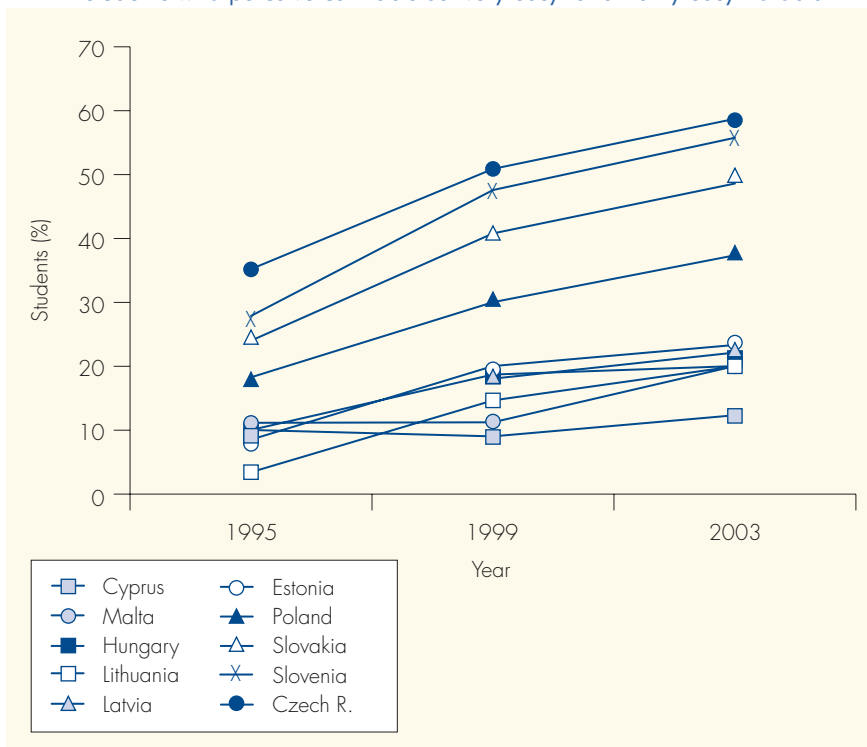
Source: ESPAD 1995, 1999, 2003.

more than 10 % in Cyprus to close to 60 % in the Czech Republic. Second, perceived cannabis availability has increased in all countries, and no saturation effect has been recorded. In other words, countries that reported high availability already 10 years ago tend to see it growing as fast as remaining countries. Third, it is evident that large differences still exist among the new EU members. Four groups of countries emerge, the first being high availability countries, including the Czech Republic, Slovenia and Slovakia, where subjective availability is around 50 % and over. These countries are followed by Poland, where the indicator approaches 40 %. Then, remaining countries report availability of approximately 20 %. Finally, Cyprus reports the lowest availability, where only 12 % of students consider cannabis easily available.

Economic accessibility

For decades, centrally planned economies in Eastern Europe were economically relatively self-contained. The economic systems included the non-convertibility of their currencies. In effect salaries, although adequate in terms of purchasing power, were extremely low when exchanged to any convertible currency, varying between USD 20 and USD 50 per month. On the one hand, smuggled cannabis was practically unaffordable for young people, and, on the other hand, Central and Eastern European markets were of little interest for illicit suppliers. The transition to a market economy brought with it the convertibility of national currencies and a rapid increase of nominal incomes calculated in hard currencies. More than a decade after this transition, prices per gram of cannabis in the EU-10 have become relatively stable and are close to prices in the EU-15, ranging from EUR 3.5 in Slovenia to EUR 17 in Latvia.

There are substantial variations in prices in relation to purchasing power, too. The average monthly income in the Baltic States equates to the value of 30–50 g of cannabis, in the Central European countries to 100–150 g. In Cyprus, Malta and Slovenia, where the currencies have been convertible for decades, an average monthly income could buy 200–400 g of marijuana.

Figure 11 shows that herbal cannabis prevalence increases with average purchasing power. This is particularly the case for former socialist countries, where national currencies became suddenly convertible at the beginning of the 1990s, and where purchasing power for imported goods increased manifold almost overnight. The outliers of this linear relationship are countries with very high (Czech Republic) or very low (Cyprus and Malta) cannabis use. Cyprus and Malta represent relatively affluent societies with a longer history of a market economy, where cannabis has been relatively affordable for decades. The third outlier — the Czech Republic — has the highest prevalence of cannabis use worldwide. Its high position on the plot may partially be attributed to its relative wealth. However, all three outliers confirm that socio-cultural factors in drug consumption are more important than affordability alone.

Figure 11: Herbal cannabis buying power of an average monthly salary
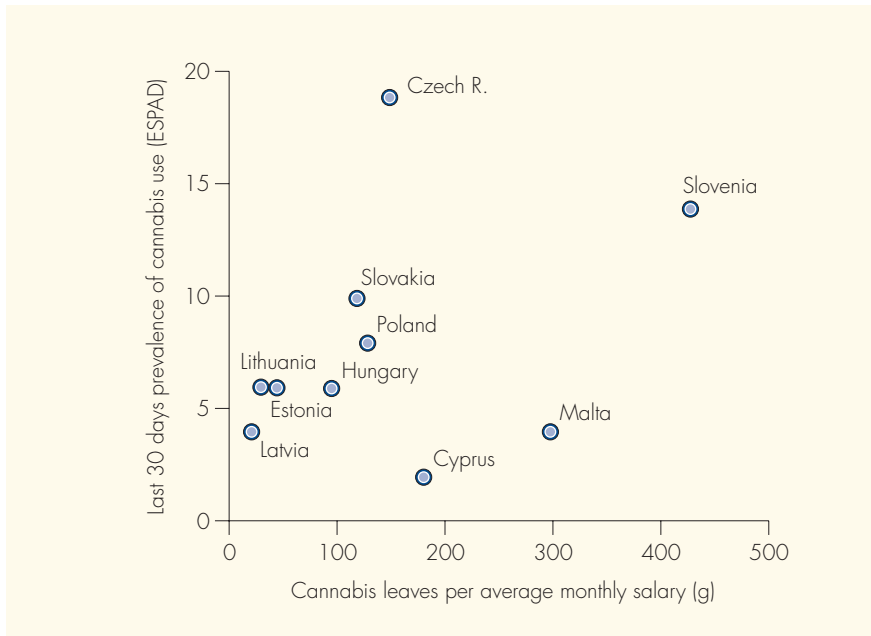
Social representations of cannabis in new EU countries

General perception of the drug problem

Officially, the new EU countries do not make distinctions between cannabis and other drugs, and the general public supports such grouping of illicit drugs. In most countries, the media tends to sensationalise drug use (Paksi, 2000: 70–86). This means that overdose cases, seizures and other drug-related crimes are overexposed compared with other major social questions. Cannabis, if discussed at all, is primarily mentioned as a gateway drug, and the normative idea that smoking cannabis leads to use of harder drugs is expressed from time to time in most of the countries. As is common in many countries, problem drug users are often stigmatised. A common presentation of drug users that is propagated through the media is the image of drug addicts as dirty asocial human wrecks with frantic eyes. However, according to public opinion surveys from Poland and Estonia, people tend to perceive drug addicts as ill people rather than as criminals (Laidmäe and Allaste, 2004: 118–143).

Perception of cannabis by the younger generation

Whereas the older generations tend to perceive all drugs as equally dangerous, younger generations tend to consider cannabis less harmful than other drugs in all the new EU countries. The generation gaps emerge with rapid social and cultural change and 'the young quickly acquire "new strategies of action" for coping with life in unsettled times' (Misztal, 2003: 85). Illicit drugs were introduced to the Baltic market only during the last decade, and to the Central European markets only a little earlier. This created a situation where the younger generations, who are experimenting with drugs, know more about the topic and are also much more tolerant than the older generations.

According to the ESPAD study, social condemnation of experimenting with cannabis is decreasing in Central Europe, and the most tolerant attitude towards this issue is displayed by school teenagers in the Czech Republic and Poland.

Although cannabis use has become ordinary, especially in the countries of Central Europe, it has also sometimes acquired a symbolic meaning of rebellion, at least in some youth cultures. Nevertheless, this rebellion is not a total negation of the society's value system, as was evident in the 1960s. Today, young people consider cannabis prohibition hypocritical within the context of the growing availability of alcohol. They either question the right of the state to impose the ban or demand that liberal economic policies applied to legal drugs should be extended to cannabis.

Images of cannabis in the arts and the media

Cannabis is not used extensively in the established visual arts, but the portrayal of cannabis with clearly positive connotations can often be seen in graffiti in most of the countries. Cannabis symbols are used in souvenirs, T-shirts, earrings, scarves, bracelets, cough drops, etc., and images of cannabis leaves can sometimes be found in book designs. However, these are niche products that can be bought from alternative shops or markets in most of the countries, and are found more commonly only in the Czech Republic.

Positive connotations of cannabis are much more often expressed in local popular and hip-hop music. In Poland, the vocalist Lora Szafran sings about the society which prohibits cannabis use but encourages youngsters to drink alcohol: 'The society is telling you that you better drink and smoke (tobacco) but grass is peace while alcohol — madness.' In the Czech Republic, the columnist of the magazine *Reflex,* Jiří Doležal, has been a strong voice in cannabis advocacy ([1]).

[1] Seth Fiegerman, Jiří Doležal: 'Still looking for change', *The Prague Post*, 18 April 2007.

Popular culture stresses the positive features of cannabis in contrast to other drugs: 'Weed unites people', 'Marihuana heals, other drugs — never use them'. Marijuana is strongly associated with rasta culture and hip-hop music, and the respective attitudes are openly expressed in the songs. Hip-hop has become a popular part of youth culture, and those who claim to belong to the sub-culture often call themselves: 'The Society of Hash and Scun', 'League of Blunters' or 'bluntoholics'. All of these play on slang for cannabis. Cannabis use combined with alcohol seems to have become an integral part of their lifestyles, as well as its symbol (Demetrovics, 1998, 2001, 2005; Tossman et al., 2001).

Social response

Supply reduction

Legislation and policy

Drug legislation in all new EU members has evolved for several decades in an unexpected way. Twenty years ago drug legislation was restrictive and repressive in the Baltic States, as elsewhere in the Soviet Union. Restrictive laws prevailed in Cyprus and Malta, too. However, in Czechoslovakia, Hungary, Poland and Yugoslavia the penal sanctions were not that severe and possession of drugs was not penalised at all. In the 1990s when a number of 'old' EU countries tended to liberalise their drug policies, countries of Central Europe introduced more repressive legislation, which generally did not make any distinction between cannabis and other drugs.

Currently, the new EU countries have stricter drug laws compared with the majority of pre-2004 Member States. Nevertheless, in terms of the most repressive legal control (prison sentences for drug use), only Cyprus among the 10 new EU Member States imposes prison sentences for drug use, vis-à-vis four existing Member States (Greece, France, Finland and Sweden). In addition to Cyprus, the Baltic countries deem drug use to be an administrative offence.

Possession of small amounts of drugs for personal use is criminalised in all of the new EU Member States, although differences exist between legislative penalties and actual sentencing practice at the judicial level. Nevertheless, in the Czech Republic, in the case of small quantities for personal use, and in the absence of aggravating circumstances, the law foresees 'administrative' sanctions only (EMCDDA, 2005). In the Baltic States (Estonia, Latvia and Lithuania), possession of a small amount of any drug is considered a 'non-criminal offence'. The difference with regard to the Czech Republic is that in Estonia, Latvia and Lithuania a 'non-criminal offence' may be punished by *deprivation of liberty* for up to 30, 15 and 45 days respectively. In Slovenia, possession for personal

Table 1: The most important characteristics of the national drug laws in the 2004 round of new EU Member States

Country	Punishment for cannabis use	Differentiation between small and substantial quantity of cannabis (threshold)	Maximum penalties for possession for personal use (small quantity)	Maximum penalties for possession for personal use (other than small quantities)	Maximum penalties for trafficking	Possibility of diversion
Czech Republic	No	Yes (10 joints, or 10 doses of 30 mg THC)	Fine (up to EUR 500)	Up to 2 years; fine	1–5 years	Yes; treatment with probation possible
Estonia	Yes, the use is deemed an administrative offence	Yes (50 g marijuana, 10 g hashish or 5 g liquid hashish)	Fine (up to EUR 770) or arrest (up to 30 days)	Not regulated separately	For trafficking up to 10 years (aggravating circumstances: up to 20 years)	Yes
Cyprus	Yes, the use of drugs is deemed a criminal offence	Yes (30 g or three plants)	Up to 8 years (1 year if the person is younger than 25)	Up to life	Up to life	Yes
Latvia	Yes, the use is deemed an administrative offence	Yes	Fine (up to EUR 130) or 15 days' arrest	Up to 5 years	Up to 10 years for trafficking but 8–15 years if a substantial quantity	No data
Lithuania	Yes, possession/use is deemed an administrative or criminal offence depending on quantity	Yes (less than 5 g marijuana or 0.25 g hashish is a small quantity)	Fine (up to EUR 290) or 30 days' arrest	Up to 2 years or, if a substantial quantity, 2–15 years	2–8 years (small or average quantity), 8–15 years if a substantial quantity	No data

Hungary	No	Yes (1 g THC is considered a small quantity)	Up to 2 years (in practice no imprisonment for personal use of small quantity)	Up to 5 years; or, if a substantial quantity, 5–10 years	2–8 years (more than a small quantity); 5–15 years (substantial quantity)	6 months' pre-trial diversion (treatment or counselling) in case of small quantities for personal use
Malta	No	Yes (difference between simple possession and possession with intent to supply, which carries a trafficking charge)	3–12 months' imprisonment	Not applicable	Up to life sentence	Alternatives to imprisonment can be applied for first-time offenders
Poland	No	Not precisely defined, but the differentiation exists	Up to 1 year	Up to 3 years	Up to 8 years, or up to 10 years if a substantial quantity	Yes
Slovenia	No	Not defined	Fine (between EUR 42 and 208) or up to 5 days' arrest (in practice no imprisonment for cannabis)	Fine (between EUR 208 and 625) or 30 days' arrest	1–10 years	In cases of possessing small quantity of illicit drugs for personal use, more lenient punishment is possible if the person voluntarily enters into treatment or social security programmes
Slovakia	No	Not precisely defined (in terms of dose for personal use)	Up to 3 years of prison	Up to 5 years of prison	Up to life	No

Sources: EMCDDA (2005) and personal communication with the country representatives.

use is punished by a monetary fine or 5–30 days of arrest. In the remaining new
EU Member States any kind of possession for personal use is considered a criminal
offence, making sentences involving imprisonment possible (EMCDDA, 2005). However,
possibilities to avoid imprisonment are available in some countries through *diversion*
or *referrals* (entering treatment as an alternative of the legal process or imprisonment
or suspension of a prison sentence). In other countries the application of the law seems
to be more lenient than would be possible if the text of the law were taken literally.
In Hungary, for example, two years of imprisonment is envisaged for possession of a
small amount of cannabis for personal use only, but until the time of writing no-one has
been sentenced to such a term of imprisonment. Differentiation between possession for
personal use and trafficking exists in all 10 countries, while a differentiation between
small and substantial quantities is defined in a number of ways. In some countries there
is no exact definition, but the differentiation is based on whether the cannabis was for
personal use or for dealing (Table 1).

Law enforcement

Among the new members, two groups of countries can be distinguished in terms of law
enforcement (that is, the extent to which police and other law enforcement agencies
implement a law). In the first group — Malta and Slovakia — any drug-related crime is
subject to a high level of police activity, which means that the level of law enforcement
is the same in the case of personal use as in the case of trafficking. In all other
countries — with the exception of Estonia, for which data were not available — a more

Table 2: Absolute number of seizures (all drugs and cannabis alone) and number of seizures per 100 000 inhabitants in 2004				
Country	Number of drug seizures (all)	Number of cannabis seizures	Number of drug seizures (all) per 100 000 inhabitants	Number of cannabis seizures per 100 000 inhabitants
Czech Republic	907	572	8.9	5.6
Estonia ([1])	940	270	69.6	20.0
Cyprus	n/a	n/a	n/a	n/a
Latvia	n/a	316	n/a	13.6
Lithuania	1 552	265	45.0	7.7
Hungary	2 751	1 791	27.2	17.7
Malta	308	113	77.0	28.3
Poland ([1])	543	305	1.4	0.8
Slovenia ([2])	4 777	3 421	243.2	174.2
Slovakia	1 538	913	28.6	17.0

([1]) Data from 2002.
([2]) Data from 2003.

differentiated picture can be identified. In these countries use and possession of a small quantity of cannabis for personal use is enforced at a low or medium level, while the focus of the police and other agencies is on trafficking or possession of substantial quantities of drugs.

Other, more objective data show that the most seizures (both cannabis and other drugs) occurred in Slovenia (4 777 seizures for any drugs in 2003; 3 801 in 2004) followed by Hungary (2 952 in 2003; 2 751 in 2004), Slovakia (1 532 in 2003; 1 538 in 2004), Lithuania (1 029 in 2003; 1 552 in 2004), Estonia (1 060 in 2003) and the Czech Republic (979 in 2003; 907 in 2004). When drug seizures are calculated per 100 000 inhabitants, the highest rate of seizures is found in the smallest countries — Estonia, Malta and Slovenia — while the lowest is found in the Czech Republic and Poland. Only Hungary diverges from this rule, particularly with regard to cannabis, which has three times more seizures than the Czech Republic, yet a comparable number of inhabitants (Table 2).

However, there are large differences in what percentage of these numbers are cannabis seizures. For example, in Slovenia in the past four years, 70–90 % of all seizures were of cannabis. In the Czech Republic, Hungary, Poland and Slovakia this proportion varied between 40 and 70 %. Lower shares of cannabis seizures can be found in Lithuania (12–17 %), Estonia (26–29 %) and Malta (33–43 %). Figure 12 suggests that

Figure 12: Proportion of cannabis seizures among all drug seizures
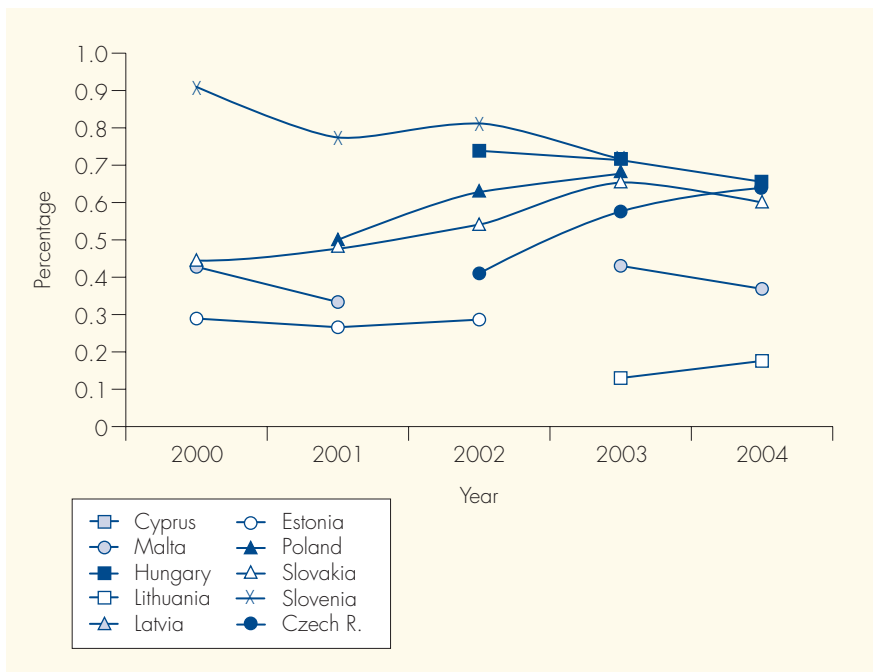
Figure 13: Herbal cannabis to cannabis resin ratio in cannabis seizures in Malta and Hungary
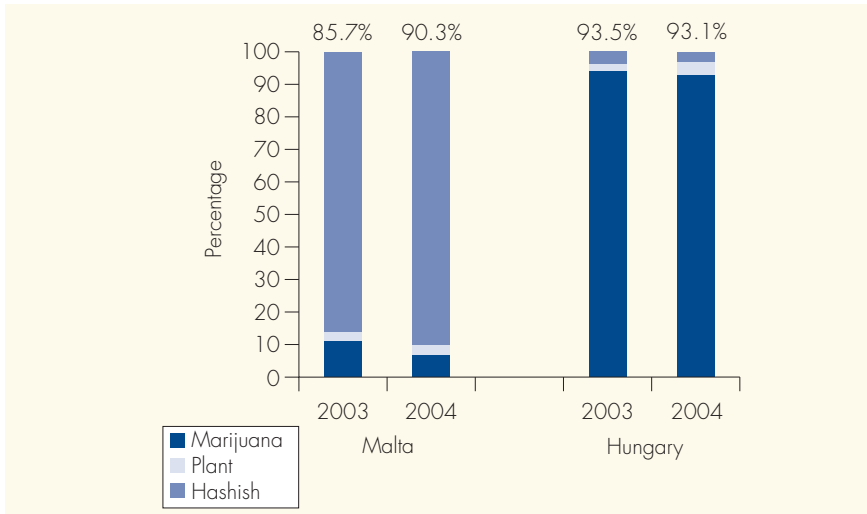
the proportion of law enforcement efforts devoted to cannabis is converging in the 10 countries. In those with the highest 'cannabis oversight' (Hungary and Slovenia), the cannabis share in their seizures has declined while in the remaining countries this share has tended to rise (Figure 12).

Data are available only from Hungary and Malta about the type of cannabis seizures, but these two countries are worth comparing as they represent substantially different profiles. In Malta the highest percentage of cannabis seizures is registered for cannabis resin (70 % to well over 90 %), while in Hungary herbal cannabis represents 93 % of all cannabis seizures. This comparison may reflect either a great distinction in consumption patterns or a large difference in the focus of control (Figure 13).

A substantial proportion of those who are arrested for petty drug offences — drug possession or use but not trafficking — is arrested because of cannabis. The highest percentage can be found in Slovenia, where four out of five arrests are related to cannabis. In the three other countries where data are available, this share varies from 30 % to 60 %.

Figure 14: Proportion of cannabis arrests among all arrests for possession and/or personal use
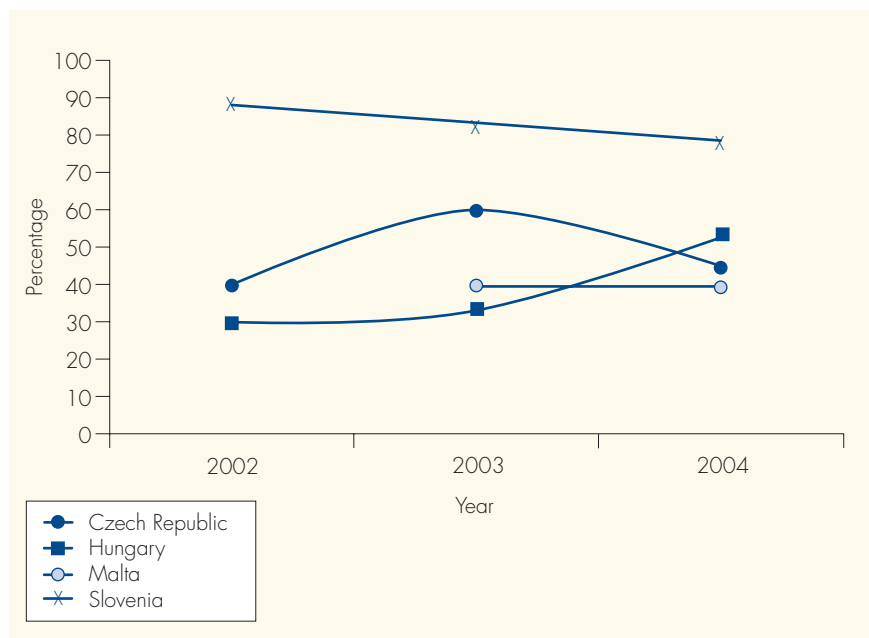
Demand reduction

Prevention

Prevention campaigns in all 10 countries are dominated by school-based universal prevention programmes, and these naturally integrate cannabis-related issues. However, programmes do not specifically discuss this drug, and no specific emphasis is placed upon cannabis (Paksi and Demetrovics, 2002).

Treatment response

Among the 10 countries, Hungary has the highest prevalence of cannabis users in treatment (see Figures 15 and 16), estimated at 45 cannabis clients in treatment per 100 000 inhabitants (2004). Hungary is followed by Malta (32 per 100 000 in 2003), Estonia (15 per 100 000 in 2003) and the Czech Republic (14 per 100 000 in 2004). In all remaining countries there are 10 or fewer cannabis clients per 100 000. As is also evident in the pre-2004 EU Member States (see Montanari et al., this monograph), all of the new EU states have experienced a substantial increase in cannabis admissions to treatment in the past 10 years. This increase is, however, proportionately higher in Hungary than in the other countries. The reason behind this may be attributed to the

Figure 15: Patients demanding treatment for cannabis as a primary drug (all data sources)
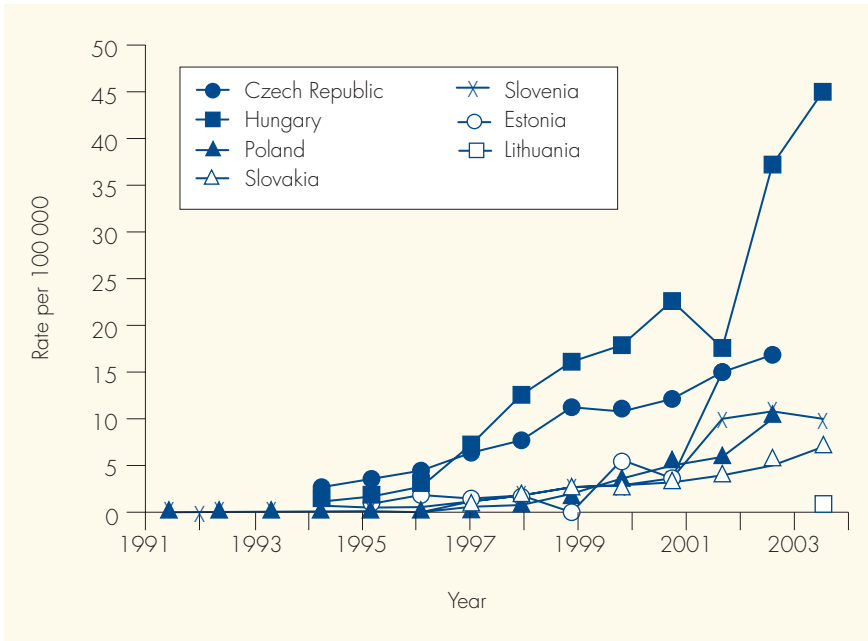
Figure 16: Proportion of clients with cannabis as their primary drug among all treatment clients
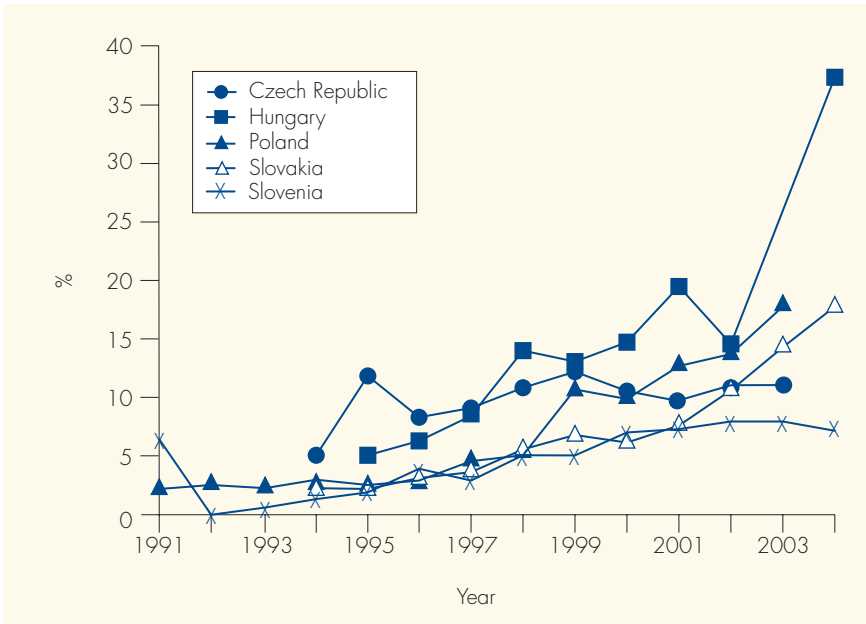
proportionately high possibility of referrals (choosing treatment as an alternative to the legal process) rather than a greater need for treatment in Hungary. In 2004, for example, more than half of the clients entered treatment in the frame of referrals, and not on the basis of experiencing physical or mental problems which requires professional help.

Slovakia: outpatient treatment services

In relation to the graphs above, it must, however, be noted that the increase in demand for treatment is a complicated issue and not fully explained in the literature. Trends which indicate an increase in cannabis admissions may reflect: growing numbers of problem cannabis users who look for help with their medical problems; an increase in specialised services which may attract more clients; and more restrictive legislation and enforcement which forces cannabis users to seek an alternative to prosecution in the less repressive medical sector (see Simon, this monograph).

Public debate

Political debate

Officially, there is no distinction between soft and hard drugs in any of the new Member States. Nevertheless, there are some differences in perception of cannabis at the official level. In the Czech Republic, the National Drug Commission has initiated amendments in the legislation in order to distinguish between soft and hard drugs. In Hungary, the distinction between soft and hard drugs and decriminalisation of cannabis use are supported by the representatives of the Hungarian Liberal Party. In Poland, representatives of left-wing political parties also favour depenalisation of cannabis. In 2004, a member of the parliament from the then governing Democratic Left Alliance officially issued a statement on the legalisation of drugs, especially cannabis, which was widely quoted by the media. Two years ago, the agenda of a local left-wing party in Slovakia included decriminalisation of cannabis. By contrast, in the Baltic States and Malta, no officials have publicly expressed their support for the decriminalisation of cannabis.

The topic of legalisation of cannabis use has received much attention from the public in recent years. Much of this discussion has been driven by the liberalisation of drug policies and decriminalisation of cannabis in parts of Western Europe. In Estonia this Western liberalism is strongly opposed by the authorities. The Minister of Social Affairs stated publicly in a newspaper that use of cannabis is illegal and will remain illegal. In other countries, particularly in Slovenia, a co-author suggests that politicians may be waiting for EU directives or an external initiative in order to deal with this matter.

To summarise, opposing political forces tend to gain political leverage from the drugs question in general, and cannabis in particular. Their motives include generating support either among young voters who defend decriminalisation or legalisation, or among conservative elements of society who demand more repressive policies. This political context is counterproductive to a technical discussion on how to achieve a more rational consensus on cannabis policy.

Cannabis activist groups

In Central and Eastern Europe there are active groups advocating drug law reform in terms of depenalisation or decriminalisation of cannabis. In Hungary, one of the leading professional drug reform organisations is the Hungarian Civil Liberties Union (HCLU), which advocates the human rights of other vulnerable populations as well. The Hemp Seed Association (Kendermag Egyesület), a local users' group, actively speaks in favour of the legalisation of cannabis. Each year the Hemp Seed Association organises a demonstration as part of the Million Marijuana March (an annual, worldwide protest campaign for the legalisation of cannabis) in Budapest. It also initiated a civil disobedience movement in March 2005. Participants of this movement appeared at the National Police Headquarters, blaming themselves for violating drug laws in order to raise awareness of the criminalisation of drug users. In the Czech Republic, there are also rather professional organisations fighting for the rights of cannabis users, and there is also a 'Cannabis Ombudsman' whose mission is to help people who have problems with the law. In Poland, the Kanaba.info Association is a union of Polish drug users and other people alarmed by the present repressive drug policies. In 2003, they participated in ENCOD's 'Spread the Seeds' campaign and coordinated a public demonstration in Warsaw. In Slovakia, the non-governmental organisation (NGO) 'Free Choice' was established, as a response to the repressive legislative situation in February 2004. Its goal is to 'invoke discussion about cannabis and its legalisation and demythologise the plant that has been used for hundreds of years as food, a cure, for industry or pleasure'. In Slovenia, the Konoplja.org project campaigns for cannabis users to be given a political voice, together with the depenalisation of cannabis and the introduction of alternative sentences or admonitions. Every year, the Million Marijuana March is organised in Ljubljana and Maribor, where users can freely smoke cannabis (trafficking is forbidden) and point out that changes are necessary. In the Baltic States, Cyprus and Malta, activist groups exist, but are more covert and far less active and professional than in the above-mentioned countries. In the Baltic States, their main forum is the Internet, where they present articles and reports related to cannabis and its effects. There are also discussion forums and other information (legislation, pictures, smokers' stories, instructions on how to grow cannabis at home, extracts from legal acts, etc.).

Discussion

Eight out of the ten new EU Members States have undergone recent transformations from a centrally planned economy to a market economy, and from a single-party system to a pluralist political system. This shift has ushered in not only positive social developments but also a variety of problems which are measurable by 'objective' statistics and are often magnified in the public perception (Leifman, Edgren Henrichson, 1999). Drug problems, despite their high media exposure, are considered less important compared with other burning social issues such as unemployment, poverty and even alcoholism. Nevertheless, a rapid increase in drug use is recorded by relevant statistics (Moskalewicz and Swiątkiewicz, 2005).

Based on current data it is difficult to fully explore determinates of cannabis use in the new EU Member States and, therefore, some of the explanations offered in this chapter are hypothetical and need more research. The data do, however, point towards broad trends and crucial and intriguing issues, which should be monitored and researched more closely.

Cannabis is a widely used illicit drug in the 10 new EU Member States, particularly among teenagers and young adults. Its prevalence used to be somewhat lower than in the EU-15, but a rising tide of cannabis use in the years 1995–2004 has meant that the new EU Member States are reaching approximately the same prevalence rates as the rest of Europe (EMCDDA, 2004).

The sudden rise in cannabis use in all the new countries — except for Cyprus and Malta — has accompanied root-and-branch social change, which could have increased demand for psychoactive substances. Significant influences have been imported from the pre-2004 Member States, where cannabis use was more widespread and normalised than it used to be in the new Member States before the 1990s. Intensive transmission of Western European consumption patterns has affected drug use patterns in general, including cannabis. Young men and boys seem to be more open to the new patterns, particularly in the more religious societies (Cyprus, Lithuania, Malta, Poland) where the gender ratios in prevalence of cannabis use range from 2:1 to 4:1. In other, more secular cultures, such as the Czech Republic, this ratio is 1:1. The gender gap tends to narrow in practically all countries that have a tradition of female emancipation. As in other parts of the world, Westernisation first affects capital cities and larger urban centres. This is reflected by the dynamic geographic spread of cannabis in the countries, which has spread fast from large cities to smaller towns and then to the countryside.

This Westernisation hypothesis is supported by the fact that new EU countries with the highest cannabis prevalence — the Czech Republic, Slovenia and Slovakia, and to a lesser extent Hungary and Poland — are also those which are closest to pre-2004

Member States. The process of cultural homogenisation of Europe seems to be most advanced among younger generations, which are more willing to adopt new cultural patterns, including cannabis use. The image of cannabis has a very positive connotation in the context of rasta and hip-hop culture, both of which are international youth cultures. Cannabis is also popularised by movies, music and souvenirs. The force exerted by these influences seems to be higher in Central Europe, especially when comparing the Czech Republic with the Baltic States, Cyprus and Malta.

The low prevalence of cannabis use in Cyprus and Malta may also have its roots in culture. Unlike in the remaining continental countries, where cannabis has been integrated into teenage culture, particularly in large cities, cannabis for young Cypriots may be associated with traditional hashish waterpipes smoked by middle-aged and elderly men, and therefore have a much less attractive cultural appeal. In Malta, being a smaller country where social stigmas may be felt to a greater extent, open views about cannabis use may be more restricted.

Increasing cannabis consumption can be explained by its growing availability, which is confirmed by subjective opinions collected by the ESPAD study in all countries. The availability hypothesis has been backed up by data from international and national control agencies that focus on the supply side of the drug market. Nevertheless, our study suggests that the availability increase is a phenomenon present in all countries, including those where consumption has tended to level off, such as Cyprus, Malta and Slovenia. Moreover, it is difficult to explain large gender gaps in cannabis consumption recorded in a number of countries, despite its similar availability for boys and girls (see Hibell and Andersson, this monograph).

Cannabis prevalence cannot be explained by its affordability. There is no linear relationship between the economic situation of the country and its level of cannabis use. However, experiences in the new EU members suggest that the income-price elasticity of cannabis demand is much higher in those countries whose currencies recently became convertible and where incomes expressed in terms of convertible currencies tended to grow fast. In more stable economies, cannabis price elasticity is much lower.

Public discussion tends to demonise drugs, to place cannabis on a par with other illicit drugs, and generally to portray drug use as something dangerous. Illicit drug use in society is also generally stereotyped (Young, 1971: 182), and despite idiosyncrasies among the 10 countries, common features include the high social visibility of the drug problem and the negative image of drug addicts in general. Since the Eastern European countries undergoing transition still suffer from many unsolved social problems, drugs have been attributed the role of the 'good enemy' (Christie and Bruun, 1986); that

is, drugs are seen as a straightforward political target, rather than attempts to resolve urgent matters such as the problems of disadvantaged groups, inequality in the employment market and undeveloped regional policy. However, especially regarding cannabis, it is possible to make distinctions between regions. In the Central European countries (Czech Republic, Hungary, Poland, Slovenia and Slovakia), cannabis has a higher social visibility than in the other countries, where the social perception of drug use is focused mainly on problem drug use. Nonetheless, since illicit drug use is a relatively new phenomenon in all of these countries, the older generations tend to have naive and homogenous views of drugs and drug users. Perhaps reflecting such concerns, the majority of new EU countries have recently introduced legislation that is more restrictive than under previous regimes.

Rapid political change in 8 out of the 10 new EU member countries and increasing integration with the EU has had a serious impact on drug policy. All these countries have become more open and more vulnerable to external pressures, particularly from the most powerful allies, such as the USA, which has attempted to exert its influence through relevant UN agencies and by targeting professionals as well as policymakers and politicians. Nordic countries, too, have tended to export their restrictive drug policies, especially across the Baltic Sea. On the other hand, pre-2004 EU members must also have felt the impact of enlargement in this area. Existing European divisions in drug policy may be reinforced by the new Member States, which are more likely to join coalitions of more restrictive countries.

The social response to cannabis is overwhelmingly dominated by individually oriented approaches, that is, law enforcement and treatment. From incomplete data it can be estimated that the number of cannabis users dealt with by law enforcement agencies is much higher than those in medical treatment. This results from increasingly repressive legislation which applies penalties even for possession of small amounts for personal use, which in fact implies penalisation of use. In some countries presence of cannabis in body fluids may legally be interpreted as possession. Such legislation implies that referrals to medical treatment, where present, are used as much as a social control as a psychosocial care method. In most countries cannabis-specific treatment is not widely available, and cannabis dependence is accepted as a phenomenon, which is not considered as requiring specific treatment centres and methods. Treatment of cannabis clients is integrated in general drug treatment settings which focus on opiate-dependent individuals. Thus, the growing share of cannabis users in medical treatment probably reflects referrals from the criminal justice system rather than impressive advances in treatment methods.

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Policies, legislation and control strategies

PART II
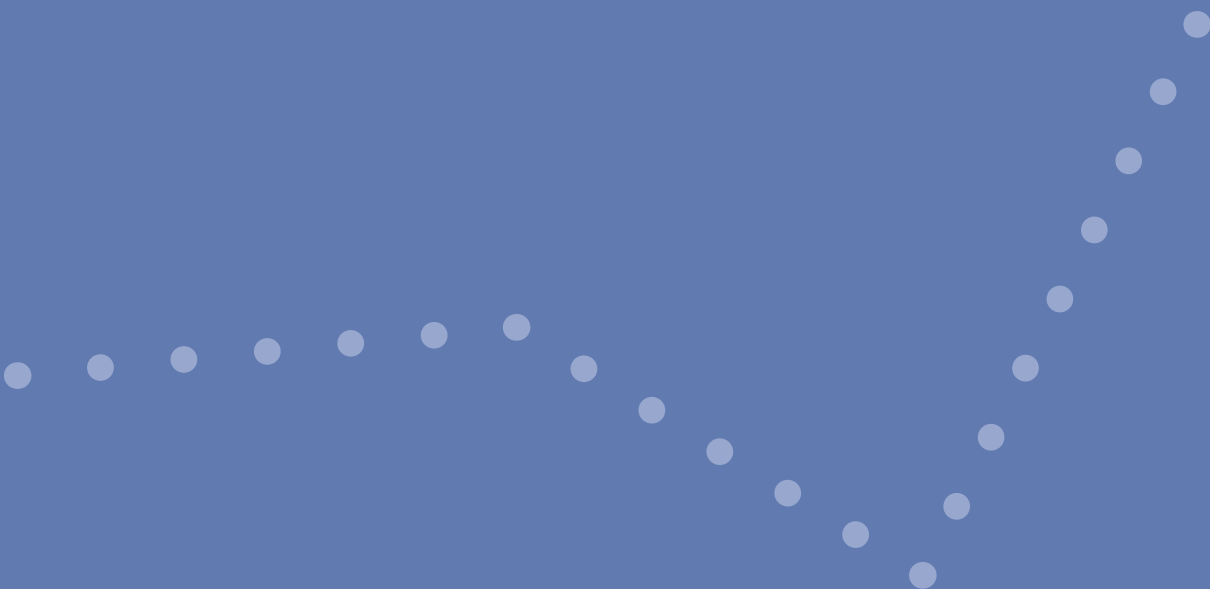
Chapter 7
Cannabis control in Europe

Keywords: cannabis – decriminalisation – drug policy – Europe – legislation
– international law – UN convention

Setting the context

The history of cannabis has been the subject of numerous books in recent years (see Fankhauser, this monograph). One of the many historical perspectives that have been explored is cannabis's social, political and legislative history. This chapter provides a brief history of controls on cannabis, and analyses a series of recent government enquiries that have informed legislative reform, particularly in Europe.

Opinions are divided in this area. Liberalisers and cannabis advocacy groups — the key Internet publishers of information on the issue — continue to claim cannabis is a recently controlled substance and 'natural product', and have espoused a number of theories to explain its prohibition ([1]). Yet the historical picture is more complex. Use of cannabis as a psychoactive drug has stirred controversy for centuries. And finding the most appropriate control system has interested professionals, politicians and governments from the beginning.

Today, international drugs conventions recommend signatories to designate, under national legislation, the most stringent control over cannabis. However, some countries have used the granted discretion to move away from such recommendations. A cross-

([1]) Among others, theories include: diplomatic dealmaking (with Turkey and Egypt) during the 1925 amendment to the *International Opium Convention*; timber interests curbing hemp industry growth in the USA (particularly involving a marijuana scare campaign by media, controlled by William Randolph Hurst); synthetic fibre interests curbing hemp industry growth (in particular Du Pont); inter-agency conflict between the FBI and FBN in the USA (with Harry J. Anslinger cast as arch-prohibitionist); cannabis control as a result of institutionalised racism (stigmatising cannabis as a drug of choice of specific racial groups, especially in the USA); and strong international focus on stringency by the United Nations (INCB and UNODC).

reading of governmental enquiries shows that, while cannabis is considered a potentially dangerous substance, its dangers, in comparison with other controlled substances, may have been overstated and alternative forms of sanctions, such as civil sanctions, fines or compulsory health assessments, have been recommended in place of criminal penalties.

European countries' laws or prosecution policies seem to be broadly in accord with these government enquiries. Nonetheless, more liberal positions have attracted some concerns, expressed in particular at UN level, on the grounds that leniency on cannabis can endanger the overall international effort against drugs. Accordingly, the latest developments in some countries seem to tip the balance back towards a new attention on restrictive measures.

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See also the list of governmental reviews (Table 1) in this chapter and the grey literature list in the Appendix to Volume 1 of this monograph (p. 300).

Cannabis control in Europe

Danilo Ballotta, Henri Bergeron and Brendan Hughes

Introduction

The use of cannabis as a psychoactive substance has always been a subject of controversy. International drugs conventions recommend signatories to designate, under national legislation, the most stringent control over cannabis, but some countries have used the granted discretion to move away from such recommendations. Indeed, finding the most appropriate control system has interested professionals, politicians and governments since the beginning. A cross-reading of governmental enquiries shows that, while cannabis is considered a potentially dangerous substance, its dangers in comparison with other controlled substances might have been overstated, and alternative forms of sanctions, such as civil sanctions, fines or compulsory health assessments, have been recommended in place of criminal penalties. European countries' laws or prosecution policies seem to be broadly in accord with such enquiries, but these positions have attracted some concerns, expressed in particular at UN level, on the grounds that such a 'lenient approach to cannabis' can endanger the overall international effort against drugs. Accordingly, the latest developments in some countries seem to tip the balance towards a new attention on cannabis through restrictive measures.

Cannabis: a substance under continuous control

Origins of control

Cannabis has been used for a variety of purposes for thousands of years. Yet in Europe, consumption remained mostly limited to experimentation by small elites or to those having contact with specific countries, in particular North Africa and India (Booth, 2003). There is significant evidence to suggest that cannabis has always been a controversial or troubled substance, and was placed under some sort of restriction almost as soon as its psychoactive effects were discovered.

In 2000 BC in India, religious authorities used cannabis in holy rituals and it is likely that only priests had access to it (Booth, 2003). In the Muslim world in medieval times there existed an ambivalent attitude towards the use of cannabis (Hamarneh, 1957). Hashish, furthermore, had derogatory associations with Sufism and as a precipitator of

madness (Booth, 2003). Key critics of cannabis include the theologian Ibn Taymiyyah, the judge Ibn Ganim and historian Al Magrii. Much-cited examples of controls include the prohibition in 1265 of cannabis in Damascus by King al-Zahir Baybars (Hamarneh, 1957), and the destruction of cannabis plants and prohibition of cannabis use in 1378 by the Ottoman emir of Egypt, Soudoun Sheikouni (Rosenthal, 1971; Caballero and Bisiou, 2000; Arana and Márquez, 2006). In Europe in 1484 Pope Innocent VIII associated the use of hashish with witchcraft in the bull *Summis Desiderantes* (Booth, 2003). Such examples, though anecdotal, illustrate that controversy surrounding cannabis use is not a new phenomenon.

Some precursors of controls relating to cannabis can be found in Europe's colonial period, though outside the continent itself. Following Napoleon's invasion of Egypt in 1798, in 1800 he prohibited his soldiers to smoke or drink the extracts of the plant, imposing a penalty of imprisonment of three months, thus implementing perhaps the first 'penal law' on cannabis. A law in South Africa in the 1870s, that was tightened in 1887, prohibited the use and possession of *dagga* (cannabis) by Indian immigrants, largely in response to a perception that its use by them was dangerous for white rule (Booth, 2003). In India, prohibition of cannabis was mooted in 1838, 1871, 1877 and, most famously, rejected following an extensive 3000-page report by the *Indian Hemp Drugs Commission* in 1894. Nonetheless, despite rejections of a blanket ban, various Indian cities and states issued quotas, tax regimes or restrictions on cannabis (Booth, 2003).

While familiarity with cannabis products in the pharmaceutical sphere was widespread in the early 20th century (Lewin, 1924; Fankhauser, this monograph), within Western Europe there is little evidence of significant cannabis prevalence and criminal prosecutions until after the Second World War. Cannabis control is best viewed in the context of national and international initiatives in the area of drug control during the late 19th and early 20th centuries — in particular, relating to opiates, together with increased supervision of pharmaceutical products in general. Controls in Europe focused on regulating pharmaceutical use of cannabis. For example, in Germany, the first legal act on cannabis was in a Pharmacy Ordinance of 1872 when the sale of Indian hemp was limited to pharmacies (this ordinance was still valid in 1920) (see Fankhauser, this monograph).

However, in Greece and near-neighbour countries such as Turkey and Egypt, cannabis prevalence was higher and attracted strong legal responses. Hashish possession was made a capital offence in Egypt in 1868, with a tax on cannabis imposed in 1874, although exemptions for non-Egyptians and enforcement issues led to them being ineffectual (Booth, 2003). In Turkey a nationwide campaign to confiscate and destroy cannabis was begun by the Sultan in 1877, and an import ban imposed in 1879; in 1884 cultivation of cannabis became a criminal offence (Abel, 1980). In Greece

cultivation, importation, and usage of cannabis was banned in 1890, based on concern for hashish use among the poor. Nonetheless, Greece was a significant exporter of hashish to Turkey and Egypt into the 1920s (Abel, 1980).

Prior to the First World War, international agreements on narcotic substances increased the mechanisms of control on opium and related substances. For opiates, the Opium Commission in Shanghai in 1909 contributed to a framework agreement on opium control at the First International Opium Conference in the Hague in 1911–1912. While the Hague conference concentrated on opium, at this conference Italy lobbied for an international ban on cannabis, largely based on hashishisms in its protectorates Tripolitania and Cyrenaica (obtained from Turkey during a war in 1911). In the USA, a number of states also prohibited non-medical use of cannabis: California (1915), Texas (1919) and Louisiana (1924). A parallel development was legal restriction on alcohol use: a ban in Finland (1919) and the USA (1920), and a rationing system in Sweden (from 1914). In Switzerland cannabis was outlawed in 1924.

The key driver of international cannabis prohibition in the early 20th century was an amendment to the International Opium Convention (1925), which was extended beyond opiates to embrace cannabis. The convention prohibited the export of cannabis resin to countries that prohibited its use (Bayer and Ghodse, 1999). The process behind the inclusion of cannabis in the convention has been both heavily discussed (e.g. Lowes, 1966) and roundly criticised (e.g. Kendell, 2003; Holzer, 2004). There is consensus that the cannabis subcommittee advising the Second League of Nations Opium Conference succumbed to strong Egyptian demands for a ban on cannabis and that delegates were certainly given little time to conduct due diligence on materials (Booth, 2003; Kendell, 2003; Holzer, 2004).

Following the approval of the 1925 International Opium Convention, European countries gradually outlawed cannabis use and possession (e.g. the UK's *Dangerous Drugs Act*, 1928; Germany's second *Opium Law*, 1929). Nonetheless, the first substantial wave of convictions for cannabis offences did not occur until the 1960s. Official crime reports in the 1960s and 1970s did not differentiate cannabis convictions from those for other illicit drugs, yet studies suggest that there were very few cases other than cannabis. Böllinger suggests that the bulk of the less than thousand 'narcotics cases' (police registrations) before 1960 in Germany related to the 'stem of old morphinists' (Böllinger et al., 2002). In Canada the first known seizure of marijuana did not occur until 1932, but widespread enforcement is reported much later, with a total of 261 convictions for drug offences in 1960 (the majority, however, for heroin offences). In the Netherlands, in the first half of the 20th century, no problems or social controversy are reported on cannabis, but the opium law was revised in 1953 to include cannabis and comply with international treaties. Thus, some authors (e.g. Fischer et al., 1998) have argued that prohibition was introduced mainly in response to international

obligations — in a broader diplomatic context — than to answer to an urgent problem
at national level between law and enforcement (or necessity of it), as 'the solution
without the problem' ([2]).

International law

The United Nations Single Convention on Narcotic Drugs (1961) elevated the control on
narcotic substances and on cannabis to a global level. Under the system introduced in
1961 (mainly imported from previous treaties), cannabis is to be considered as one of
the most dangerous existing drugs ([3]).

This section discusses the texts of the UN Convention. While this approach may appear
legalistic to the non-specialist reader, a thorough understanding of the legal status of
cannabis under international law is vital for understanding the 'room for manoeuvre'([4])
given to different countries on the issue.

Cannabis, cannabis resin and extracts and tincture of cannabis are listed in Schedule
I of the 1961 Convention among substances whose properties might give rise to
dependence and which present a serious risk of abuse, which are subject to all control
measures envisaged by the Convention ([5]). Cannabis and cannabis resin are again
listed in Schedule IV of the 1961 Convention, which comprises 15 substances already
listed in Schedule I that are considered particularly dangerous by virtue of their harmful
characteristics, risks of abuse and extremely limited therapeutic value. Among these
15 substances, we find heroin and cannabis but not cocaine, which is (only) listed in
Schedule I.

([2]) Giffen et al. (1991) affirm that 'unlike other narcotic drugs brought under federal control up to the
    1920s, marijuana was added to the Schedule I in 1925, before it came to be defined as a social
    problem in Canada. Why this was so remains a mystery'.
([3]) Article 2.5(a) of the 1961 Convention introduces the concept of dangerousness for substances
    included in schedule IV.
([4]) 'Room for manoeuvre' was the title of a report commissioned by the British charity Drugscope,
    with a focus on the UN conventions and potential changes to UK drugs possession laws (Dorn and
    Jamieson, 2000).
([5]) There are four schedules under the 1961 Single Convention on Narcotic Drugs: Schedule I — those
    substances which are, inter alia, having, or convertible into substances having a liability to abuse
    comparable to that of cannabis, cannabis resin or cocaine; Schedule II — having addiction-producing
    or addiction-sustaining properties not greater than those of codeine but at least as great as those of
    dextropropoxyphene; Schedule III — preparations which are intended for legitimate medical use, and
    which the WHO considers not liable to abuse and cannot produce ill effects, and the drug therein is
    not readily recoverable; and Schedule IV — substances that are particularly liable to abuse and to
    produce ill effects, and such liability is not offset by substantial therapeutic advantages not possessed
    by substances other than drugs in Schedule IV.

As specified by the 2001 INCB Annual Report, 'to be included in Schedule IV, a drug has to be considered particularly liable to abuse and to produce ill effects, and such liability should not be offset by substantial therapeutic advantages'. In the view of the delegations present at the Plenipotentiary Conference that prepared the 1961 Convention, cannabis certainly presented such characteristics (though cocaine, for example, did not). THC, the main psychoactive ingredient of cannabis, is also listed by the 1971 Convention on Psychotropic Substances, in the first of four schedules, its use being prohibited except for scientific and very limited medical purposes (Article 7a) ([6]).

This composite classification reflects the concern about the abuse of cannabis and the desire of the convention promoters to advise countries to design, under national legislation, the most stringent control on cannabis ([7]). Indeed, this *double classification* (Schedule I plus Schedule IV, 1961 Convention) allows signatory countries to adopt any special measures of control regarded *as necessary*, including prohibition of use, due to the 'particularly dangerous properties' of the drugs listed in Schedule IV. However, a country shall adopt any special measures of control *if considered necessary* having regarded the particularly dangerous properties of drugs in Schedule IV ([8]). The non-obligation of this norm, in fact a condition for its implementation, is confirmed by the UN Commentary on the 1961 Convention, which restates that a party is 'obliged to apply special measures only if it believes them to be necessary' ([9]).

([6]) There are four schedules under the 1971 UN Convention on Psychotropic Substances: Schedule I — substances whose liability to abuse constitutes an especially serious risk to public health and which have a very limited, if any, therapeutic usefulness; Schedule II — substances whose liability to abuse constitutes a substantial risk to public health and which have little to moderate therapeutic usefulness; Schedule III — substances whose liability to abuse constitutes a substantial risk to public health and which have moderate to great therapeutic usefulness; and Schedule IV — substances whose liability to abuse constitutes a smaller but still significant risk to public health and which have a therapeutic usefulness from little to great.

([7]) The UN documents of the years preceding the signatures of the 1961 and 1971 Conventions confirm a particular concern towards cannabis. In 1959 countries were requested 'to increase their efforts to suppress the illicit cultivation of cannabis' (CND Decision 14 December (XIV) April/May 1959). In 1968 they were recommended to 'increase their efforts to eradicate the abuse of and illicit traffic in cannabis' or to 'promote research and advance additional medical and sociological information regarding cannabis, and effectively deal with publicity which advocates legalisation or tolerance of the non-medical use of cannabis as a harmless drug (Economic and Social Council E/RES/1968/1291(XLIV), 1520th Plenary Meeting, 23 May 1968, on the abuse of cannabis and the continuing need for strict control). An extract from E/RES/1959/730(XXVIII)E 1088th Plenary Meeting, 30 July 1959, reads as follows: 'Recalling that the third draft of the Single Convention on Narcotic Drugs contains an express provision for the prohibition of the medical use of cannabis drugs except in certain systems of indigenous medicine'. An extract from Economic and Social Council Resolution IV(XII) on the question of cannabis, April/May 1957, 'Requests all Governments to abolish, except for medical (Ayurvedic, Unani and Tibbi systems) and scientific purposes, the legal consumption of all substances having a cannabis base within a reasonable period where it has not been done so far'.

([8]) Article 2.5(a), 1961 Convention.

([9]) UN Commentary on the 1961 Single Convention (p. 65).

It seems, therefore, that the 1961 Convention suggests to apply the most stringent control system to cannabis, yet leaves countries some flexibility in their interpretation of the *necessity* of such control. According to this classification, use and possession of cannabis should not be allowed except for authorised medical or scientific purposes (Articles 4c, 33, 36, 1961 Convention). Countries are requested to prevent its misuse (Article 28, 1961 Convention) and take all practicable measures for the prevention of its abuse (article 38, 1961 Convention). They should also not permit its possession (Article 33, 1961 Convention) and if they decide to do so, they are entitled to make possession of cannabis a punishable offence (Article 36, 1961 Convention), and are mandated to make possession for the purpose of trafficking an offence of criminal nature (Article 3, paragraph 1(a)(iii), 1988 Convention). Possession for personal consumption may also be criminalised (Article 3 paragraph 2, 1988 Convention).

This system of provisions leaves no doubt about the severity requested towards cannabis and it is evident that signatory countries cannot allow non-medical use of cannabis, such as in a hypothetical *legalisation regime*, without renouncing the UN Conventions. They must set measures to discourage, prevent or — if considered necessary — prohibit and punish personal use of cannabis ([10]).

All this is, however, largely based on the *acceptance* of the Conventions by the signatory countries. This means that countries must judge the *opportunity* and *necessity* of applying the convention norms. Conventions are, in fact, not *self-executing* and in the transposition of the international dictate into national law, countries are allowed discretion, while applying the principle of good faith in interpreting international agreements. This is visible throughout in the presence of safeguard clauses in the text of the Conventions: *subject to constitutional limitations* (Article 36.1, 1961 Convention); *subject to basic concepts of national legal systems* (Article 3, paragraph 2, 1988 Convention); *the Parties shall as far as possible* (Article 26, paragraph 2, 1961 Convention); *these measures are necessary or desirable* (Article 22 and Article 30, paragraphs 2 and 4, 1961 Convention). Nevertheless, states should interpret treaties in good faith and in the light of their object and purpose, according to Article 31 of the 1969 Vienna Convention on the Law of Treaties.

A constant quest for evidence

By 1970, 64 states had ratified the Single Convention on Narcotic Drugs and with it the control system required for cannabis. Nevertheless, the fact that cannabis was treated no differently, even more strictly, than other substances that were perceived to be more dangerous provoked uncertainty within governments and parliaments.

([10]) An expression that, according to the country considered, might mean use of cannabis or possession of small quantities of cannabis for personal use or both.

There is evidence to suggest that disagreements embraced the question of the international *classification(s)* of cannabis from its beginning. Already, during the Plenipotentiary Conference, which drafted the 1961 Convention, controversies arose around the question of whether the prohibition of drugs in Schedule IV should be mandatory or only recommended. More recently, some authors see the insistence of certain countries to place cannabis under the strictest control regime in the convention as the main reason for such classification (Canadian Senate Report on Cannabis, 2002). Others go so far as to use the words 'arbitrariness' when addressing cannabis classification (Caballero and Bisiou, 2000).

Evidently, the question of the classification of cannabis or of its derivatives is controversial and has arisen from time to time [11]. In 2003 the WHO Expert Committee on Drug Dependence [12], following a *Critical Review* [13], recommended the rescheduling of dronabinol (THC, the main active principle of cannabis), to Schedule IV of the 1971 Convention [14]. This would mean that the active principle of cannabis would be moved from a schedule where substances have very limited, if any, therapeutic usefulness and their abuse constitutes an especially serious risk to public health, to a schedule where substances have some therapeutic usefulness with a smaller (but still significant) risk to public health due to their liability of abuse. If implemented, this would probably have important consequences on the overall classification of cannabis and on its control requirements worldwide, but no further procedural steps have been taken.

[11] ARF/WHO Scientific Meeting on Adverse Health and Behavioural Consequences of Cannabis Use, WHO and the Addiction Research Foundation of Ontario, 1981; *Cannabis: a health perspective and research agenda*, Division of Mental Health and Prevention of Substance Abuse, World Health Organisation, 1997.

[12] The WHO Expert Committee has the task of carrying out medical and scientific evaluations of the abuse liability of dependence-producing drugs falling within the terms of the 1961 Single Convention on Narcotic Drugs and the 1971 Convention on Psychotropic Substances. It then makes recommendations to the United Nations Commission on Narcotic Drugs on the control measures, if any, that it considers appropriate. The Expert Committee's reports are published by WHO in the Technical Report Series.

[13] A Critical Review is an assessment process in which the Expert Committee, on the basis of (1) a notification from a Party to the 1961 or the 1971 Convention concerning the scheduling of a substance; (2) an explicit request from the UN Commission on Narcotic Drugs to review a substance; (3) a pre-review of a substance which has resulted in a recommendation for critical review; (4) information sent to the attention of the WHO that a substance of especially serious risk to public health and society, and of no recognised therapeutic use by any Member State, is clandestinely manufactured, with analysis of the substance according to its similarity to known substances and effects on the central nervous system, dependence potential, actual abuse and/or evidence of likelihood of abuse, therapeutic usefulness, and providing recommendations for scheduling or non-scheduling.

[14] The WHO Expert Committee report recommend that 'all stereochemical variants of delta-9-tetrahydrocannabinol be moved to Schedule IV of the 1971 Convention', and that this is 'to avoid placing different stereochemical variants of the same substance under different control systems'. We have, in fact, to remind that in 1990 the WHO Expert Committee proposed the rescheduling of dronabinol, a stereochemical variant of delta-9-tetrahydrocannabinol, to Schedule II of the 1971 Convention.

In response to the WHO, the INCB expressed its concern in its 2003 report about this possible rescheduling of THC. In March 2006 the WHO Expert Committee on Drug Dependence concluded that dronabinol (THC) constitutes a substantial risk to public health, but the risk is different from that of cannabis, and it has moderate therapeutic usefulness. As a result, it recommended that dronabinol and its stereoisomers should be rescheduled from Schedule II to Schedule III of the 1971 Convention (WHO, 2006). At the 50th UN Commission on Narcotic Drugs in March 2007, members agreed to postpone any decision on dronabinol until more conclusive evidence is available, although firm opposition to the rescheduling was expressed by some delegates.

At the level of national authorities, evaluations of cannabis have been carried out on a regular cycle. The first 'official' enquiries date back to the late 19th and early 20th centuries, for example the Indian Hemp Drugs Commission in 1894, the *Panama Canal Zone Report* in 1925 and the *La Guardia Report* in 1944. The frequency of publication of such enquiries, however, picked up from 1969 onwards and has led to a proliferation of 'official' enquiries in the 1990s and 2000s. Despite their differences in scope, methods and conclusions, the recommendations of these, and older enquiries, reveal interesting common patterns. Three have been isolated for simplicity: (1) cannabis is not a harmless substance; (2) its dangers, in comparison with other controlled substances, have been overstated; and (3) civil sanctions, fines, or compulsory health assessments should be established in place of criminal penalties for personal use offences (Table 1).

Conclusion of reviews 1: cannabis is not a harmless substance

Cannabis is a substance that poses some kind of threats to health for which certain control would be justified. The UK Wootton Report in 1968 affirms that the '*adverse effects that cannabis consumption, even in small amounts, may produce in some people, should not be dismissed as insignificant*' ([15]). These words were echoed more than 30 years later by the UK *Report of the Advisory Committee on Drug Dependence*, which stated in 2002 that its use '*unquestionably poses risks both to individual health and to society*' (UK Home Office, 2002). This view is also mirrored by other enquiries. For example, the inquiry for the Prime Minister of Jamaica in 2001, affirming that '*it is accepted that cannabis is not entirely safe*, even where it is still used for traditional religious rituals, such as in Jamaica', and that '*despite its proven folk medicinal qualities, its use can be injurious to health*' (National Commission on Ganja, 2001). The general attitude is that cannabis and its derivatives should be maintained as controlled drugs (UK House of Lords, 1998), as governments are responsible for restricting the availability of harmful substances, in particular to prevent the exposure of young people (Canada, 1970; Australia, 1994; New Zealand,1998).

([15]) UK Home Office (1969): cover letter to the Wootton Report sent to the Home Secretary by Chairman Mr Edward Waine, 1 November 1968. See also Abrams, this monograph.

Table 1: Summary of governmental reviews on cannabis control

Title of report	Country	Year
Cannabis: Report by the Advisory Committee on Drugs Dependence ('The Wootton Report')	United Kingdom	1969
Le Dain Report	Canada	1970
Baan and Hulsman Commissions	The Netherlands	1970, 1971
Report of the Expert Group on the Effects of Cannabis Use	United Kingdom, Home Office Advisory Council on the Misuse of Drugs	1982
Legislative options for cannabis use in Australia, Monograph No. 26	Australia	1994
Inquiry into the Mental Health Effects of Cannabis, Report of the Health Committee, AJHR, I.6A	New Zealand	1998
House of Lords Science and Technology Select Committee, Ninth Report, Cannabis: the scientific and medical evidence, HL 151 1997–98	United Kingdom	1998
Swiss Federal Commission for Drug Issues, Cannabis Report	Switzerland	1999
A Report of the National Commission on Ganja to Rt Hon. P. J. Patterson, QC, MP, Prime Minister of Jamaica	Jamaica	2001
The Senate Special Committee on Illegal Drugs, Cannabis: our position for a Canadian public policy	Canada	2002
Report by the Advisory Committee on Drug Dependence, Home Office, The Classification of Cannabis under the Misuse of Drugs Act 1971	United Kingdom	2002
Rapport de la Commission d'enquête du Sénat français sur la politique nationale de lutte contre les drogues illicites, No. 321	France	2003
Report by the Advisory Council on the Misuse of Drugs, Home Office, Further consideration of the classification of cannabis under the Misuse of Drugs Act 1971	United Kingdom	2005

Conclusion of reviews 2: the dangers have been overstated

The identification of cannabis as a potentially dangerous psychoactive substance did not, however, prevent a substantial number of these enquiries to explore the issue of whether current legislation reflected the real dangers posed by cannabis. Already in 1944, the *La Guardia Committee Report on Marihuana* concluded that 'the practice of smoking marihuana does not lead to addiction in the medical sense of the word' and that 'the use of marihuana does not lead to morphine or heroin or cocaine addiction' (Zimmer and Morgan, 1997). In 1968 the Wootton Report stated that 'the dangers of cannabis use as commonly accepted in the past and the risk of progression to opiates have been overstated' and 'cannabis is less harmful than other substances (amphetamines, barbiturates, codeine-like compounds)'. A similar conclusion was

arrived at 34 years later in 2002 when the Advisory Committee on Drug Dependence proposed the reclassification of cannabis from Class B to Class C (enforced by law in 2004 and confirmed in 2005). These views were reiterated by other enquiries, such as the *Baan Committee* in the Netherlands, which affirmed in 1971 that 'cannabis use does not lead directly to other drug use' ([16]) or by the US National Commission on Marihuana and Drug Abuse, which in 1973 stated that 'the existing social and legal policy is out of proportion to the individual and social harm engendered by the use of the drug [cannabis]' ([17]). The Canadian *Le Dain* Commission saw 'the UN Single Convention of 1961 as responsible' for such a situation which 'might have reinforced the erroneous impression that cannabis is to be assimilated to the opiate narcotics'. The same commission, however, suggested that the UN Convention did 'not prevent domestic legislation from correcting this impression' ([18]).

Conclusion of reviews 3: personal use offences do not require criminal sanctions

Endorsing these interpretations, a number of enquiries proposed that criminal sanctions should be withdrawn from private use and/or possession for such use, to create instead a criminal exemption scheme or to impose fines, to decriminalise personal use or just to impose compulsory health assessment. These conclusions were largely based on the belief that criminalising the users of small quantities of cannabis could engender far more harm than good to the society as a whole (e.g. Jamaica, 2001), and that such alternative measures would remove the criminal stigma and the threat of incarceration from a widespread behaviour (possession for personal use) which does not warrant such treatment (US National Commission on Marihuana and Drug Abuse, 1973). The Canadian Senate in 1970 argued that 'the criminal law should not be used for the enforcement of morality without regard to potential for harm'. Three years later, the US National Commission on Marihuana and Drug Abuse stated that 'Relieving the law enforcement community of the responsibility for enforcing a law of questionable utility, and one which they cannot fully enforce, would allow concentration on drug trafficking and crimes against persons and property'. The French Senate in 2003 recommended to impose a fine in case of a first offence of drug use (all drugs), and to create an obligation for health or social measures. In 2002 the UK Advisory Committee on Drug Dependence proposed a reclassification of cannabis in the list of controlled substances. The UK government, which endorsed the recommendations to move cannabis from

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([16]) In Cohen, P. (1994), *The case of the two Dutch drug policy commissions. An exercise in harm reduction 1968–1976*. Paper presented at the 5th International Conference on the Reduction of Drug Related Harm, 7–11 March 1994, Addiction Research Foundation, Toronto. Revised in 1996.

([17]) *Marihuana: a signal of misunderstanding. The official report of the National Commission on Marihuana and Drug Abuse*, Raymond P. Shafer, Chairman (1973), 211.

([18]) Le Dain, G. et al., *Cannabis: report of the Commission of inquiry into the non-medical use of drugs*. Ottawa: Government of Canada in Report of the Senate Special Committee on Illegal Drugs, 'Cannabis: our position for a Canadian public policy', September 2002, Volume II, 278.

Class B to Class C, pointed out that reclassification does not mean that cannabis is legalised or decriminalised, and that possession for personal use still carries a maximum sentence of two years in prison. Yet, following reclassification in the UK, it is unlikely that adults caught in possession of cannabis will be arrested, the usual outcome being a warning and confiscation of the drug. Nonetheless, some instances may lead to arrest and possible caution or prosecution, including repeat offending, smoking in a public place, instances where public order is threatened and possession of cannabis in the vicinity of premises used by children.

A few enquiries went even further, recommending the regulation of cannabis consumption and sale. The Senate Special Committee on Illegal Drugs in Canada recommended in 2002 that the government amend the Canadian legislation in order to create a criminal exemption scheme that would allow 'for obtaining licences as well as for producing and selling cannabis'. The Senate also asked, as a consequence of this legislative modification, for an amnesty to be declared for any person convicted of possession of cannabis under current or past legislation [19]. Illegal trafficking and export would still attract criminal penalties. In Switzerland, in 1999, the Federal Commission for Drug Issues recommended the removal of the prohibition of consumption and possession of cannabis, and the possibility for cannabis to be purchased lawfully. According to the Federal Commission, clear provisions for the protection of the young and the prevention of all the potential adverse consequences of legalisation ought to be included in the new system. The commission suggested that if the government accepted this model, Switzerland should renounce the Single Convention of 1961 given that these provisions were not compatible with international drug control agreements. In Australia, in 1994, the study undertaken by the government, *Legislative options for cannabis use in Australia,* concluded, more ambiguously, however, that 'cannabis law reform is required' and that the reform should be one 'within the broad categories of prohibition with civil penalties, partial prohibition and relatively free but regulated availability'.

The value of these inquiries — while in many cases limited in the strict scientific point of view — lies in their political significance. The overall picture suggests that cannabis consumption potentially poses risks both to individual health and to society, and on this basis some sort of legal control seems justified. At the same time, it is acknowledged that the dangers of cannabis have in some cases been overstated, that there has been a lack of separation between cannabis and other more dangerous substances and that its consumption does not necessarily lead to crime or other drug use. Alternative forms of criminal sanctions, such as civil sanctions, fines or compulsory health assessments, have been suggested. In a few cases, enquiries have included in their suggested options the regulation of cannabis consumption and sale, while drawing attention to the political impracticability of the option.

[19] Report of the Senate Special Committee on Illegal Drugs, 'Cannabis: our position for a Canadian public policy', September 2002, Volume III, recommendations nos. 6 and 7, p. 618.

European Union countries

Classification of cannabis

As far as the classification of cannabis at national level is concerned, the variety of laws and procedures within the EU reflect both the severe requirements as suggested by the UN Conventions and the 'room for manoeuvre' at Member State level. Legislation may be organised into a 'pyramid': on the bottom tier are those legal systems where cannabis is fundamentally considered as different from other drugs; at the top are those in which cannabis is treated on a par with all other drugs, but where prosecutorial instructions or even judicial discretion in practice apply a distinction between substances, usually based on criteria regarding the nature of the substance. Four general groups of countries can be identified in which cannabis is classified and controlled differently from other drugs, being thus subject to a different prosecutorial approach. These approaches are as follows: *classification by law*; *exemption to the law*; *exception by guidelines*; or *exception due to judicial discretion*.

Firstly, in certain countries, lists established in or directly linked to the laws are used to determine different legal degrees of severity in control and prosecution of offences. Cannabis is included in those lists that do not request the maximum legal response. For example, in Cyprus, the Netherlands and the United Kingdom, the respective laws classify cannabis in lists where the level of severity demanded in response to offences is not as strict as for substances included in other lists. Strikingly, no other substance listed in Schedule IV of the 1961 Convention has received this treatment.

Secondly, the law may consider drugs to be equally classified but provide specific *exemptions* for the prosecution of cannabis offences. In countries such as Ireland, Belgium and Luxembourg, cannabis is either legally classified amongst those substances presenting a serious risk of abuse, no medical value and subject to all control measures, or it is included in the general list of controlled substances which do not distinguish between such substances based on health risks. However, the national laws or penal codes introduce specific distinctions for cannabis possession that can render prosecution or sentencing for cannabis more lenient than for other drugs. In Greece, cannabis is classified on an equal footing to other drugs but production or cultivation of cannabis is legally distinguished from production or cultivation of other drugs for personal use. In Spain, classification of drugs is analogous to the UN Schedules, but there is a distinct lower penalty range for trafficking in drugs that are not considered as 'very dangerous substances', and jurisprudence shows this to be interpreted as cannabis. Less specifically, in Poland, while cannabis is classified in a way similar to the UN Conventions, the laws establish the category of a 'minor' drug possession offence, which may take into account the substance nature when determining if the offence qualifies as 'minor'. In practice, this may be attributed to first time personal use of cannabis.

A third variant is visible in those countries in which cannabis is legally classified in the most stringent lists and the law or penal code does not provide for any exemptions. However, *prosecutorial guidelines* or *judicial precedent* indicate that a distinction should be made based on the *nature* of the substance when prosecuting. In Denmark a State Prosecutor directive and in Germany a Constitutional Court decision request less severe measures for possession of cannabis for personal use.

In a separate group of countries (e.g. Czech Republic, Estonia), cannabis is not classified differently from other drugs and the law does not differentiate among substances, that is, drug offences attract the same penalty regardless of the substances involved. In this group there are no prosecutorial guidelines in favour of a less severe approach to cannabis. Nonetheless, the *nature* of the substance is one of the criteria (together with the quantity, previous criminal records, and other circumstances) considered by prosecutorial or judicial discretion when deciding to reduce the charges or not prosecute an offender. Cannabis may be included in this category as a 'less dangerous' drug.

The evidence available thus implies that, although international policy suggests that cannabis ought to be classified as one of the most dangerous substances to which the most severe controls apply, this is not often transposed as such across the different European national criminal justice systems. Nevertheless, the different interpretations of international conventions can be visible 'de jure' or 'de facto'. They can be managed either by *legal classification*, or by specific mention in the *law or penal code*, or by *prosecutorial guidelines*, or by the *discretionary powers* proper to each judicial system. The choices between 'de jure' or 'de facto' options might reflect different political attitudes towards cannabis.

Personal use of cannabis ([20])

Based on laws passed in parliament, ministerial directives or prosecutorial guidelines, a variegated picture emerges of the overall legal attitude towards personal use of cannabis. Nonetheless, despite the different legal approaches towards cannabis, a common trend can be seen in the development of alternative measures to criminal prosecution for cases of use and possession of small quantities of cannabis for personal use without aggravating circumstances. Fines, cautions, probation, exemption from punishment and counselling are favoured by most European justice systems. The EMCDDA maintains a table enabling comparison of legislation regarding cannabis offences on its website ([21]).

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[20] 'Personal use' here applies to offences for simple use or possession exclusively for personal consumption, and where other finalities are excluded (although legal definitions vary, these usually involve small quantities and absence of aggravating circumstances).
[21] See eldd.emcdda.europa.eu/index.cfm?nNodeID=5769

In the European countries considered for this chapter, personal use of cannabis attracts administrative sanctions ([22]) or alternatives to custodial sanctions in 16 countries. This suggests that in many European countries considered, *personal use of cannabis* is an offence that attracts sanctions such as fines and deprivation of certain rights, for example suspension of driving licence, or other measures such as cautioning, discontinuance or suspension of proceedings or, if needed, referral to treatment, but does not lead to imprisonment. Indeed, drug policies in many European countries seem to concur that criminal action against non-problematic use/possession of cannabis should receive the lowest prosecutorial priority ([23]).

Cannabis legislation: between global consistency and national leniency

In recent years cannabis or general drugs laws have been substantially modified in a number of European countries. In Portugal, drug use was decriminalised in 2000. In Luxembourg in 2001 penalties for cannabis use and possession passed from imprisonment to fines. In Belgium in 2003, following a similar approach, legislation was introduced that would attract a police registration and fine for the first two cannabis use prosecutions, although police registration was annulled by the ruling of the Belgian Court of Arbitration in 2004. The United Kingdom reclassified cannabis from a Class B to Class C drug in 2004. These are in line with the conclusions of the inquiries described above. The cannabis issue has been strongly debated in recent years in France, Switzerland, Italy and the Netherlands, fuelled by a number of legislative proposals. Some debate has embraced the legal status of cannabis used for therapeutic purposes. For example, in the Netherlands a project to supply cannabis to patients was established from 2003, with an Office of Medicinal Cannabis strongly regulating supply. However, demand has proven lower than expected (1 000–1 500 patients, or around one-tenth of predicted demand), although the policy was renewed for a 5-year period in November 2007.

Modification — or proposed modification of cannabis laws — have often been accompanied by heated debate in the media. The political sensitivity of moving away from strict control has caused governmental apprehension, and concern has also been manifested at the international level. The UN control system has taken a position on cannabis in several instances: the INCB has repeatedly raised objections to the way some EU countries deal with cannabis offences, in particular where personal use is

([22]) 'Administrative sanctions' applies to sanctions not including imprisonment, such as fines or other non-criminal measures.
([23]) EMCDDA (2002) *Prosecution of drug users in Europe*, p. 69, and Rand Europe (2003), *Cannabis policy, implementation and outcome*.

concerned. The Netherlands has often been criticised by the INCB for its 'coffee shop' policy, and also Luxembourg, Portugal and the United Kingdom have been the object of scrutiny for their new laws on cannabis, allegedly because of their non-alignment with international drug control treaties ([24]). This message was again made clear in a chapter on 'the new [high potency] cannabis' in the UNODC's 2006 *World Drugs Report*, which stated that 'It is essential (…) that consensus be regained, and that what is truly a global issue is again approached with consistency on a global level. After all, it is for precisely this that the multilateral drug control system was designed.'

Such calls for awareness on the presumed cannabis leniency and the danger that such a 'soft line' on cannabis could provoke have not fallen on deaf ears. Without suggesting a direct link, some acknowledgement may be detected in the 2004 EU Council Resolution on cannabis, and increased scrutiny of cannabis in some EU countries. In Denmark, where since the 1970s people caught for possession of cannabis (for personal use) were just warned, a new directive of 2004 advises prosecutors that a fine should now be the norm. In the Netherlands, the government adopted an action plan to reduce the use of cannabis. In Italy, a country where since 1993 cannabis was officially considered to be different from other drugs, a 2006 law eliminated this difference on the assumption that all drugs are dangerous. In France, in 2005, a new campaign was launched on the risks of cannabis for young people after the government turned down the possibility of substituting penal sanctions with administrative fines for cannabis consumption, adducing that such a modification could have been interpreted as recognition of the 'weak dangerousness' of cannabis and could lead to an increase in consumption ([25]).

To conclude, there is sufficient evidence to confirm that the legal approach to *personal use* of cannabis is far from homogeneous across the European countries. Nevertheless, avoiding imprisonment seems to be the trend for *personal use* offences, which can be applied more or less openly, through the law or through prosecution powers. However, there are some efforts to limit this trend. A rise in concern is visible at international and national level. An alleged increase of THC content (see King, this monograph) and increased demand for treatment with cannabis being the primary drug have contributed to this concern. The UN system openly condemns 'lenient policies' and recent policy shifts in some Member States suggest a renewed attention towards cannabis. Overall, it is interesting to note that while drug policies which appeared in the 1990s and early 2000s suggested a non-criminal approach to personal use of cannabis, more recent policies seem to tip the balance back towards more restrictive measures.

([24]) See International Narcotics Control Board (INCB) Reports 1999, 2001 and 2002.
([25]) *Plan gouvernemental de lutte contre les drogues illicites, le tabac et l'alcool 2004–2008*. Available at: www.drogues.gouv.fr

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Chapter 8
In thinking about cannabis policy, what can be learned from alcohol and tobacco?

Keywords: alcohol – cannabis – economics – environmental strategy – polydrug consumption – prohibition – regulation – taxation – tobacco

Setting the context

Cannabis is just one of many psychoactive substances used in Europe for recreational and therapeutic purposes. Research into the topic has never really ignored this real-life polydrug use. Most joints contain tobacco. A cannabis session often includes the consumption of alcoholic drinks. These are givens. Nonetheless, only recently have professionals working in the area of cannabis control genuinely begun to look at the 'cross-substance' effects of legislation targeted at other, legal, substances such as alcohol and tobacco.

This is not to say that there has been a revolutionary shift towards examining the interrelationships of polydrug consumption. The epidemiological regime — which splits drug taking along neat substance-specific lines (cannabis, ecstasy, cocaine, etc.) — remains in place. Rather, there has been a shift in national drug strategies — at least in Europe — to erode the *substance-specific approach* which traditionally segregated activity on licit psychoactive substances from activity on illicit drugs (¹). Politically, it is no longer taboo to compare legal and illegal substances. The recent advent of smoking bans in Europe represents a golden opportunity to measure the knock-on effects on consumption of other substances. Moreover, evidence on the effects of decriminalisation of cannabis (that is, lower penalties for personal possession) in many European countries during the early 2000s is now filtering into the policy literature.

This chapter does not retread the well-worn track of comparative drug harm indexes and the relative harms of cannabis and society's chosen licit drugs. Instead, it examines the

(¹) EMCDDA *Annual Report 2006*, selected issue: 'European drug policies: extended beyond illicit drugs?'.

ways in which the market for licit substances has been subject to government control, together with brief commentary on the merits of these interventions. The 'elephant in the room' has been dutifully ignored. There are no 'what-if' scenarios on how market controls could be transposed to cannabis in a post-legalisation environment. A postscript to this chapter provides a range of sources for further reading on the topic of mooted cannabis regulation. However, for the time being, any such options would require a huge shift in the political balance, which currently appears to be, if anything, more tipped in the favour of increased controls on cannabis rather than liberalisation (see Ballota et al., this monograph).

Further reading on the regulation of alcohol and tobacco

Alcohol

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In thinking about cannabis policy, what can be learned from alcohol and tobacco?([2])

Robin Room

If caffeine and other such banalised psychoactive substances are left out of consideration, almost everywhere in Europe today cannabis is one of the 'big three' of psychoactive substances, along with alcohol and tobacco. Although the international drug control system applies continuing pressure against it, cannabis has taken on a semi-legal status in many parts of Europe, at least at the level of the user.

This raises the question, what can be learned from the extensive literatures on alcohol and tobacco policy which might be useful in thinking about cannabis policy? The question is obviously applicable in a situation where cannabis has a legal or semi-legal status. It also has some applicability where cannabis has a clearly illegal status. Total prohibition was once fairly common in both the tobacco (Austin, 1978) and alcohol fields, in the case of alcohol applying less than a century ago in many parts of Europe — Norway, Finland, Iceland, the Russian Empire and then the early Soviet Union. Studies of what happened during alcohol prohibition, and also of what happened with legalisation, are of interest in thinking about cannabis policy.

Taking into account the alcohol and tobacco experience is particularly important because the field of empirical studies of cannabis policy is so little developed. A landmark in this field is the sustained effort by MacCoun and Reuter (2001) to assemble the evidence on the likely results of illicit drug legalisation in the USA. A byproduct of this study, however, was an underlining of how weak the evidence base is in this area. A recent review of 'the contribution of economics to an evidence-based drugs policy' (MacDonald, 2004) found agreement that illicit drug use showed some responsiveness to price, but that 'there is not yet a consensus on the possible range of price elasticities for certain drugs'. Evidence on the effects of depenalisation of marijuana still depends on a rather small range of studies (Single, 1989; MacCoun and Reuter, 2001; Donnelly et al., 2000), in some cases of paradoxical instances where the reach of the criminal law actually widened (Single et al., 2000).

([2]) This paper draws in part on Room (2005).

Traditions of studying the impact of alcohol and tobacco policies

Alcohol policy impact studies

There is a very substantial literature on the effects of alcohol control policy changes on drinking amounts, patterns and problems. Data used in these analyses has primarily been of two types: social and health statistics, such as alcohol sales data, police statistics and mortality and hospital discharge data; and before-and-after surveys, mostly cross-sectional but in a few cases longitudinal. Some studies have included control sites, and one or two notable studies have included a random assignment to intervention or control condition (e.g. Norström and Skog, 2003).

Alcohol policy impact studies have primarily been carried out in a limited range of countries, generally excluding both the developing world (Room et al., 2002) and Southern European wine cultures. Even between somewhat similar societies, there are substantial variations in the research emphasis on particular topics (Room, 2004).

There is an imperfect fit between what those involved in liquor licensing decisions may want to know and what is available in the literature on alcohol controls. This gap between the content of alcohol control legislation and the research literature has been documented in the USA (Wagenaar and Toomey, 2000), but exists also elsewhere — particularly in countries where the tradition of alcohol policy impact studies has not been strong. The studies are sometimes done because a change was controversial in a particular jurisdiction, and funding an evaluation was a way of defusing the controversy. Other studies have been opportunistic, where a researcher seizes the chance to do a 'natural experiment' study ('natural' here means that the researcher did not have a voice in the circumstances of the change, so that the study's design is often constrained). Often studies have made use of available data, such as per-capita consumption data or mortality registers. Since research is usually a national government responsibility, its topical focus is not necessarily attuned to the concerns of local jurisdictions.

Nevertheless, the growth of the literature evaluating the effects of alcohol controls has been a substantial achievement involving a number of national traditions, and lessons from it can be applied, with suitable caution, across jurisdictions, and drawn on in thinking about cannabis policy. Reviews are now available (e.g. Babor et al., 2003; Room et al., 2002) which summarise the findings and implications of the literature. A new step forward, as part of the WHO-CHOICE programme ('Choosing interventions which are cost effective', available at: www3.who.int/whosis/menu.cfm?path=evidenc e,cea&language=english), has been the estimation of the relative cost-effectiveness of different strategies and combinations of strategies to prevent alcohol-related problems (Chisholm et al., 2004), in terms of dollars per saved DALY (disability-adjusted life

Table 1: Comparative cost-effectiveness of alcohol interventions in 'Europe-A' (Chisholm et al., 2004)		
	DALYs saved/million population	Average cost-effectiveness ratio ($/DALY)
Brief medical advice	1889	2351
Tax: current + 50%	1764	258
Tax: current + 25%	1576	289
Tax: current	1365	333
Advertising ban	459	594
Saturday closing for off-sales	251	1087
Random traffic breath tests	247	2467

year). Table 1 shows some of the results from these analyses for the 'Europe-A' WHO subregion, which is roughly coextensive with the European Union. Since evidence was lacking for any effectiveness of mass media persuasion of school-based education, these strategies were excluded from the analysis as having no apparent cost-effectiveness. In terms of cost-effectiveness per DALY saved in developed European countries, then, the policies tested ranked as follows (most cost-effective first): taxes (even without counting the revenues from taxes); advertising ban; closing times (specifically, Saturday closing for off-sales); random traffic breath tests; screening and brief medical advice; and (with no cost-effectiveness) mass media persuasion and school education.

Tobacco policy impact studies

There is also a substantial literature of tobacco policy impact studies. As for alcohol, there are several synthetic reviews of the literature (e.g. Jha and Chaloupka, 1999; Rabin and Sugarman, 2001). Whereas the alcohol policy impact literature aims primarily at assessing the impact of specific interventions, the equivalent tobacco literature is often aimed at assessing the impact of anti-smoking policy packages as a whole (e.g. Siegel and Biener, 1997; Pierce et al., 1998). This partly reflects the reality that policy changes in the tobacco area have often involved the simultaneous application of multiple strategies. It also reflects the different circumstances of the substances in the countries where the main policy impact studies have been done. For alcohol the status quo ante has often been a detailed system of controls on availability and on places and times of use, with the literature often studying what happens when one or more of the controls is removed or relaxed. For tobacco the status quo ante has been very little control on availability, and the literature is primarily studying the effect of initiating measures such as anti-smoking persuasion campaigns, controls on places of use and on age of purchase, and raised prices, which have been increasingly put forward as a coordinated package.

Comparing the alcohol policy and tobacco control literatures, one can find clear differences in emphasis. Taxes loom even larger as a strategy for tobacco than they do for alcohol (see Chaloupka et al., 2001). Although a much greater proportion of the total harms from alcohol than from tobacco are to others, the aim of reducing harm from 'second-hand smoke' has proved politically potent for tobacco control in a way that has only been true for drink-driving in alcohol policy. Accordingly, a strong emphasis in the tobacco literature has been put on environmental prohibitions — bans on smoking at work and in public places — which are already, to a considerable degree, taken for granted with respect to alcohol.

In this connection, Hauge (1999) has argued that the modern emphasis on health harm to the drinker has been a policy mistake in the alcohol field. The two policy impact literatures have also reached substantially different conclusions about the effects of counter-advertising campaigns. This probably primarily reflects the differences in the aims and content of the campaigns, as well as differences in the social politics of the substances. The anti-smoking campaigns which have proved effective (Pechman and Reibling, 2000; Sly et al., 2001, 2002; Wakefield et al., 2003) have often involved frontal attacks financed by governmental agencies on the bona fides of the tobacco industry. This is an unusual enough occurrence in a capitalist society to have impressed teenagers, at least in the short run — although the campaigns have often proved politically unsustainable in the longer run (Givel and Glantz, 2000). Also, more available in the nicotine field, though underutilised, has been the option of harm reduction through changing the mode of use of the psychoactive substance (Shiffman et al., 1997).

As for alcohol, the WHO-CHOICE programme has calculated estimated cost-effectiveness ration for specific interventions, and for combinations of interventions (Shibuya et al., 2003). Results for 'Europe-A' are shown in Table 2. Again, the cost-effectiveness calculations exclude the government revenue gained from the tax from the calculations. A comparison of the results suggests that somewhat more conservative assumptions were used in the alcohol calculations than in the tobacco calculations.

Instead of impact studies: 'expert knowledge'

As will be apparent from the discussion above, there is great variability in the availability of published evidence on the effects of policies governing the availability and use of psychoactive substances, both licit and illicit. It should be noted, however, that the lack of a formal academic literature does not mean a lack of practical knowledge of the effects of policies. As Valverde (2003) has documented for the alcohol control system in Ontario, those staffing regulatory systems typically build up a job-based stock of knowledge, often mixing 'facts' and values, which guide their everyday actions. On the other hand, there is ample experience from medicine and other professions with

Table 2: Comparative cost-effectiveness of tobacco interventions in 'Europe-A' (Shibuya et al., 2003)		
	Total DALYs saved (millions/year)	Average cost-effectiveness ratio ($/DALY)
Doubling the highest tax	6.9	13
Highest regional tax rate (75%)	4.8	18
Global average tax rate (44%)	2.0	44
Enforced bans on smoking in indoor public space	0.8	358
Counter-advertising campaigns	0.7	337
Nicotine replacement	0.7	2164
Comprehensive advertising ban	0.6	189

such practice knowledge that its conclusions about effects are often mistaken, when subjected to the harsh test of well-designed outcome and impact studies. It would be advantageous, with respect to cannabis policy, and for that matter policy on all psychoactive substances, to move to an 'evidence-based' standard of policymaking. This requires a substantial investment in developing the evidence on which the policymaking can be based.

Some specific lessons from alcohol and tobacco policy research

Does consumption necessarily go up after legalisation?

The answer to this question seems to be, 'it depends'. The total alcohol consumption does not seem to have changed much after the legalisation of alcohol at the end of US Prohibition (Gerstein, 1981). But this was in a circumstance of economic depression, and with quite stringent alcohol control regimes replacing prohibition in many US states. As MacCoun and Reuter (2001 pp. 356–366) conclude, in the US context, depenalisation of use seems not to increase cannabis use, but outright legalisation probably would. However, the circumstances of legalisation would certainly affect this, and stringent regulatory control of cannabis would be likely to hold consumption down (see below).

What regulatory alternatives are there to prohibition?

The history of control of alcohol and other psychoactive substances is full of examples of different regulatory regimes, and the effects of some of them have been evaluated. One part of such a system is the regulation of the market in the substance, including retail sales.

One option for such regulation is a kind of *prescription or permit system*, issuing licences to individuals to purchase cannabis. This could be a system organised with physicians and pharmacists as the gatekeepers, like prescription systems for psychoactive medications. Such a system, with a mental health screening component, might be adopted if there is a major policy concern about cannabis precipitating schizophrenia. But it seems more likely that a more bureaucratised system, as for driver's licences, would be adopted. Sweden's 'Bratt system' for alcohol in the decades before 1955 had a version of such individualised controls (Frånberg, 1987).

A second option is a *rationing system,* which allots a maximum purchase amount to the purchaser in a particular time period. The Swedish Bratt system included a rationing system, and there are also some more recent examples of alcohol rationing (Schechter, 1986).

A third option is a *government monopoly system*, where the state monopolises one or more levels of the production, distribution and sale of the substance. Such monopoly systems presently exist for alcohol in 18 US states and all Canadian provinces (though only a few of the states and nine of the provinces have monopoly stores at the retail level), as well as in all Nordic countries, except Denmark. There have been state monopoly systems for cannabis in India, and monopoly systems for opiates were a feature in the Asian territories of the empires of the first half of the 20th century (Brook and Wakabayashi, 2000). The medicinal cannabis office set up by the Dutch government may be seen as a similar monopoly. There is a recent Canadian proposal for government shops to take over the sale of tobacco (Callard et al., 2005), and there have also been proposals in Canada and in the US northwest for cannabis to be legalised for sale in government alcohol stores.

The fourth option is a *licensing system*, where private commercial enterprises are licensed to sell the product, with the licence conditional on the seller abiding by the rules of a regulatory system. Such a system is common for alcoholic beverages, as an alternative to a government monopoly. A licensing system is used in the Netherlands to regulate the 'coffee shops' that allow non-criminalised retail purchase of cannabis (see Korf, this monograph). Specific licensing systems for retail tobacco sales have become common, for instance, in the USA in recent years (www.healthpolicycoach.org/doc. asp?id=3147).

Is a rationing system effective?

There is good evidence that rationing systems for alcohol hold down the levels of problems from alcohol, whether in terms of violence (Schechter, 1986) or long-term

health consequences (Norström, 1987). When the Swedish system of individualised rationing was abolished in 1955, for instance, the rate of liver cirrhosis mortality jumped by one-third in the following year, reflecting the removal of a constraint on the consumption of heavy drinkers (Norström, 1987).

Is a government monopoly system effective?

It has been shown that government monopoly of retail sales can be quite effective in holding down retail sales of alcoholic beverages (Her et al., 1999). The effects are partly through associated characteristics which have been shown to be effective in holding down sales: limitation of the number of sales outlets, and limitation of hours and days of sale. Government management of the system also results in more professionalised employees, less likely, for instance, to sell to those who are under legal age. And it removes the private profit motive, which tends to drive consumption upwards, not only in terms of sales promotion but also in terms of political influence from private actors to loosen restrictions in availability (Room, 2001).

Do taxes on psychoactive substances affect the amount of consumption?

As already indicated in Table 2, the answer to this from both the tobacco and the alcohol literature is an emphatic 'yes'.

Can regulatory policies affect the potency of the psychoactive substance used?

The answer to this question is clearly 'yes'. At least a dozen US states, for instance, ban Everclear spirits, a product that is 95 % pure ethanol. The legal availability of lesser-strength alcoholic beverages (including regular-strength spirits) means that there is no substantial black market for Everclear.

Prior to 1915, spirits were the main form of alcohol consumed in all Nordic countries. By the 1980s, the main form was beer (wine has now replaced beer in Sweden as the most used form in terms of alcohol content). The changeover from spirits to beer was accomplished very quickly in Denmark by a swingeing tax on spirits imposed during the First World War (Bruun et al., 1975). In other Nordic countries the change was more gradual, accomplished partly by differential taxation and partly by making low- and middle-strength beer more widely available than other alcoholic beverages.

Whether a more potent form of the psychoactive substance is more harmful than a less potent form is an apparently easy question to answer for alcohol, in the sense that most of the harm from drinking alcohol comes from the psychoactive ingredient itself. Nevertheless, it can be questioned how much effect the Nordic political effort to channel consumption toward beer and wine and away from spirits had on alcohol-related problems. The political intent was to moderate drinking customs along with the change in beverage, but there is little evidence that this happened. At least in the short run, the 'trouble per litre' of alcohol did not decline when beer was made much more available in Finland in 1969, and consumption rose by about 50 % (Mäkelä et al., 1981).

For tobacco, as for cannabis, the issue of whether greater potency is more harmful is obviously more complicated, since much of the harm results not from the psychoactive ingredient but from what accompanies it, particularly in smoked form (tars, carbon monoxide). Thus, low-nicotine, high-tar tobacco cigarettes are likely to cause more health harm than high-nicotine cigarettes, since the smoker will get more tar and carbon monoxide in the course of reaching the same level of nicotine. Analogously, it should not be assumed that a higher THC content will be more harmful.

Interacting with the issue of potency is the issue of mode of ingestion. It is likely that there is less risk to health from eating or vapourising marijuana than from smoking it. However, for licit as well as illicit psychoactive substances, there is relatively little systematic knowledge on the effects in a population of measures designed to favour one mode of ingestion over another. Often policies are made on the basis of vague fears rather than systematic knowledge. For instance, the Swedish form of snuff, known as *snus*, is banned for sale in the European Union, other than in Sweden, on the grounds that it is a health hazard. There are good public health arguments for promoting the use of *snus* as a much less harmful alternative to smoking cigarettes, although these arguments are also disputed (Gilljam and Rosaria Galanti, 2003). But at present the European legal system considers that it must make decisions on whether *snus* should remain banned on the basis of suppositions.

> *Snus* is much less deadly than smoked tobacco ... [But] one cannot conclude with certainty whether offering *snus* on the market would principally have the effect of encouraging smokers to stop smoking (a 'substitution effect') or of facilitating, on the contrary, the path towards consumption of tobacco (a 'passage-way effect') ... The insufficiency of data and the scientific uncertainty [is about] the supposed behaviour of the public. The question which poses itself is that of knowing if, in these circumstances, the ban on *snus* can be considered as a protective measure efficacious for public health.
>
> (Geelhoed, 2004; translated from French version)

Can regulatory policies affect the location and circumstances of use?

Again, the answer to this is clearly positive. One result of prohibitory policies is to push consumption into private or semi-private places. The Dutch coffee shop model of limited cannabis availability in designated places may be seen as holding down the public nuisance from cannabis smoking (see Korf, this monograph).

Again, however, the issue of which locations of use are more harmful has turned out to be complicated in the alcohol field. Drinking in streets and parks is usually seen as increasing the nuisance for others (Törronen, 2003), but the perception has varied at different times on whether drinking in a tavern or restaurant is more or less harmful than drinking at home. On the one hand, control laws in US states at repeal of prohibition often forbid sale of 'liquor by the drink', since at that time the 'old-time saloon' was defined as the seat of most alcohol problems. But when 'liquor by the drink' was finally allowed in North Carolina, no effect on alcohol-related harm statistics could be detected (Blose and Holder, 1987). On the other hand, Finnish authorities in the 1970s presumed that drinking in a bar or restaurant would be more restrained than drinking at home. But in fact, Partanen (1975) found that the empirical results in Helsinki were the opposite: 'people do not drink any more at home than in a restaurant, but they do it in a more leisurely manner, which seems to lead to a lower degree of intoxication'. The issue of the harm associated with specific circumstances of use should be treated as an empirical question rather than a matter of 'expert knowledge'.

What about the impact of the European single market and of trade agreements and disputes?

The prohibition on cannabis sales under the international drug control regime is presumably primarily responsible for the fact that there have been so far no challenges to any legislation that discriminates, for instance, between cannabis grown in the country and imported cannabis. Such challenges have been a regular occurrence for both tobacco and alcohol, and both the single market mechanisms of the European Union and the trade agreements administered by the World Trade Organisation have created substantial difficulties for alcohol and tobacco control regimes (e.g., Room and West, 1998; Taylor et al., 2000). The new Framework Convention on Tobacco Control may help to remedy this situation, but the issue of whether it overrides trade agreements is not settled (Room, 2006). It would thus be wise for any move to legalise cannabis, however restrictive the regulations, to take into account the need to exempt hazardous substances from coverage under trade agreements and disputes.

Conclusion

Although the literatures have their limits, studies of the impact of tobacco and alcohol policies are much more numerous and cover a broader territory than the equivalent studies for cannabis. In the absence of formal studies, estimation of the impact of laws and policies remains a matter for 'expert knowledge', although it is clear from the alcohol and tobacco fields, as well as from medical and other research, that expert knowledge based only on general principles or practical experience is often wrong. Any government that is serious about making laws and policy that have specific intended effects needs to build funding into any policy initiative for a scientific evaluation of its actual effects, both intended and otherwise.

The alcohol and tobacco research findings suggest some general conclusions about the relative strength of different prevention and policy strategies. As with cannabis, it is difficult to show lasting effects from public information campaigns and school education on tobacco and alcohol. On the other hand, laws which channel rather than forbid use — for instance, laws against drink-driving — have been shown to be effective. In general, the findings in both the alcohol and the tobacco literatures underline the power of regulatory approaches, including taxation, in limiting the harm from psychoactive substances. Such regulations are more easily and effectively applied where there is a legal market, since in that case there are licensed actors in the market who have something to lose by having their licences suspended or taken away. From this perspective, the state ties one hand behind its back with a prohibition regime, since its ability to control the market is greatly restricted.

On the other hand, it must be acknowledged that Europe has serious health and social problems from both tobacco and alcohol. In both areas, the European Union is now taking some steps to assist national and local governments in reducing the levels of problems. But a clear difficulty in this effort, both at EU and national levels, is the entrenched political power of vested economic interests in maintaining the size of the alcohol and tobacco markets. Any shift towards regulatory regimes for cannabis would be wise to take account of this, and to build into cannabis policies insulation from the potential influence of market forces and interests.

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Editorial postscript

This chapter focuses deliberately on experiences with regulating alcohol and tobacco. It does not include crystal gazing for regulation of legalised cannabis. In the production of the monograph, some reviewers felt that some more information on specific regulatory controls on cannabis was required. The chapter, however, remains useful in drawing attention to the many 'unknowns' faced when regulating psychoactive substances. For illicit drugs in general, economic analysis of market size is relatively immature, relies on broad assumptions and triangulation of diverse datasets (seizures, prevalence, retail prices, arrests, potency, etc.), and usually implies a large margin for error. So significant preparatory work would need to be done before regulatory models could be seriously considered for cannabis. At this point, it is premature to discuss topics such as product certification and licensing, feasibility studies, econometric analysis, market sizing, regulatory standards, fiscal forecasting, seasonality, etc. with any degree of certainty. While some exploratory work has been done on market sizing in the EU, estimates to date remain problematic. In particular, regulation would need to respond to findings that home-grown self-supply and informal supply 'among friends' make up a substantial amount of the market in EU countries (see Legget and Pietschmann, this monograph) (Table 3).

In terms of further reading on economic controls of cannabis in a (hypothetical) regulated market, the subject has recently experienced a revival in interest. This is true both of economic and statistical journals, as well as in the usual drugs and public health journals. As a basic introduction, the difficulties of drug market sizing formed the subject of a chapter in the UNODC's World Drug Report 2005 (UNODC, 2005). Specific studies on cannabis are generally based on patterns that follow the decriminalisation of cannabis use. Specific studies include those in Australia (Clements and Zhao, 2005),

Country	Reference year	Population	Estimated annual retail market value (EUR, millions)	Source
Ireland	2003	3 883 159 (2002)	379 (374.465 resin plus 4.03518 herb)	Connolly (2005)
France	2007	62 518 600 (2005)	832	Costes (2007)
The Netherlands	2004	No data	244–371 (211–283: domestic market; 43–88: non-domestic market)	Bieleman and Snippe, (2006), in WODC (2006)
UK (England and Wales)	2003/2004	52 481 000 (England and Wales, 2002)	1 285 (£900 800 000; euro conversion rate EUR 1 = £0.701 (ECB monthly rate at December 2004)	Pudney et al. (2006)

Table 3: Recent estimates of the size of the illicit cannabis market in four EU Member States

British Columbia (Easton, 2004) and Massachusetts (Miron, 2003). In Europe, while a regulated cannabis market is frequently a subject of lobbyists' pamphlets (e.g. Holtzer, 2004; Atha, 2004), policy-oriented study has either been restricted to domestic market profiling (Bramley-Harker, 2001; Pudney, 2004) or has favoured the broad-brush analysis of illicit drugs in general (Clark, 2003; Bretteville-Jensen, 2006). A recent study in France (Ben Lakhdar, 2007) provides a useful exploration of how the French cannabis market is structured, in terms of volume and values. Such quantitative study is rare in Europe, yet would contribute greatly to our understanding of the economics of cannabis.

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Chapter 9
An open front door: the coffee shop phenomenon in the Netherlands

Keywords: cannabis – coffee shops – drugs tourism – enforcement
– the Netherlands – regulation

Setting the context

A European monograph on cannabis would not be complete without a chapter on Dutch 'coffee shops'. 'Coffee shop' in the Dutch context is a euphemism for cafés where, since 1976, the sale and consumption of cannabis has been tolerated.

This chapter provides a number of surprising insights on the coffee shop phenomenon, from the leading Dutch authority on the subject. The Netherlands has relatively low prevalence of cannabis use (see Monshouwer et al., this monograph), despite the proximity of retail outlets. The 737 coffee shops (2004) are also found in a small number of towns, and their numbers have dwindled as municipalities have sought to tighten their licensing. The chapter also describes a number of features of coffee shops: the AHOJ-G operating restrictions, under which coffee shops operate; the challenges in enforcement of ensuring a limited supply of 500 g on the premises ([1]); the 'back door' problem and controlling links with wider trafficking and crime. Indeed, beyond such retail outlets, the Netherlands is a wholesale hub in the trafficking of Moroccan cannabis resin across northern Europe (see Gamella, this monograph).

Coffee shops are controversial, both within the Netherlands and in the international context. This chapter remains focused on the domestic situation in the Netherlands: coffee shops and their impact on Dutch drug use patterns. However, coffee shops also

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([1]) This problem has become known as 'the back door' problem in the Netherlands. A recent case in the town of Terneuzen highlights the problem. A police check of the coffee shop Checkpoint in June 2007 found over 5 kg of cannabis on the premises and over 90 kg in a nearby warehouse (www.hvzeeland.nl/nieuws.php?id=5542).

Table 1: Dutch coffee shops at a glance					
Number of coffee shops in the Netherlands	Coffee shop density (in the 103 localities with coffee shops present)	Number of people employed at coffee shops	Estimated size of domestic cannabis market	Estimated size of non-domestic cannabis market	Average estimated revenue per coffee shop from cannabis sales
737 (2004)	One coffee shop per 28 715 inhabitants. Highest density: Amsterdam (one coffee shop per 2 969 inhabitants)	3 400	EUR 211–283 million (32–43 tonnes)	EUR 43–88 million (6.6–13.3 tonnes)	EUR 280 000–380 000

Sources: Bieleman et al. (2005), Bieleman and Snippe (2006).

play an interesting role in cross-border supply: annual sales volumes to non-Dutch buyers are estimated at 6.6 to 13.3 tonnes (Bieleman and Snippe, 2006). Cross-border drugs tourism has led to considerable and repeated criticism of the Dutch coffee shop policy, particularly among neighbouring countries. A counter argument of note is that cannabis prevalence among young people in the Netherlands is lower than many of its neighbouring countries, and that most cannabis consumed in these countries will not have been purchased at Dutch coffee shops (Table 1).

Perhaps most significantly, Dutch coffee shops play a symbolic role as a paradigm of liberal cannabis policies. In addition to their common appearance in academic studies of drug policy, they have become associated in popular culture with the liberal attitudes of the Netherlands. The coffee shops themselves do little to prevent such notoriety, and play a role in cannabis advocacy and the seed distribution businesses operating from the Netherlands. So, although in the Netherlands discussions in recent years have focused on the inevitability of supply — i.e. underground dealers will supply the demand which is currently served by coffee shops ([2]) — Dutch drug policy is likely to remain a controversial subject.

([2]) This was one of the broad conclusions of the *Cannabis zonder coffee shop* report.

Further reading

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An open front door: the coffee shop phenomenon in the Netherlands

Dirk Korf

Introduction

Although cannabis is still an illicit drug in the Netherlands, herbal cannabis and cannabis resin are openly sold in so-called 'coffee shops'. In general, coffee shops are café-like places, although some function more as a store where one can buy, but not use cannabis. In this paper we first describe the process of decriminalisation of cannabis and the evolution of coffee shops in the Netherlands. Then we discuss long-term trends in cannabis use in the Netherlands, both among the general population and among students at secondary schools, followed by exploring some problems regarding the causal relationship between coffee shops and trends in cannabis use in the Netherlands. Next, we examine the role of coffee shops relative to other cannabis sellers at retail level. Finally, we discuss recent developments regarding the supply of coffee shops.

From underground market to coffee shops

The Netherlands was one of the first countries where cannabis became the object of statutory regulation. The import and export of cannabis was introduced into the Opium Act in 1928. Possession, manufacture and sale became criminal offences in 1953. Statutory decriminalisation of cannabis took place in 1976. De facto decriminalisation, however, set in somewhat earlier.

With regard to the cannabis retail market in the Netherlands, four phases can be distinguished.

Phase 1

During the first stage, the 1960s and early 1970s, the Dutch cannabis retail market was a predominantly underground market. Cannabis was bought and consumed in a subcultural environment, which became known as a youth counterculture.

Phase 2

The second stage was ushered in when Dutch authorities began to tolerate so-called 'house dealers' in youth centres. Experiments with this approach were formalised through statutory decriminalisation in the revised Opium Act of 1976. This law distinguishes between two types of drugs: on the one hand, hemp products (Schedule II drugs), and on the other hand, drugs that represent an 'unacceptable' risk (Schedule I drugs, such as heroin and cocaine). The law also differentiates on the basis of the nature of the offence. For example, drug use is not an offence, possession of up to 30 grams of cannabis is a petty offence or misdemeanour, while possession of more than 30 grams is a criminal offence.

Official national *Guidelines for Investigation and Prosecution* came into force in 1979. These guidelines are founded on *the expediency principle*, a discretionary principle in Dutch penal law which allows authorities to refrain from prosecution without first asking permission of the courts. Basically, the expediency principle can be applied in two ways. The first favours prosecution: prosecution is a default response, but is waived if there are good reasons to do so ('prosecution, unless …'). This case-directed approach was common in the Netherlands until the end of the 1960s.

The second approach applies the expediency principle differently: prosecution takes place only if it is expedient and serves the public interest ('no prosection, unless …'). Society-wide prosecution of cannabis offences was believed not to serve the public interest: it would stigmatise many young people and socially isolate them from society. According to the 1979 national guidelines, the retail sale of cannabis to consumers would be tolerated, provided the house dealer met the so-called AHOJ-G criteria. These criteria are:

- no overt advertising (*affichering*);
- no hard drugs;
- no nuisance (*overlast*);
- no underage clientele (*jongeren*); and
- no large quantities (*grote hoeveelheden*).

Small-scale dealing of cannabis thus remained an offence from a legal viewpoint, but under certain conditions would not be prosecuted. It should be acknowledged that this legal tolerance was initiated before the Opium Act was revised in 1976, and became more visible after 1979 with the entry into force of the national guidelines and AHOJ-G criteria. So by the end of the 1970s, the *house dealer* had become a formidable competitor to the street dealer.

Phase 3

In the third stage, cannabis resin and herbal cannabis were sold predominantly in café-like places, which have become known as 'coffee shops'. Although the government never intended this development, through case law it was decided that coffee shops were to be tolerated according to the same criteria as house dealers. During the 1980s coffee shops captured an increasingly large share of the Dutch retail cannabis market (Jansen, 1991).

Phase 4

The fourth stage began in the mid-1990s, when legislative onus was placed on curbing the number of coffee shops. Since then, the number of coffee shops has steeply declined from about 1 500 to 813 in 2000 and further to 737 in 2004 (Bieleman and Goeree, 2000; Bieleman et al., 2005). Moreover, in 1996 local communities received the opportunity to decide whether or not they would allow coffee shops in their municipality. To date, 77 % of the 483 communities have decided not to allow coffee shops at all. Consequently, they can close down coffee shops even if they do not violate the AHOJ-G criteria. In addition, the minimum age for visitors was increased from 16 to 18 years.

So, coffee shops are not distributed evenly over the country. Over half (52 %) of all coffee shops are located in the five largest communities (> 200 000 inhabitants), while only 1 % can be found in communities with less than 20 000 inhabitants. Although only 5 % of the national population lives in Amsterdam, the city is the home of one-third of all coffee shops in the country.

Trends in cannabis use

From an analysis of available data on the prevalence of cannabis use between the late 1960s and the late 1990s, we concluded that there was little room to doubt that cannabis use in the Netherlands spread rapidly around 1970 (Korf et al., 2002). Most probably, cannabis use among youths in the Netherlands evolved in two waves, with a first peak around 1970, a low during the late 1970s and early 1980s, and a second peak in the mid- to late-1990s.

Prior to the Second World War, cannabis use in the Netherlands had hardly been heard of, and this did not change much in subsequent years. The 1950s witnessed the introduction of cannabis in the Netherlands, when herbal cannabis was used by small groups of jazz musicians and other artists who had learned to use it while abroad, as well as foreign seamen and Germany-based US military personnel, in particular in Amsterdam (Cohen, 1975; de Kort and Korf, 1992).

In the course of the 1960s, cannabis use in the Netherlands rapidly gained popularity. An increasing number of adolescents began smoking it, but not until the end of the decade did a cannabis smokers' subculture emerge. Cannabis spread significantly in the wake of the hippie movement, and smoking cannabis at the national monument in Dam Square or in the Vondelpark in Amsterdam became a staple of a burgeoning international youth sub-culture (Leuw, 1973).

The first indication of the rapid growth in the popularity of cannabis towards the end of the 1960s can be found in school surveys. In 1969 as many as 9% of the students in the final form at secondary school reported having used cannabis at least once. Two years later this percentage had doubled to 18%. Yet rates did not continue to rise in subsequent years. In 1973, lifetime prevalence was again put at 18% (see Korf, 1995). It was more than a decade before the next national school survey was carried out, in 1984. This survey yielded a much lower lifetime prevalence of cannabis use (5%). To a considerable degree, however, the lower rate can be explained by inconsistencies in the samples. If comparable age groups are examined, the difference between 1973 and 1984 rates is much smaller: 18% ever use of cannabis for students with a mean age of 17.5 years in 1973; 12% for students 17 years and older in 1984 (Plomp et al., 1990).

Unfortunately, these school surveys did not address nationally representative samples. Since 1988 nationally representative surveys have been conducted on the extent to which secondary school students aged 12 and older have experience with alcohol, tobacco, drugs and gambling. From 1988 to 1996, cannabis rates among students rose, but stabilised in the late 1990s, followed by a drop (Monshouwer et al., 2004). (Figure 1).

Figure 1: Cannabis use among secondary school pupils, aged 12 years (1988–2003)
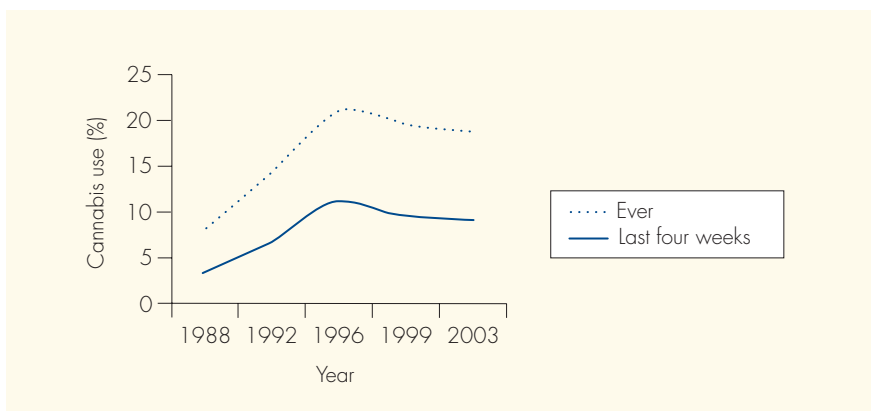
General population surveys are another indicator of trends in cannabis use. Between 1970 and 1991 six national household surveys have been conducted in the Netherlands (see Korf, 1995). They reveal a growing percentage of people that report having used cannabis at least once in their lives: from 2–3% in 1970, to 6–10% during the 1980s and to 12% in 1991. In 1997, a new series of general population studies was initiated, using large representative samples of people aged 12 years and over. In addition to figures on lifetime use of — amongst others — cannabis, this National Prevalence Study also includes data on current use (Abraham et al., 1999). According to the 1997 data, the vast majority have never tried cannabis and only one in six respondents have ever used cannabis (15.6%). One in 40 respondents (2.5%) used cannabis in the month prior to the interview (current use). The second National Prevalence Study, conducted in 2001, revealed a lifetime prevalence rate of 17% and 3% for last month use (Abraham et al., 2002). A different age group (15–64 years) was studied in the third National Prevalence Study (2005/2006). Between 1997 and 2005–2006, trend analysis showed: a decrease in last year prevalence in the age group 15–24 years; an increase in lifetime, last year and last month prevalence among the age group 25–44 years; and an increase in last month prevalence in the age group 45–64 years (Rodenburg et al., 2007).

Cannabis use is not distributed evenly across the Netherlands. Cannabis use is more prevalent in urban than in rural areas. Amsterdam tops the list with respect to ever use and current use. Such an uneven geographical spread of cannabis use is not only typical for the Netherlands, but can also be found in other countries (Partanen and Metso, 1999). Since 1987, five surveys have been conducted among the general population of Amsterdam aged 12 years and over, applying a similar methodology as in the National Prevalence Study. Prevalence rates increased (Abraham et al., 2003). To a large extent, this increase reflects a generation effect. This generation effect also helps to explain why rates for ever use increase much more strongly than those for current use (Figure 2). The

Figure 2: Trend in cannabis use, general population, Amsterdam, 12+ years (1987–2001)
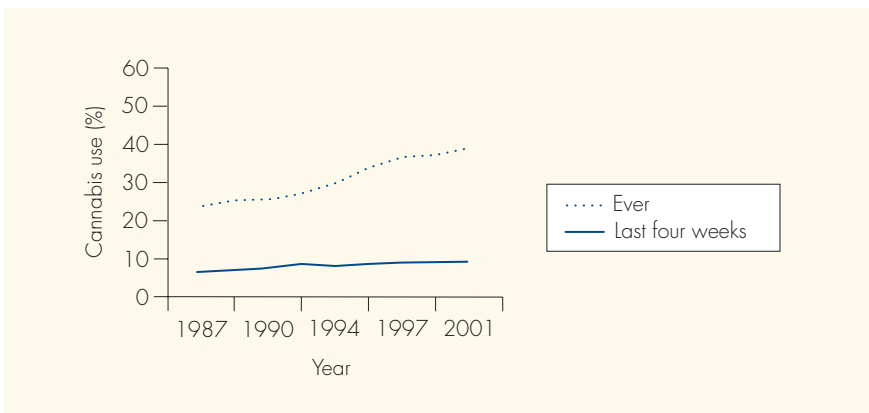
Figure 3: Trend in cannabis use, general population, Amsterdam, 25–29 years (1987–2001)
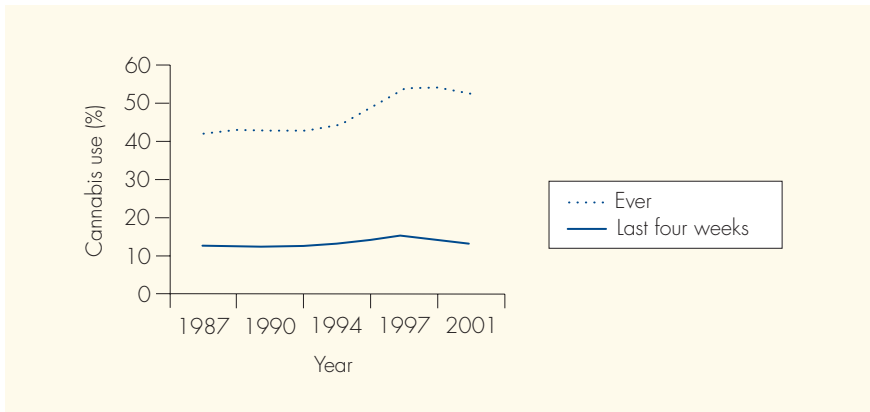
majority of the adult ever users in Amsterdam have stopped using cannabis. While many young ever users are currently taking cannabis, few older ones continue to do so. The mean age of cannabis use in Amsterdam remained stable at around 20 years. For the age cohort of 25–29 years, lifetime use first increased in the 1990s and then stabilised, while current use remained quite stable during the period (Figure 3).

Decriminalisation and cannabis use

During the transition from the first to the second phase in Dutch cannabis policy, the many underground selling points became consolidated into a more limited number of formalised sales outlets that were publicly accessible yet shielded from public view. During the third phase, availability increased markedly in numerous coffee shops. More recently, availability may have decreased because of the declining number of coffee shops. It is striking that the trend in cannabis use among youth in the Netherlands parallels our four stages in the availability of cannabis. The number of adolescent cannabis users peaked when cannabis was distributed through an underground market during the late 1960s and early 1970s, when the drug was available through many small-scale retailers (street dealers, in homes and bars). Adolescent use then decreased as house dealers superseded the underground market during the 1970s. It increased again in the 1980s after coffee shops took over the sale of cannabis. And it stabilised or slightly decreased at the end of the 1990s, when the number of coffee shops was reduced.

Rising or falling cannabis consumption need not be the unequivocal result of decriminalisation or criminalisation. In order to study the possible link between decriminalisation and the evolution of Dutch cannabis use, first we need to analyse the

prevailing rates of cannabis use both before and after decriminalisation. Moreover, longitudinal trends in cannabis use in the Netherlands can only properly be ascribed to decriminalisation when it is made plausible that they are causally related.

In line with MacCoun and Reuter (1997), reasoning by analogy might be helpful in getting closer to an understanding of the nature of the link between decriminalisation and cannabis prevalence rates in the Netherlands. How do the Dutch trends in the cannabis case compare to those in other Western nations? Such a question is not easy to answer, mainly because there are few countries where cannabis consumption has been consistently and systematically recorded over the years.

The USA has a relatively long tradition of surveys on drug use and the American figures consistently appear to be higher than those in the Netherlands (Plomp et al., 1990; NDM, 2006). Clearly the USA, as the prototype of a prohibitionist approach towards cannabis, reports higher cannabis consumption than the Netherlands, the prototype of anti-prohibitionism. Marijuana use among youth in the USA also evolved in waves, with a peak during the late 1970s, a decline in the 1980s, a rise in the 1990s and then stabilisation. Harrison (1997) concludes that such a wave-like development can be understood as a verification of Musto's more general model on trends in drug use (Musto, 1987). In addition, structural factors such as the post-Second World War baby boom and drug education (affecting health risk perception) might help to explain the development in marijuana use in the USA (Harrison, 1997). Other European countries have also reported a wave-like trend in cannabis use (Kraus, 1997). For example, cannabis use spread rapidly in (West) Germany toward the end of the 1960s, followed by stabilisation and decline in the early 1970s and then an increase in the 1980s (Reuband, 1992; Kraus, 1997). The rising use of cannabis in Germany continued in the 1990s (Kraus and Bauernfeind, 1998; Kraus et al., 1998).

Cannabis use in some other countries with a prohibitionist approach towards cannabis — Sweden in particular — is substantially lower than in the Netherlands. Although this has been used as supporting evidence that prohibition deters use, the argument does not hold when seen in relation to data from other prohibitionist countries, for example, the USA, and elsewhere in Europe. From the available data from general population surveys in 10 Member States of the EU (which are not absolutely comparable), the EMCDDA concluded that the level of cannabis use varies strongly within the EU (EMCDDA, *Annual Report* 2001); from 9.7 % in Finland to 25 % in the UK (England and Wales). The Netherlands is placed somewhere in the middle (and this would most probably be lower if its level of urbanisation were taken into account). From a comparison of data from general population surveys in Germany (Kraus et al., 1998) and the UK (Ramsay and Partridge, 1999), we concluded that adolescents and young adults in these countries have showed a similar trend to that in the Netherlands: increasing cannabis use from the late 1980s onwards (Korf et al., 2002).

So, trends in cannabis use in the Netherlands appeared to run along similar lines to those in other European countries, and Dutch figures on cannabis use between the late 1960s and the late 1990s were not out of line with those from countries that did not decriminalise cannabis. Over time, prevalence of cannabis use shows a wave-like trend in many countries, including the Netherlands. This supports Reuband's earlier conclusion that cannabis use trends evolve relatively independently from drug policy, and that countries with a 'liberal' cannabis policy do not have higher or lower rates than countries with a more repressive policy (Reuband, 1995).

From the data discussed so far, it appears unlikely that decriminalisation of cannabis causes an increase in cannabis use. However, before we draw such a final conclusion, we need to address three issues. First, we have compared Dutch prevalence data with those from countries that did not officially decriminalise cannabis. However, the actual enforcement of cannabis offences may be less strict than the law suggests. Second, at the level of the 'dependent variable', the question is 'what is the most appropriate indicator for cannabis use?' Third, we must take into account the accessibility of coffee shops: as mentioned, there is a minimum age for visiting coffee shops.

How do drug laws relate to the actual enforcement of cannabis offences? The Netherlands has separate schedules for cannabis and other illicit drugs. The use of cannabis is not illegal, and penalties for trafficking are higher than for possession. In this respect, the Dutch drug law is not unique. There are other EU countries with differential drug laws (two or more schedules), where cannabis use is not illegal, and where the drug law sets higher penalties for trafficking than possession (see Ballotta et al., this monograph; Korf, 1995; Leroy, 1992). Most EU countries have penalties for cannabis possession, ranging from a fine to incarceration (EMCDDA ELDD, 2001). According to Kilmer (2002), in practice most arrests for cannabis possession in EU Member States appear to only lead to a fine, while few data are available on the levels of these fines and about what happens when they are not paid. So Kilmer examined actual cannabis law activities within a number of Western countries, by comparing police capacity, enforcement of and punishment for cannabis possession laws. He concluded that the probability of cannabis users being arrested for cannabis possession is generally between 2 and 3 %. Probability of arrest was fairly similar (2–3 %) in EU countries with relatively low cannabis prevalence rates (e.g. Sweden: arrest rate, 2.4 % in 1997) and those with higher rates (e.g. United Kingdom: arrest rate, 2.1 % in 1996 and 2.9 % in 1998). Consequently, formal criminalisation of cannabis possession rarely leads to actual criminalisation in practice. So it appears plausible that current cannabis laws in EU Member States, as well as other Western countries, have little deterrent effect on cannabis use.

It is not uncommon to discuss the effects of decriminalisation of cannabis in the Netherlands on the basis of data from school surveys. The analysis by MacCoun and

Reuter (1997) was largely based on data from school surveys, and we included such figures in our analysis earlier in this chapter as well. Unfortunately, this is not without problems. In 1996 the minimum age for coffee shop visitors was raised from 16 to 18 years. Consequently, minors are not allowed to buy and use cannabis in coffee shops, which means that prevalence rates of cannabis use among youth below the age of 18 cannot be defined as valid indicators in the analysis of the effects of decriminalisation.

In a secondary analysis of national school survey data from 1992, 1996 and 1999 we looked at how the use of cannabis evolved amongst adolescents (Korf et al., 2001). We faced two difficulties. First, school populations are constantly changing, partly due to an ongoing rise in percentages of ethnic minority students. Second, samples do not always precisely reflect school populations. Statistical bias can be corrected to an extent by weighting, but that still does not ensure full representativeness. Both the real changes in the student population and the sampling errors could potentially damage the reliability of the cannabis use statistics. We allowed for this as much as possible by performing logistic regression analysis. This enabled us to detect any changes in the use of cannabis that were not due to differential background characteristics (gender, ethnicity, school type and urbanisation) in the samples. Analysis revealed a break in the previous upward trend in current cannabis use among 16–17-year-olds after the raising of the age limit for coffee shops in 1996. Cannabis use stabilised between 1996 and 1999. In addition, the analysis indicated a shift in supply from coffee shops to other sources. Current 16–17-year-old cannabis users among the students in 1999 bought their cannabis less often in coffee shops (25.7%) than those from 1996 (45.2%). Logistic regression led to the same conclusion: the 1999 students showed a greater likelihood of buying cannabis outside coffee shops (an odds ratio of 0.76).

These figures are a strong indication that the higher age limit at coffee shops has indeed resulted in a reduction of cannabis sales to adolescents in coffee shops, in favour of more informal supply through friends (from 47.6% in 1996 to 66.5% in 1999). These figures are somewhat problematic as what has been reported as buying in a coffee shop could also mean that the respondents had someone else buy the drug there. Nevertheless, the data strongly suggest that raising the minimum age for coffee shops had an effect on buying behaviour. According to the 2003 national school survey, most current cannabis users among students aged 18 years buy their cannabis also or exclusively in coffee shops, substantially more often than younger users (Monshouwer et al., 2004). It is tempting to interpret the nationwide stabilisation in adolescent cannabis use as a result of raising the age limit. Adolescents are now more likely to obtain cannabis from friends and acquaintances instead of from coffee shops. Thus, at the user level we see an apparent displacement of the cannabis market (Korf et al., 2001).

In conclusion, trends in the lifetime prevalence of cannabis use in the Netherlands developed in parallel to changes in cannabis policy. Alongside the rapid growth in

the number of coffee shops, we observed a significant increase in prevalence rates. However, this does not automatically support the conclusion that decriminalisation has led to an increase in cannabis consumption. First of all, lifetime prevalence is often not an adequate indicator since it largely reflects a 'generation effect'. Current (last month) use seems to be a better indicator, although from the perspective of harm reduction it might be argued that 'problem use' is an even better one. Unfortunately, there is no standardised indicator for problematic cannabis use.

Reasoning by analogy through cross-national comparison partly leads to conclusions other than MacCoun and Reuter's (1997). In particular, their conclusion that commercial access — through coffee shops — is associated with growth in cannabis use has to be questioned. Their study largely focused on data from the USA and Nordic countries (Denmark and Norway). Within a Western European context, prevalence rates in the Nordic countries are generally rather low, with the exception of Denmark, which combines relatively high lifetime figures with low current use. Comparison with other EU countries shows striking similarities with Dutch figures on current cannabis use. In addition, neighbour countries, as well as the USA, report similar trends in current cannabis use over time. Cannabis use in neighbour countries also shows a wave-like development, so it seems implausible that the trends in cannabis use in the Netherlands were causally related to Dutch cannabis policy. It seems more likely that the parallel development of cannabis use with stages in the decriminalisation process in the Netherlands was accidental, and that trends in cannabis use were predominantly affected by other factors that were not unique to the Netherlands.

Most probably, these factors relate to general youth trends that make cannabis more or less fashionable and acceptable. We were able to include more recent figures on cannabis than MacCoun and Reuter, and these data show that cannabis use stabilised among Dutch youth in the late 1990s. At first glance, this seems to be a result of raising the minimum age for access to coffee shops from 16 to 18 years. However, informal networks of friends appear to have quickly taken over the role of coffee shops as retail suppliers of cannabis. Most probably, the role of such informal networks is similar to those in other European countries. This leads to the conclusion that regulating the cannabis market through law enforcement has only a marginal, if any, effect on the level of cannabis consumption.

The restricted role of coffee shops

As has been mentioned, most communities in the Netherlands do not have coffee shops at all, in particular smaller towns and villages. In 2003–2004 we conducted a study on the 'non-tolerated' sale of cannabis in the Netherlands (Korf et al., 2004). By non-tolerated cannabis dealers, we meant the ones outside the officially tolerated coffee

shops. The study focused on the retail trade and not on the coffee shop suppliers (the back door) or the middle and higher levels of the cannabis market.

The study was conducted in 10 municipalities with more than 40 000 inhabitants, that were geographically spread throughout the country and different as regards their size and coffee shop density (number of coffee shops per 10 000 residents). Eight of the municipalities had one or more coffee shops and the other two did not have any official coffee shop at all. Local experts were interviewed in all 10 communities, a survey was made among approximately 800 current cannabis users (not recruited in coffee shops) in seven communities and an ethnographic field study was conducted in five communities.

In all the municipalities we studied, there was a non-tolerated cannabis market at the retail level. We distinguished two main categories: fixed and mobile sale points. The fixed non-tolerated sales points can be divided into home dealers and under-the-counter dealers primarily at clubs or pubs. The mobile non-tolerated sales points can be divided into home delivery after cannabis is ordered by telephone (mobile phone dealers) and street sales in the street and at spots where people hang out (street dealers). In addition, there are home growers, who can be either fixed or mobile dealers.

We found that, whether or not municipalities have coffee shops, the non-tolerated sale of cannabis is widespread. At the retail level, the non-tolerated cannabis market was very similar in all the municipalities in the study, and the same sales patterns were found in virtually all municipalities. In the municipalities with officially tolerated coffee shops, an estimate of approximately 70 % of the local cannabis sales went directly through the coffee shops. The higher the coffee shop density, the greater their percentage of the local sales. In municipalities with no coffee shops or a low coffee shop density, users most frequently bought cannabis somewhere else, as well as in a coffee shop.

There are various reasons why non-tolerated cannabis dealers also operate in municipalities with coffee shops. The major reasons are the geographic distribution of the coffee shops, their opening hours and the minimum age they adhere to. In particular, it is the mobile phone dealers and home dealers who take advantage of the geographic gaps in the cannabis market and are mainly active in districts where coffee shops are rare or non-existent. Additionally, coffee shops are not open 24 hours a day and the non-tolerated dealers explicitly take advantage of this by being easy to reach customers at times when the coffee shops are closed. For minors, the minimum age at coffee shops is an important reason to have cannabis resin or herbal cannabis delivered, or to buy it on the street or from a home dealer. In addition, non-tolerated dealers can serve as an attractive alternative for coffee shops because users can buy larger quantities of cannabis, and sometimes the cannabis is sold more cheaply.

The 'back door' of coffee shops: diverging policy options

Originally, most cannabis used in the Netherlands was cannabis resin, and until the mid-1980s most cannabis was imported. Due to strong improvement in cultivation techniques, domestically grown herbal cannabis became more and more popular. In the early 1990s approximately 50% of the cannabis used in the Netherlands was domestically grown (Boekhoorn et al., 1995). In the second half of the 1990s, the popularity of domestically cultivated herbal cannabis further increased. According to a study among experienced cannabis users by Cohen and Sas (1998), about half preferred herbal cannabis, mostly 'nederwiet', one-quarter preferred cannabis resin and another quarter had no preference. In 2001, from a survey among coffee shop visitors in Amsterdam, it was concluded that two-thirds preferred herbal cannabis to cannabis resin (Korf et al., 2002).

Today, herbal cannabis is the product sold most often in coffee shops. Mostly this is so-called 'nederwiet', or home-grown herbal cannabis. In practice, this kind of herbal cannabis is grown indoors and only a small proportion is imported herb grown outdoors. Most cannabis resin is imported, predominantly from Morocco (see Gamella, this monograph) and only a very small proportion of the resin sold in coffee shops stems from indoor cultivation in the Netherlands.

The THC content of cannabis as sold in coffee shops in the Netherlands has been systematically monitored by the Trimbos Institute since 1999. It might be debated to what extent these figures are correct as there is dispute among researchers over what is the most appropriate method to measure THC concentrations (King et al., 2005), and perhaps the Dutch method generates relatively high concentrations. Nevertheless, while consistently applying the same laboratory techniques, the monitoring system is an adequate instrument to analyse trends in purity over time. THC concentrations in sold 'nederwiet' more than doubled between 1999–2000 and 2003–2004, from an average of 8.6% to 20.4%. In 2004–2005 the average concentration dropped to 17.7%, and 17.5% in 2005–2006, which was comparable to 2002–2003. Imported hashish showed an increase in THC concentration from 11–12% in the first two years to 17–18% in 2002, and then remained stable. THC concentrations in imported herbal cannabis remained quite stable at around 6% (Pijlman et al., 2005; Niesink et al., 2006).

The supply of coffee shops is commonly known in the Netherlands as 'the back door', even though in reality both suppliers and customers use the same door to enter the coffee shop. While the sale of cannabis to consumers is tolerated in coffee shops, the supply remains illegal and is subject to law enforcement. Although a maximum of 500 grams 'in stock' is tolerated, coffee shops can still be prosecuted for sourcing the cannabis into their locality. Moreover, cultivation of five plants or more per person is

illegal. Police and the judicial authorities have increased their actions against herbal cannabis growers. Between 2000 and 2003, the number of cases brought to the public prosecutor for cannabis offences increased by more than 40 % (from 4 324 to 6 156). A growing number of cannabis plantations have been raided and in both 2005 and 2006 approximately 6 000 herbal cannabis cultivation sites were dismantled, and about 2.5 million plants confiscated and destroyed per year (Wouters et al., 2007).

When the Dutch authorities decided to decriminalise cannabis and to tolerate the retail sale of cannabis to consumers, they did not, and probably could not, envision that this would lead to the coffee shop phenomenon. The strong growth of the number of coffee shops — that were never intended to exist — meant that the authorities were confronted with a new problem. In order to cap this growth, the national government decided to give local communities legal instruments to regulate the number of coffee shops, including the option to not allow coffee shops at all. Regarding the supply side of the cannabis market, enforcement has focused on large-scale dealers. Interestingly, herbal cannabis has taken over from the once-dominant resin. While cannabis resin typically was, and still is, imported, herbal cannabis is today mostly domestically cultivated. Consequently, a shift in law enforcement can be perceived from controlling import to controlling cultivation within the country itself (Decorte and Boekhout van Solinge, 2006).

While finalising this paper, two options for regulating the supply of coffee shops have been debated in the Netherlands. On the one hand, at a national level the Ministry of Justice of the previous government was a strong advocate of persistent repression of the illegal cultivation of cannabis in the Netherlands. On the other hand, a growing number of communities with coffee shops, as well as a majority in the Dutch parliament, have pleaded to take a further step towards decriminalisation by regulating the back door problem. From their perspective, the fight against international traffickers should be continued and intensified, while supply for the national market should become less profitable for criminals by allowing the cultivation of herbal cannabis under strict conditions for coffee shops only. Just before Christmas 2005, the Ministry of Justice gave up its resistance and declared to no longer block an experiment with regulated cultivation of herbal cannabis. With the new national government, installed early in 2007, the future of the supply of coffee shops is an open question.

Recent developments

In 2007, the national guideline that coffee shops are not allowed to sell alcohol has finally been implemented in Amsterdam. As a result, most of the approximately 40 coffee shops in Amsterdam that were also serving alcohol, have decided to stop selling cannabis and consequently lost their coffee shop licence.

Also, there is a trend to be more strict on allowing coffee shops in the proximity of schools. The city council of Rotterdam has been the first to decide to close down approximately 27 of a total of 62 coffee shops, mostly in the inner city. It is to be expected that coffee shop owners will continue to protest in the courts against this decision, in particular because the city of Rotterdam has declared that the coffee shops to be closed will neither receive any financial compensation, nor be given a licence for a coffee shop elsewhere in Rotterdam.

As part of the plans of the national government to ban tobacco smoking from restaurants and cafes in 2008, a vivid discussion continues on the question of whether coffee shops should become totally smoke-free, be allowed to have a separate smoking facility, or will be exempt from the general anti-smoking policy.

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Chapter 10
Cannabis policy: tightening the ties in Denmark

Keywords: cannabis – crackdown – enforcement – Christiania – Copenhagen – Denmark – legislation – protest and reform movements

Setting the context

Several chapters in this monograph have touched on the link between cannabis culture and social movements of the 1960s and 1970s. One of the remnants of this period is the alternative district of Christiania in Copenhagen, Denmark, recently described by *Time-Life* magazine as 'Europe's last commune'.

One of the features of Christiania was an open cannabis market known as *Pusher Street*. This chapter describes the events preceding and following the closure of Pusher Street in March 2004. The clashes between police and residents described here were more recently echoed in a series of incidents in May 2007, which again brought Christiania into the international limelight.

So how does Denmark look in terms of cannabis ([1])? It has the highest reported lifetime prevalence of cannabis in the EU, at 31.3 % of the adult population (EMCDDA, 2005) and although recent use is also relatively high, with 20 % of 16- to 24-year-olds reported to have used cannabis in the last month (EMCDDA Danish Focal Point, 2004), it is not exceptionally high.

This chapter is written from a liberal perspective. Its arguments serve to illustrate the resistance law enforcement can face in any attempt to break from established tolerance. The chapter documents the considerable efforts made to close down a long-established drug market. These efforts were ultimately successful, although the author's view

([1]) General information and analysis about the Danish drugs situation is compiled each year by the EMCDDA's national focal point in its national report and country situation summary. See www.emcdda.europa.eu/index.cfm?nNodeID=435

suggests that they may have been heavy-handed and not delivered the benefits intended in reducing cannabis use.

Others might take a different perspective. It could equally be argued that the authorities had demonstrated that public drug dealing was an unacceptable behaviour which would not be tolerated and that firm action could be effective. The extent to which longer term use of cannabis is influenced by police action is more difficult to assess. This debate is still ongoing and will not be resolved here. Nonetheless, enforcement clampdowns can be seen as a visible declaration that use of a drug is not socially condoned. Such 'denormalisation' may have an impact in the longer term on the attitudes of young people to drug-taking.

Ongoing reporting of cannabis use in Denmark will tell us how current Danish drug strategy is affecting cannabis use and drug prevalence in general. This chapter makes interesting reading as it details the concerted efforts made to close down Pusher Street. Developments in Copenhagen underline the conclusion drawn by Ballotta et al. earlier. Although public perception is that attitudes to cannabis are becoming more liberal in Europe, there are plenty of examples where a tougher approach is observable.

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Cannabis policy: tightening the ties in Denmark

Vibeke Asmussen

General background

Christiania

The self-declared free state of Christiania was set up by activists in 1971. It occupies 34 hectares of military property in central Copenhagen. In 2004, Christiania had a population estimated at between 850 and 1 000 out of a population of over 500 000 in central Copenhagen. An eviction ruling from 1976 has never been enforced, enabling Christiania to develop over 30 years as a centre for alternative culture, crafts and art. As a rare survivor of hippie utopian culture — *Time* magazine recently called it 'Europe's last commune' ([2]) — it has long played a role as great divider in Danish politics, simultaneously lauded by the left and damned by the right. Current developments in the late 2000s suggest that the free state's days may be numbered: negotiations between Christiania and the government on its future status have been going on for the past three years (Asmussen, 2007).

Pusher Street

Parallel to its free state ideals, Christiania developed a lucrative criminal sideline, *Pusher Street*, which its website calls a 'multi-million business'([3]) for drugs. In 2004, the cannabis market included about 40 street stalls, attracting both a domestic clientele and cross-border drugs tourists, particularly from Sweden. Clients could openly buy drugs to take away, or could smoke 'in situ' in the street or in Christiania's bars and cafés.

Although 'hard drug' sales were voluntarily banned from 1980, a 6 May 2003 report on Christiania by the Minister of Justice and the Minister of Defence documented links with organised crime and biker gangs. It also reported a 'spillover' effect of hard drugs being sold on the periphery of Christiania, if not actually within it ([4]) (EMCDDA Reitox Danish Focal Point Report, 2004). Regular police drugs seizures — not to mention the contested estimate of 20 kg per day, discussed below — suggest a high revenue business

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[2] Christopher Thompson, 'Europe's last commune braces for battle', Time magazine, 23 July 2007. Available at: www.time.com/time/world/article/0,8599,1637000,00.html

[3] www.christiania.org, accessed February 2007.

[4] On 24 April 2005 a shootout among cannabis gangs left one dead and three injured.

with efficient logistics, where daily deliveries were made to the point-of-sale. Moreover, experience with arrests of dealers over two decades revealed Pusher Street's resilience to controls: points-of-sale were restaffed and replenished within hours of police action. The May 2003 report concluded that extraordinarily high police resources, most likely for a sustained duration, were needed.

While for many years Pusher Street was effectively a no-go area for uniformed police patrol routines, surveillance and arrests in the area intensified throughout the early 2000s as the Ministry of Justice and the Copenhagen Metropolitan Police Force sought to 'normalise' conditions for drug dealers in line with the rest of the city (EMCDDA Danish Focal Point, 2004). Increased policing of Christiania was accompanied by the nationwide tightening in 2004 of legislative controls over cannabis in Denmark, aimed at curbing both dealing and personal possession of cannabis (EMCDDA ELDD, 2006).

The culmination of police actions in Pusher Street was the March 2004 operation to 'close' the market and arrest its dealers. This chapter describes the nature of the police action in March 2004, together with the judicial process and convictions that followed it, as reported in the Danish press [5]. It also discusses the political background to the government's official policy on drugs, launched in 2003, *The Fight against Drugs*.

Danish drug policy 2001–2005: legal tightening

In the course of the 2000s, Denmark has experienced a tightening in drug policy — and cannabis policy in particular — from a liberal to a relatively repressive regime.

2001's *Law Prohibiting Visitors to Designated Places* (popularly called 'the Hash-Club Law') was proposed as a response to a moral panic about youths frequenting underground 'hash clubs' [6] (Asmussen and Moesby-Johansen, 2004). The new law enabled police to clamp down on hash clubs, and has since been reinterpreted in 2005 to make it even easier to close down hash clubs. The number of offences that the police needed in order to close a hash club was reduced from 10–15 to 3–5.

2004's *Law on Euphoria-inducing Substances* was revised to criminalise possession of cannabis. While possession of less than 10 grams of cannabis was not prosecuted

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[5] Descriptions of the arrests, trials and sentences are based on a corpus of newspaper articles published between March 2004 and July 2005 in three Danish newspapers: *Jyllands-Posten, Berlingske Tidende and Politiken*. A second source of information — a description of the sentences handed out — is taken from the Copenhagen City Court's website (www.domstol.dk/). For a detailed description of the closure of Pusher Street, see Asmussen, 2007.

[6] Hash clubs are illicit speakeasies at private addresses where cannabis can be bought. The hash club law states that an apartment's inhabitant can be forbidden to receive visitors if he or she is known 'to practice a systematically illegal business which can disturb and endanger his neighbours'.

before the revision, it is now punished with the minimum of a fine. It is thus illegal to possess any amount of drugs, cannabis included, in Denmark. At the same time, another part of the Law on Euphoria-inducing Substances was revised. Penalties were increased from a fine to a prison term 'if drug dealing is performed with children and young people under the age of 18 years' at discos, clubs or music festivals.

Also in 2004, prison sentences for drug crimes were raised during revisions to *The Prison Law*. The maximum prison sentences for drug crimes were raised from 6 to 10 years, for serious drug crimes (trafficking and dealing) from 10 to 16 years, with even sentences of up to 24 years for particularly serious drug crimes (Storgaard, 2005).

The swing towards repression is not an entirely new phenomenon ([7]). Storgaard (2005) argues that drugs policy — about different control policies for users versus dealers, 'soft' drugs versus 'hard' drugs, etc. — has been a permanent parliamentary battlefield in Denmark over the last 30 years, with the liberal-conservative and the centre-left wing, headed by the Social Democratic Party, in opposing camps (Storgaard, 2005). The centre-left's position dominated Danish drug policy until 2001. For example, from 1969 to 2004 possession of up to 10 grams of cannabis for personal use was not prosecuted, and onus was placed on combating hard drugs and organised crime, with a blind eye being turned towards small-scale cannabis sales (Grytnes, 2003).

Since the liberal-conservative government came into power in 2001, its self-styled 'zero-tolerance' policy has been to tighten the legal control of drug crimes and to raise the penalties for drug offences, while also increasing access to treatment, particularly in prisons. Moreover, its action plan, *The Fight against Drugs*, explicitly removes the distinction between seller and buyer, stating that the drug policy targets both supply and demand side, drug dealers *and* drug users (Danish Government, 2003). The action plan also prioritises actions that protect youths from drug misuse.

Party political divides should also be placed in the context of growing responsiveness to media 'hot button' issues, with drugs suffering both negative connotations on one hand and a stranglehold on headlines on the other (Christie and Bruun, 1985). Thus, the first new legal instrument, the Hash Club Law, was as much the work of the former social democratic government as of the new liberal-conservative government. Moreover, at the same time that laws were tightened, liberalising proposals by the centre-left opposition — respectively to decriminalise cannabis on almost the same terms as the Netherlands, to implement safe injection rooms, and to implement heroin trials — were all overturned, suggesting a general hostile climate towards liberalisation.

([7]) On the Danish drug policy combating hard drugs in the 1990s and the effects it had on hard drug users see, for example Frantszen (2003) and Laursen and Jepsen (2002).

So what does this legal tightening mean in practice? First, the former differentiation between users and dealers, 'soft' drugs and 'hard' drugs is no longer the heart of Danish drug policy. Use of any drug is perceived as drug misuse, and in particular, *use* of cannabis is now criminalised. This effectively brings the appreciable numbers of cannabis consumers in Denmark within reach of prosecution (EMCDDA Danish Focal Point, 2005; Storgaard, 2005).

Another aspect of these changes is the concern for young people. On the one hand, adolescent drug users have been criminalised by the legislation covering possession of cannabis for personal use. On the other hand, they are protected by the revision of drug dealing to young people and the closure of illicit dealing premises under the Hash Club Law (Asmussen and Moesby-Johansen, 2004).

Finally, sentences for drug crimes have been raised and can be compared to sentences for manslaughter and homicide. The former focus in Danish drug policy on organised crime is now also widened and includes 'zero tolerance' towards all kinds of dealers. It is this last change which provided the leverage to police to tackle the long-standing quandary of Pusher Street.

The Pusher Street raid: 50 cannabis dealers and security guards arrested

The date 16 March 2004 represents a milestone in Danish drug policy. At 5 am police action to close down Pusher Street began. Bulldozers and several hundred armed police officers entered Christiania and removed the small wooden, zinc-roofed stalls where cannabis was sold (Asmussen, 2007). Simultaneously, over 50 cannabis dealers and security guards were arrested in different locations in Copenhagen and remanded in custody. Major police actions had occurred in Christiania before, as Laursen (1996) and the EMCDDA Danish Focal Point (2005) point out, but this was the first time that a police action was planned so thoroughly with the aim to actually close down Pusher Street. This was also the first time so many dealers (and security guards) were arrested simultaneously.

Surveillance of Pusher Street was carried out by police between October 2003 and March 2004, involving videotaping of Pusher Street and the tapping of radio communication and phone calls. Tapped phone calls and radio communications were especially important in enabling the police to charge people for being members of, or employed by, a private security force that warned the dealers and customers about police activity. This security force was dubbed *Christiania's Intelligence Service* by the police, and it represented a key argument for the police, the judges, and prosecutors in categorising Pusher Street as 'well organised'. The police claimed the security force was regimented into six posts in different parts of Christiania from where guards could

warn dealers if the police were approaching. Police argued that the guards worked in shifts from these posts and communicated via radio and cell phones, substantiating claims with both tapped phone calls and radio communications between the guards and with a duty roster found in one of the managers' houses. The duty roster consisted of initials of the guards, their phone numbers and a list of day and evening shifts. The police also worked as undercover agents, buying cannabis at the stalls in Pusher Street. Swedish and Norwegian policemen were used together with the Danish police. Using undercover police as a method of investigation is exceptional in Danish police work and requires court permission. With the videotapes and the undercover police work the police systematically registered the dealers that operated from the different stalls. It was on the basis of the videotapes and the undercover police work that the police estimated that about 3.6 tonnes of cannabis was sold in Pusher Street during the six months of surveillance. The amount was, however, disputed by the defence lawyers as well as by the defendants, and the judges later found these calculations too uncertain.

The pre-trial detention

The dealers and security guards arrested on 16 March were remanded in custody in solitary confinement by the City Court of Copenhagen. The pre-trial detention was prolonged multiple times on the grounds that the police needed time to investigate and prepare the trials. A few were released after two months, but about 40 of the defendants spent three months in solitary confinement, the legal upper limit for solitary confinement in Denmark. At the same time, the pre-trial procedures were held behind closed doors on account of police investigations. In July several of the dealers were discharged, but during the summer and autumn of 2004 the City Court continued to prolong pre-trial detention, three to four weeks at a time, with the security guards in particular having their custody prolonged. Five months after 16 March, 36 defendants were still in custody. On several occasions when a defendant was discharged by the City Court the prosecutor immediately appealed to the High Court, who on all occasions decided to confirm the prolonged pre-trial detentions. The defence attorneys protested each time the City Court prolonged the pre-trial detentions, and called into question the closed doors at the pre-trial procedures.

Since the court meetings were held behind closed doors the detailed arguments behind the prolongations were kept secret from the public. The only reason given was that the defendants could jeopardise the police investigations as well as the presumed risk that the defendants would take up their criminal activities again, that is, dealing cannabis, and this risk was considered especially high since they were 'well organised'.

In the beginning of September one of the defence lawyers received permission from the Danish Board of Appeal Permission to try one of the cases with the long pre-trial detentions in the Supreme Court. In late November the Supreme Court confirmed

the decision made by the High Court that the defendants should continue to be in custody. The reason given was, again, that the cannabis sale had been extensive and well organised, which was reason enough to keep them in custody. Therefore, in late November 2004, 36 of the initial 50 defendants were still in custody. They had at that time been in custody for almost nine months. Media reports mentioned two of the defendants in custody that were affected by illness. One suffered from claustrophobia, the other had gained 23 kg, and as a consequence suffered repeatedly from thrombosis in his legs. These cases were reported in the news because their defence lawyer complained about the defendants being in custody while suffering different forms of illnesses. The City Court in Copenhagen discharged the two defendants, but the prosecutor appealed to the High Court. Here, one was discharged, the other one who suffered from claustrophobia was moved to a larger cell and maintained in custody.

The charges

The defendants were charged as dealers or as security guards. The dealers were charged with extensive cannabis dealing from stalls in Pusher Street and for having sold between 25 and 150 kg of cannabis in the period the police held Pusher Street under surveillance. The amount that each individual dealer was charged with was based on calculations made from the surveillance and the undercover police work. The dealers were 'and could only be' charged for the amount of cannabis they had sold themselves, that is, for specific dealing. Thirty of the defendants were charged as dealers, and some were facing up to three-and-a-half years of imprisonment.

The security guards did not sell cannabis themselves but secured that all the dealers could run their business, and were therefore charged for complicity. The police calculated that 20 kg of cannabis was sold every day in Pusher Street and multiplied this by the days the police monitored Pusher Street, resulting in total sales of several tonnes of cannabis. Since the guards worked on a structured duty roster in day and evening shifts, they could be charged collectively, and thus faced up to four years' imprisonment.

This was the first time in Denmark that persons were charged collectively for drug crimes. The police claimed that the security force during the preceding years had developed from individual persons warning cannabis dealers with whistles if the police were in the neighbourhood, to a structured force with duty rosters, managers organising the shifts, and payment by the dealers, thus making guarding a lucrative business. The defendants themselves, however, described themselves as a kind of 'buffer' between the police and the dealers in Christiania, ensuring that any trouble accompanying police presence in Christiania did not escalate. They also claimed that they ensured hard drugs or biker gang members did not appear in Christiania. This was highlighted by the defence lawyers, who also denied the existence of a formal Christiania Intelligence Service.

The trials and sentences

At the end of August 2004 the first trial began. Two dealers — a stallkeeper and a helper — were charged with having sold 114 and 30 kg of cannabis respectively. However, the sentences that the two dealers received in December only convicted them for selling 25 and 10 kg of cannabis respectively, with accompanying prison sentences of one-and-a-half years and one year. The method of calculation that the police had used was accepted by the judges, but only in part: they accepted what was to be seen on the videotapes and the testimonies from the undercover policemen, but in general the means of calculating what was sold from the stalls in the whole period was deemed too uncertain. After this first trial, 10 of the defendants that were charged with having sold less than 40 kg of cannabis were released from custody by the City Court on the account that the sentence would no longer be equivalent with the pre-trial detention.

Throughout December 2004 and January 2005 the rest of the dealers were convicted. However, it was not until the end of May 2005 that the last trial ended. The dealers were all convicted for having sold less cannabis than they were charged with. They received sentences of between 30 days and 2 years and 6 months. In total, the convicted dealers got 35 years of imprisonment. Only one defendant was found not guilty.

The joint trial against the security guards began in May 2005. Seventeen persons were charged for being security guards in the Christiania Intelligence Service and three were charged for being managers of the service. The latter organised the shifts, supervised the security guards and collected money from the cannabis dealers. All the defendants pleaded not guilty to the charges. Based on tapped phone calls and radio communication between the guards and the three managers, the City Court found all guards, but only two of the three managers guilty. The two managers received a two-and-a-half years prison sentence each. The security guards got a sentence between one and two-and-a-half years, depending on how long they had been employed in the security force. In total, the 19 defendants received 34 years of imprisonment.

Concluding remarks

This report of the arrested dealers and security guards illustrates how the Danish government's 'zero-tolerance' drugs policy is implemented in practice. The closure of Pusher Street was clearly a 'show of strength', as seen in the Ministry of Justice and Ministry of Defence report submitted in 2003, detailed planning by police, the use of undercover agents, the simultaneous arrest of so many dealers and security guards, the involvement of detectives from Norway and Sweden, etc. Also unusual was the use of the upper level of solitary confinement (three months), as well as of extremely long pre-trial detentions (up to 10 months) for what in effect was retail street dealing rather than wholesale trafficking of drugs.

In terms of police success, the convictions could be viewed as a mixed bag. Many of the dealer defendants were discharged after sentence for time served in pre-trial custody, with none being convicted of selling the full volume of cannabis claimed by police. Conversely, the collective charging of the security guards resulted in all but one being found guilty as charged. This latter result highlights the extension of Danish drug legislation beyond dealers towards those aiding and abetting drug sales, and the lowering of the threshold for what is considered 'organised' and 'well organised' drug crime.

One can question the rationale behind the sudden departure from the 'blind eye' that was turned to cannabis dealing for about 30 years in Pusher Street. Nothing indicates that cannabis dealing had changed or increased in years preceding before the closure of Pusher Street. Moreover, when denying the existence of the *Christiania Intelligence Service* the defence lawyers pointed to the self-regulation within Christiania with regard to hard drugs, even the cooperation of individuals as mediators during any confrontations between police and dealers. The clampdown must therefore be viewed as a political and 'moral' change in attitude rather than a change in cannabis dealing practice.

The most important question is, what effect did closing Pusher Street have? Not much, it seems. Cannabis dealing is still carried out in Christiania, according to the police as well as personal observation. However, cannabis dealing no longer occurs in public from small stalls in Pusher Street, but more discreetly from person to person. In Copenhagen in general there is also just as much cannabis circulating, both according to the police and the Municipality of Copenhagen. However, the market has dispersed into many different and new areas, with some anxiety that cannabis is now even more easily available to young people (Asmussen, 2007).

So, the recent change in Danish drug policy seems to follow what scholars on drug policy like Kilmer (2002) and Korf (2002) in general argue: drug policy, whether repressive or liberal, does not influence either a decrease or an increase of cannabis use. The closure of Pusher Street is more an example of how a government pursues a 'zero tolerance' policy rather than a serious attempt to solve drug problems. Seen in the context of the gradual dismantling of the Christiania commune, it can also be viewed as a moral rejection of laissez-faire.

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Christiania
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EMCDDA
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Official online register of Danish legislation
    www.retsinfo.dk

Chapter 11
Cannabis: a harm reduction perspective

Keywords: cannabis – education – harm reduction – information – vaporisers

Setting the context

'Harm reduction' means many things to many people. A useful and concise definition is provided by the UN's Glossary of Terms on Demand Reduction ([1]), which mentions 'policies or programmes that focus on reducing the harm resulting from the use of alcohol or other drugs, both to the individual and larger community (...) without necessarily requiring abstinence'. The definition clarifies that harm reduction may 'precede subsequent efforts to achieve total abstinence' and 'is neutral regarding the wisdom or morality of continued drug use and should not be synonymous with moves to legalize, decriminalize or promote drug use'.

With regard to cannabis, harm reduction is more difficult to define than, say, programmes to reduce needle injuries, hepatitis and HIV transmission among heroin users. One problem is that harm reduction for cannabis is often a bottom-up phenomenon that is delivered via unofficial rather than governmental or central sources, for example, cannabis magazines, websites and headshops. Harm reduction is also transferred via word of mouth. Long before a user comes into contact with a drugs professional, information will be delivered by dealers, fellow cannabis users, peers and siblings.

Among the more formal harm reduction programmes, there is considerable overlap across harm reduction, prevention and early treatment interventions. For example, low threshold interventions such as drugs helplines, the Jellinek self-screening test and French cannabisetconduite.fr campaign (see Burkhart, and Beck and Legleye,

[1] UNDCCP (2000), *Demand reduction: a glossary of terms*, UNODCCP, Vienna. Available at: www.unodc.org/pdf/report_2000-11-30_1.pdf

this monograph) could be loosely defined as harm reduction initiatives. Although the nature of harm reduction programmes varies greatly across the EU, many programmes borrow from the fields of alcohol and tobacco. Actions include advice on safer modes of administration (e.g. on the use of vaporisers, on rolling safer joints, on less risky modes of inhaling); skills to prevent confrontation with those who disapprove of use; encouraging users to moderate their use; discouraging mixing cannabis with other drugs; drug driving prevention and controls; reducing third-party exposure to second-hand smoke; education about spotting signs of problematic use; and self-screening for problematic use.

First and foremost, harm reduction centres on helping users to make informed decisions with information that is understandable, accurate and non-judgemental. For example, a recent initiative, the Evidence-based Electronic Library for Drugs and Addiction (EELDA) ([2]), attempts to filter the huge body of scientific literature on cannabis, cocaine and ecstasy into a more accessible format using relatively simple language. It includes discussion of the risks of cannabis use as it relates to medical conditions (while pregnant, if epileptic, if suffering from liver, lung or heart problems) and to specific use settings (at work, when driving).

This chapter focuses on specific work on harm reduction at the HIT project in the United Kingdom. Its discussion of the need to communicate effectively, to empathise with cannabis users and to understand the motivations for using cannabis will be relevant to drugs practitioners everywhere.

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([2]) See http://en.eelda.org/index.aspx?o=5809

Cannabis: a harm reduction perspective

Andrew Bennett

Harm reduction forms a part of many European countries' response to licit and illicit drug use: drinkers are advised to consume alcohol at safe levels; heroin users receive substitute drugs such as methadone; and drug injectors are encouraged to use clean injecting equipment.

Defining harm reduction

There is not a generally accepted definition of harm reduction. Historically, the main stimulus to the development of harm reduction policies and programmes was the identification of the role of injecting drug use and the sharing of needles and syringes in the transmission of HIV (Hunt, 2003). This led to the introduction of a range of practical initiatives such as needle and exchange schemes, low threshold services and programmes offering safer injecting advice. Thus, harm reduction strategies were seen as concerned with providing services to drug users at the individual level intending to reduce risk or rates of harm (e.g. needle exchange), while also aiming to reduce harm to others, e.g. preventing HIV among the wider community; and reducing public nuisance connected to drug taking.

Harm reduction definitions often do not describe whose harm should take priority: the user, the family or the wider community, and what type of harm it refers to — health, social, economic. Harm reduction also posits that individuals are able to make rational decisions about their behaviour. Once informed about the risks associated with drug use and how to avoid them, drug users are expected to be able to act on this information (Rhodes, 2002). While some commentators have seen abstinence as an ideal goal, most harm reduction strategies do not require abstinence.

Swift et al. (2004) provide practical criteria for assessing whether a policy or programme practises harm reduction that encompasses some of the above key points. Their central defining characteristic of harm reduction is the reduction of harm as a primary goal rather than the reduction of use per se. It must include strategies for those that continue to use as well as those aimed at reduction of use or abstinence. There should also be some attempt to evaluate whether these strategies will result in a net reduction in drug-related harm.

While harm reduction is often associated with schemes to reduce the harms of opioid use, strategies have also addressed other substances, in particular tobacco and alcohol. These include alcohol campaigns promoting sensible drinking and discouraging drink driving, training bar staff and door staff in avoiding incidents of drunkenness, and public space smoking bans to reduce people's exposure to second-hand smoke. While experience and practical measures are still limited, harm reduction may also have a role to play in helping with cannabis-related problems.

Health-related harm reduction and cannabis

Information, education and communication

Citizens in the EU will have varying degrees of access to a range of materials and media designed to impart knowledge about cannabis. However, drug related information, education and communication is an area of practice that is widespread yet seriously under-researched. In his review of harm reduction research, Hunt concludes that the existing evidence says very little about what sort of approaches work; for whom; to what extent; and whether they are cost-effective (Hunt, 2003).

In the United Kingdom, a small number of government-funded but independent organisations, such as DrugScope, HIT and Lifeline, produce and distribute booklets, leaflets and posters; host websites; and run multi-component campaigns that focus specifically on cannabis or include cannabis amongst other drug communications. Schools have a mandatory responsibility to educate young people about drugs, including cannabis. While guidance exists regarding school-based education and drug communication, the nature and extent of both activities can vary enormously. Increasingly, much health information is disseminated through non-official channels. Cannabis users, activists, 'headshops' and seed suppliers inform and educate about cannabis. Increasingly, websites and other multimedia publications offer information on the health effects of cannabis ([3]).

Information, education and communication approaches are not necessarily strategies of harm reduction.

Producing information materials that aim to reduce harm rather than prevent use per se is challenging, especially when the target audience is young people. Politicians, the media, parents and others can easily misconstrue a resource as condoning or

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[3] While web resources on cannabis vary greatly, some sites offer strong harm reduction materials, for example www.seedsman.com/en/health/cannabis-and-health and http://en.eelda.org/index.aspx?o=5809

encouraging drug use. Below is an extract from HIT's *The Stuff on Cannabis* booklet, which is aimed at young people aged 14 and above. The objective of the booklet (in its entirety and not just the extract) is to provide accurate, acceptable and useful information about cannabis for young people. The goal of the resource is to reduce harm.

> To avoid the dangers of cannabis:
>
> Don't use it. But if people do use cannabis the advice is …
>
> Don't take too much or use too often. Don't smoke every day.
>
> Be aware that some types are very strong and could make you feel bad.
>
> Remember it is still illegal and you could get into trouble with the law.
>
> Don't smoke it with tobacco.
>
> Avoid using it when you feel really down. It will probably make you feel worse.
>
> Don't operate machinery or drive whilst stoned.
>
> Avoid sexual situations you may later regret. If you have sex, use condoms.
>
> Don't take other drugs at the same time, particularly alcohol. Mixing drugs can be dangerous.
>
> If you are trying to cut down or stop, avoid people using it and places where they go.
>
> © 2005 HIT UK Ltd

Consumption methods and techniques

The potential long-term harmful consequences of cannabis use are strongly related with the consumption method, that is respiratory risks associated with smoking the drug without, or simultaneously with, tobacco. A UK House of Lords Cannabis Report (1998) proposed the following hierarchy of risk:

> Smoking a cannabis and tobacco joint is the most risky way of using the drug because the tars and toxins (plus the cigarette paper) is inhaled. Smoking a cannabis only joint enables the user to avoid inhaling tobacco. If cannabis is smoked in a pipe, no papers are burnt and inhaled and a proportion of tars and toxins may remain in the pipe. Water pipes or bongs may have advantages since the smoke will be inhaled at a cooler temperature and some tars may remain suspended in the water. Vaporisers are designed to heat cannabis to a point where the THC will be released without the plant combusting. Finally, the respiratory risks of cannabis smoking would be completely eliminated if users adopted oral methods of use.

Although research shows that cannabis may be a risk factor for the development of respiratory-related diseases (see Witton, this monograph), cannabis smoking is not thought to have a major public health impact on respiratory risks, including cancer, because most cannabis users stop their use in their 20s, few smoke more than a few joints in each session and the number of people who use in a chronic way is currently relatively small (Hall and MacPhee, 2002).

Nonetheless, recent information of the comparative pulmonary risks of cannabis smoking vis-à-vis cannabis smoking has improved, and suggests that cannabis has a similar effect on airflow obstruction to the lungs of two-and-a-half to five cigarettes (Aldington et al., 2007). Moreover, the low overall impact of cannabis smoking assumes that existing low-intensity patterns of use, together with a tendency for users to quit in their 20s, will continue. If more people smoked cannabis more frequently and for longer periods of their lives, the public health impact associated with respiratory-related diseases would be greater. It is also important to consider that cannabis consumption affects public health in other ways, for example its contribution to mental health problems and the consequences to users of a criminal conviction.

A number of cannabis resources provide information about specific techniques and tips that may reduce potential harm linked to airflow obstruction and inhalation of toxins. The rationale for such advice by necessity is often based on 'common sense' rather than research evidence. Below is an extract from HIT's cannabis booklet, which is aimed at cannabis users aged 16 and above.

You should:

> Avoid holding the smoke in your lungs – you won't get any more stoned and this just makes more tar and other dangerous chemicals stick to your lungs.

> Avoid inhaling too deeply – sucking on a bong or buckets may cool the smoke, but it forces it deeper into your lungs, so you breathe in more tar.

> Clean weed properly – the bulk of THC is in the sticky tops and flowers, so you should take out the stem, leaves and other bits.

> Avoid using a cigarette filter for a roach – filters may reduce the amount of THC you smoke. As a result you inhale more deeply which may increase the amount of tar you breathe. Avoid using anything printed (printers' ink gives off dangerous fumes when heated). A piece of plain card, loosely rolled up for a roach, allows the smoke to flow easily.

> Avoid using too many papers — three-skinners are big enough and you will inhale less burnt paper.

> Avoid using plastic bottles, rubber hoses, PVC, aluminium or foil to smoke cannabis — these all give off toxic fumes when hot (you run fewer health risks with a pipe made from glass, steal or brass.

> Clean bongs and pipes properly after use – germs can hang around long enough to infect you and your friends.

> Warning: Just because you like to get high, it doesn't mean everyone does. Show some respect and don't smoke around others, particularly children, who may be affected by you sparking up.

Assessing the evidence that one mode of consumption is safer than another

In theory, the risk of damage to the respiratory system could be reduced if users adopted consumption methods and techniques that reduced the inhalation of cannabis (and tobacco) and related tars and toxins. The evidence for proposing that one mode of consumption is safer than another is, however, limited.

Laboratory studies suggested vaporisers provided the safest delivery of cannabis when compared with unfiltered and filtered joints and waterpipes (Gieringer, 1996; 2001). Vaporisers heat cannabis to temperatures between 180°C and 200°C and above, enabling the release of THC and other cannabinoids as a fine mist while reducing the toxic byproducts of smoked cannabis. While vaporisers are becoming increasingly available for cannabis smokers, a need for a safe delivery mode for therapeutic cannabis products have also prompted interest in this technology.

Perhaps surprisingly, the unfiltered joint 'performed better' than the waterpipes, that is, the ratio of THC to tar was less in an unfiltered joint compared with the waterpipes. The performance of the filtered joint was similar to the waterpipe, that is, the filter reduces the amount of THC, thus leading to the user inhaling more vigorously, resulting in increasing the amount of tars. The two vaporisers performed better than the unfiltered joint. A follow-up study by Gieringer (2001) confirmed that vaporisers offer the best prospects for reducing the harm from cannabis smoke. However, the researchers stress caution with these findings. They point out that the findings in the laboratory may not be reflected in humans, for example, the potency of cannabis used may be different than street cannabis.

Further research has been done on vaporisers as a delivery method. A laboratory study found that a vaporisation device provided an efficient and reproducible mode of delivery of THC (Hazekamp et al., 2006). A further pilot human laboratory study comparing a vaporiser to smoked cannabis found that the vaporiser was as effective as delivering THC but with little or no increase in carbon monoxide levels, a marker for toxins that may be generated by smoking (Abrams et al., 2007). Further suggestive evidence for the value of vaporisers emerged from a large Internet survey, which found that the use of vaporisers was associated with fewer respiratory symptoms than other modes of delivery used by respondents, although the self-selecting nature of the sample and the self-report basis of the data limits the generalisability of the study's findings (Earleywine and Barnwell, 2007).

This may have important health implications if, as is reported in Australia, users believe waterpipes are 'safer' because the water cools the smoke and dissolves some tar (Hall and Solowij, 1998). The study raised concerns about waterpipes not necessarily

protecting users from dangerous tars since they filter out more psychoactive THC than they do tars, thereby requiring users to smoke more to get the desired effect. The research raises doubts about the likelihood of an improved high by using waterpipes because some of the THC is lost in the water. However, as Gieringer (1996) and Iversen (2000) recognise, this 'loss' may be compensated by simply using more cannabis and holding the fumes in the lungs for longer periods.

Some studies also highlight the possibility that increased cannabis potency may have a potentially protective effect, since the concentration of tars relative to THC will be reduced. If this is the case, it would suggest a contradictory perspective to that which is most commonly highlighted in scientific and popular debate regarding increased THC potency, namely that potency increase causes increased adverse health effects (Hall and Swift, 2000; see also King, this monograph).

Will cannabis users adopt safer ways of administration?

The consumption modes significantly associated with respiratory risks — cannabis and tobacco joint or cannabis joint — are the most frequently used in Europe. Conversely, only a minority of cannabis users choose to vaporise or swallow the drug as their main method of use, even though they offer a means to avoid respiratory risks. Hence, it is important to pose the question: will users adopt safer ways of administration?

Smoking is an effective way of delivering drugs to the brain and the rapid delivery of the drug to the brain by smoking seems to be an important factor in determining the subjective experience of the 'high' (Iversen, 2000). The effects are felt almost instantly and it is relatively easy to control or titrate the dose, for example if the cannabis is stronger than anticipated, the user will know this within a matter of seconds. By contrast, taking cannabis by the mouth is less reliable in delivering a consistent dose of the drug. Most of the drug when swallowed will be processed in the liver before general circulation takes it to the brain. The peak levels of the drug, and thus the 'high', will occur 1–4 hours after taking the drug (Stafford, 1992; see also Corrigan, this monograph).

However, the behaviours and consequences of cannabis consumption are not just determined by the drug and its method of use. Individual beliefs, expectations and reasons for using, as well as the social environment in which it is used, are also important. Surprisingly, there is a limited amount of research that explores the social context, use preferences and roles of cannabis use. Research that did explore the functions and pathways of young adult drug takers in Salford in the United Kingdom illustrates that different modes of cannabis consumption produce different effects.

> I don't really take buckets ([4]) cos they don't really agree with me, the rush is too fast. It hits me too quick. I like to get it gradually. I'll have a bong cos it don't hit you as fast. Spliffs are just

brilliant because you get everything out of it, you get all the feeling. Buckets you don't cos it just hits you and then it's gone. Bongs hit you slow but it don't last long.

20-year-old unemployed female, as quoted in Henderson (1995).

In a *Mixmag* (2002) ([5]) article a 'willing guinea pig examines the merits of spliffs, bongs and cakes'. In response to the question 'how long till you're battered?' the guinea pig answers 'two minutes' (spliff), 'little under a minute' (bong) and 'two hours' (cake). In response to the question, 'how long do you feel caned for?' the subject answers 'two hours' (spliff), 'no idea … in the morning I realise it had lasted six hours' (bong) and 'fucking ages. I'm useless for eight hours' (cakes).

Bell et al.'s (1998) research focuses on the role of friendship groups as a means of initial contact with cannabis, and learning about its use in the context of transitions to adulthood. He argues that understanding the social context of cannabis use involves examining their explanations for cannabis use, the methods of use, the physical location and the time they take it, and the social group it occurs within. Examples are provided of young people experimenting with a range of methods of using cannabis, and different ways of getting a 'hit', sometimes with unintended consequences, as one interviewee explains:

I was cookin' it and that, yeah, an' I didnae get to ma bed til aboot 4 am, ken and I didnae feel quite right ken, I woke up in the morning and I was still the same.([6])

Research conducted by Bennett (2002) explored the reasons why people use cannabis in the way they do and discussed the public health implications of the findings. It was concluded that a range of factors negate against the adoption of safer consumption methods. Cannabis, when inhaled in the form of a joint or spliff, is controllable in terms of the severity and length of the effect when compared with using bongs and vaporisers or eating the drug. Preparing and sharing joints is routine and a social activity. Alternative methods of smoking, including bongs and vaporisers, involve using other paraphernalia that may be inconvenient to use and expensive to buy. Further research that examines the different nuances and complexities of cannabis use, including consumption methods and techniques, is needed.

[4] 'Buckets' is a way of smoking cannabis in the UK. Usually, the cannabis smoke is captured in a plastic bottle with the bottom cut off. The plastic bottle is then pushed down into water (often in a bucket), thus causing the cannabis smoke to be released very quickly through the top of the bottle in relatively large amounts. The smoke is then inhaled.
[5] *Mixmag* is a UK dance magazine. The phrase 'how long till you're battered?' means, how long before you feel the effect of the cannabis; and 'how long do you feel caned for?' means, how long do the effects last.
[6] The extract is in the local dialect. The word 'cookin'' refers to preparing cannabis in food; and 'ken' should read 'know what I mean'.

Cannabis and tobacco: double trouble?

It has been estimated that 70 % of cannabis users in the United Kingdom smoke with tobacco (Atha and Blandchard, 1997). Two qualitative studies in Scotland with 15- to 19-year-olds have identified three links between cannabis and tobacco (Amos et al., 2004) ([7]). These are:

- Cannabis is linked to starting tobacco consumption — 'I hadn't smoked at all, but … I got into that (hash) and then that made me get addicted to tobacco.'
- Cannabis can reinforce tobacco consumption — 'if you've no' got any hash, you just smoke your fags.'
- Cannabis can make giving-up tobacco more difficult – 'I've tried to stop smoking but … you cannae go without a fag … you need it for your hash.'

Recognising the cannabis-tobacco link, Health Scotland published a booklet for young people titled *Fags 'n' Hash: the essential guide to cutting down the risks of using tobacco and cannabis*. In some parts of the United Kingdom, the National Health Service tobacco smoking cessation services are incorporating cannabis within their interventions with adults. Faced with the difficulties in promoting safer cannabis use, secondary prevention and treatment approaches aimed at controlling, cutting down or stopping consumption could also be seen as a plausible harm reduction technique.

A number of countries have recently developed and implemented interventions designed to enable heavy, frequent users to reduce or stop their cannabis use. In the UK the government in 2004 launched the *Know Cannabis* campaign to enable users to cut down or stop their cannabis consumption. The multi-component campaign included leaflets, posters, *A Guide to Cutting Down or Stopping Cannabis* and a self-help website ([8]). In the Netherlands a self-help website has been in existence for a number of years ([9]). These interventions use cognitive behavioural approaches, and include: assessment of the benefits and costs of cannabis; planning and preparing for change; setting targets; identifying high-risk situations; dealing with withdrawal; and relapse prevention.

The above types of secondary prevention or treatment approaches should form a part of a comprehensive approach to reducing cannabis-related harm. Harm reduction establishes a hierarchy of goals, with the more immediate and realistic ones to be achieved as first steps toward reduced risks or, if appropriate, abstinence. Cannabis users need to be aware and have the option of accessing a range of appropriate interventions.

([7]) 'Hash' is cannabis and 'fags' are cigarettes.
([8]) See www.knowcannabis.org.uk
([9]) See www.jellinek.nl/zelfhulp/cannabis

Conclusion

Cannabis is the most widely used drug in Europe and many users seemingly enjoy their use of the drug without it leading to any significant negative social or health effects. However, it is not a harm-free drug. Heavy, frequent use is associated with increased susceptibility to respiratory disorders, dependency, precipitation or exacerbation of mental health problems in vulnerable people, and cognitive impairment. Some young people, especially those that use heavily and frequently, may be particularly vulnerable to mental health problems. Furthermore, a criminal record as a consequence of cannabis can also cause problems.

Harm reduction frameworks provide a useful way to appraise and respond to cannabis-related problems. However, there is a lack of information about the design and delivery of harm reduction interventions, and a greater lack of evidence of successful application. Many EU countries are beginning to recognise the healthcare needs of cannabis users. There is a need for the development of accessible interventions for cannabis-related problems including accurate, credible and targeted information; and secondary prevention for young people and adults who want to cut down or stop their cannabis consumption.

Unfortunately, the most common method of using cannabis — smoking — is also the most risky mode of administration. While some cannabis consumption methods and techniques, such as vaporiser use, may protect health to an extent, the evidence base is limited. Social, cultural and economic obstacles, and preferences by users themselves indicate that such modes of administration may not be widely adopted.

Cannabis and harm reduction has been considered in various ways in this chapter. Critical to the success of any intervention is the need to recognise that many people experience cannabis as enjoyable and trouble free, whilst accepting that some people require help to reduce or stop. Another vital aspect is to realise that non-official sources of information — cannabis-using peers, advocacy groups, headshops and websites — often play a role in educating cannabis users, and there is a need to engage such actors in delivering accurate harm reduction messages.

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Supply and production issues

PART III

Chapter 12
Global cannabis cultivation and trafficking

Setting the context

Sizing markets for illicit products is always difficult. The most basic challenge is that the standard yardsticks common for legal markets cannot be used. Analysis and forecasts are simply not available for illicit goods, and economists working on the issue are faced with a lack of standard sources such as investor reports, tax declarations and fiscal yields, obligatory bourse filings, performance indicators, customs duties, wholesale and retail reports and the trade press.

So drug market analysts must instead make do with a piecemeal substitute, triangulating information obtained from various channels: enforcement (police reports, crime statistics, customs seizures data), healthcare (drugs epidemiology, treatment indicators) and a more nebulous literature base produced by drugs workers and charities, think tanks, academics and policymakers, and journalists. While in some cases, statistics are produced on a standard, usually annual cycle (United Nations Office on Drugs and Crime (UNODC), EMCDDA, World Customs Organisation, Interpol), more often than not analysis is ad hoc and restricted in scope, for example national, regional or single-theme studies.

UNODC is the primary provider of research into the machinations of the global illicit drugs market. In this chapter, UNODC authors reveal that, for cannabis, estimating supply is even more difficult than for other drugs, such as heroin and cocaine. For example, while satellite data have recently been used to estimate areas of cultivation in a report on Morocco, there is strong variation in crop yields and the cost of expanding such scrutiny on a global level is prohibitive. Another difficulty is that supply is moving closer to the consumer. As indoor cultivation, self-supply and locally grown herbal

cannabis become more common, the likelihood of seizures providing a complete picture of the market decreases. Beyond this, there is also considerable variation in how herbal cannabis and cannabis resin seizures are reported, a fact further impacted by the relatively low standardisation of information on the product itself (e.g. resin or herb, potency and estimated dose consumed by users).

Nonetheless, this chapter points out that indicators suggest that worldwide cannabis cultivation increased throughout the 1990s until 2004, in keeping with growing demand, both at the global level and in Europe. Only in 2005 was a reduction reported. For herbal cannabis, North America remains the largest market and is largely self-contained. For cannabis resin, Europe remains the largest consumer market, predominantly supplied by Morocco (see also Gamella and Jiménez Rodrigo, this monograph), even though Morocco's importance as a source country for cannabis is declining. Despite some progress made in recent years, there can be no doubt that more research and better official record-keeping are required to provide more precise estimates on the total amount of cannabis grown and consumed globally. And while work is taking place — some European countries are modelling consumption patterns for intensive cannabis use (EMCDDA, 2007) — this chapter offers practical suggestions for improving our knowledge of the market.

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Global cannabis cultivation and trafficking

Ted Leggett and Thomas Pietschmann

Abstract

Though cannabis is, by far, the most widely used illegal drug worldwide, consumed by some 3.8 % of the population aged 15–64 in 2005–2006, little scientific information is available on the actual extent of its cultivation and its yields. Information collected by UNODC indicates that it is produced in (at least) 172 countries across the globe. UNODC's best estimates, based on Member States' estimates and some indirect measurement techniques, suggest that some 42 000 tonnes of cannabis herb and 6 600 tonnes of cannabis resin were produced at the global level in 2005, slightly down from the peak in 2004, though still significantly more than in the early 1990s. This pattern is in line with global cannabis herb and resin seizures and global cannabis consumption estimates. The largest cannabis herb seizures have been reported from North America (Mexico, followed by the USA), followed by Africa and South America. The largest cannabis resin seizures have been reported from Western Europe (notably Spain), followed by countries of South-West Asia (Pakistan, Iran and Afghanistan) and North Africa (Morocco). Production of cannabis resin in Morocco, the world's largest cannabis resin producer and main supplier of it to Europe, has been declining since 2004, while production in Afghanistan is increasing. The chapter also makes a number of proposals on key areas where more research is needed.

Strong increases in global cannabis cultivation have been reported over the last four decades, largely related to rising demand in North America, Europe and Australia. Increased production occurred first in the traditional cannabis-producing countries and, more recently, in the developed countries that provide the most lucrative consumer base. Only in 2005 were the first signs of a decline in global cannabis production seen, following years of continuous increases in the 1990s and in the early 2000s.

It remains difficult to establish how much cannabis is produced globally. Unlike other drug crops, cannabis is a plant that can be grown in virtually every inhabited region of the world, and can be cultivated with little maintenance in small plots, or even indoors. UNODC regularly collects, mainly using its Annual Reports Questionnaire (ARQ), estimates from UN Member States on the areas under cannabis cultivation and estimated yields. But reliability of these figures is significantly lower than the corresponding estimates for heroin or cocaine, which are typically made using satellite photos and scientific yield assessments.

Heroin and cocaine production estimates are facilitated by the fact that production of opium and of coca leaf is nowadays geographically concentrated in just a few areas. A global assessment of cannabis cultivation, in contrast, would have to be truly global, and would be both extremely difficult and expensive. An idea of the costs involved can be derived from UNODC's work in this area. UNODC has conducted studies of the extent of cannabis cultivation in Central Asia in the late 1990s and, in collaboration with the government of Morocco, of the primary cannabis-producing areas of that country in 2003, 2004 and 2005. The latter studies employed the use of remote sensing technology as well as ground survey data. Conducting such comprehensive surveys in countries the size of Morocco would probably cost between USD 200 000 and USD 300 000 per country. While Morocco actually covers a large part of the survey costs, many other countries would not be in a position to do so, which would leave the costs with the international community.

Even if the precise number of hectares dedicated to cannabis cultivation worldwide could be determined with the help of remote sensing technology, estimates of crop yields would still be a challenge. Although cannabis can be grown in most countries, its productivity is directly linked to growing conditions, and cannabis is a highly adaptable plant. Depending on the cultivar and the environment in which it grows, cannabis can vary in appearance from a small weed to a substantial bush to a five-metre tree (Clarke, 1981).

Yield estimates provided by Member States to UNODC ranged from as low as 5 kg per hectare for wild cannabis to 17 500 kg per hectare for countries that reported a high proportion of hydroponically grown cannabis. The median cannabis yield was 730 kg per hectare, and the unweighted average yield was 2 070 kg per hectare (UNODC, 2007). Moreover, cannabis can be 'adulterated' considerably by the inclusion of inert (or relatively inert) plant material. All of this makes coming up with an estimate of yield per plant or per unit area (square metre or hectare) a difficult exercise. Yield estimates must also take into consideration whether the plants in question were intended to be used for cannabis herb or resin production. Cannabis can be consumed with little processing after harvesting. As a result, users can feasibly cultivate their own supply, and production is highly decentralised. While substantial international trafficking of cannabis does occur, it is unclear what share of the total market this comprises. It appears that many countries can satisfy much of domestic demand with locally produced cannabis (see Korf, this monograph), and this trend appears to be growing in many important markets.

The matter is complicated further by the fact that cannabis comprises two distinct drug products, cannabis herb and cannabis resin. Over the period 2000–2005, 82 % of the cannabis end-product seizures concerned cannabis herb and 18 % cannabis resin (UNODC, ARQ). Herbal cannabis comes in various grades, including a product made

up of only the unfertilised buds of the female plant, known as *sinsemilla*. There are also various grades of hashish, based on amount of impurities contained in the final product. In addition, it is possible to produce 'cannabis oil', although this form of the drug is not widespread: 0.02 % of global seizures of cannabis end-products over the 2000–2005 period, and only 0.01 % in 2005.

While herbal cannabis is consumed throughout the world, the largest market for cannabis herb is in North America, where 63 % of global seizures occurred in 2005, followed by Africa (18 % in 2005). Europe accounted for just 2 % of global cannabis herb seizures in 2005, down from 4 % in 2000 (UNODC, ARQ). Changes in law enforcement priorities among some European countries may also have played a role here.

Western Europe is the largest market for cannabis resin, responsible for more than 70 % of global seizures in 2005. UNODC estimates that around 70 % of this hashish was produced in Morocco in 2006, down from some 80 % in previous years (UNODC, 2007). In 2003, France reported that 82 % of the cannabis resin found on its market in 2002 originated in Morocco. Similar estimates were made for Belgium (80 %), Sweden (85 %), and the Czech Republic (70 %). Spain, Italy, Denmark, Finland and Ireland reported that almost all of the cannabis resin originated in Morocco (UNODC, 2006). By 2005–2006, most European countries reported a decline of the importance of Moroccan cannabis resin. Based on individual drug seizure data provided by the World Customs Organisation (WCO) to UNODC cannabis from Morocco accounted for, in weight terms, 74 % of total cannabis resin seizures made in Western Europe in 2006, down from 82 % in 2004. In terms of number of seizure cases, the proportion of Moroccan cannabis fell to 67 % by 2006, according to WCO data. All of this reflects an underlying decline of cannabis resin production in Morocco in recent years.

While UNODC relies primarily on official government figures for its global estimates, these estimates are not available for all cannabis-producing countries in the world. Only a few countries have scientifically valid estimates based on remote sensing technology or based on ground surveys. Most countries provide estimates based on some extrapolations from their cannabis eradication activities. Where official figures for cannabis herb production are not available, UNODC bases its estimates on demand data, also taking police intelligence into account. Law enforcement information is often available with regard to a country's position as a cannabis production, transit or export country. For countries that are neither importing nor exporting countries, it can be assumed that domestic demand is covered by domestic production. For cannabis importing countries, there are usually rough estimates available on the share of imported cannabis. Similarly, for cannabis exporting countries there are rough estimates available on the proportion of cannabis produced for local production and for export. Based on such information and estimates on the size of the local cannabis market, likely orders of magnitude of domestic cannabis production can be established.

This approach, of course, is not without difficulties. Survey data on cannabis use are also not available for all countries. In such cases, the sub-regional prevalence rates are used as a proxy. Even where available, many important questions may remain unanswered, particularly with regard to the quantities of cannabis consumed per user. Where these figures are available, the reliability of such consumption estimates can still be questioned. Even for experienced users, estimating total consumption can be difficult: cannabis is often smoked communally, with many consuming less than a whole 'unit' in a single session of use. Use levels also vary based on drug availability and potency.

Despite these difficulties, available data show some general trend patterns. Most available indicators suggest that cannabis production, after having fallen in the late 1980s (mainly due to large-scale eradications in Latin America), rose again in the 1990s and continued rising in the new millennium until 2004 before falling back in 2005. Similarly, the volumes of cannabis seized by customs and the police have been increasing from the early 1990s until 2004 at the global level before declining strongly in 2005. Drug use surveys also show that global demand increased until 2004 before declining in 2005. An estimated 159 million people, or 3.8% of the population age 15–64, used cannabis at least once in the 12 months prior to the survey(s) in 2005–2006, down from 162 million people in 2004. This figure for 2005–2006 is, however, still some 10% higher than for the late 1990s (144 million people in 1997–1998) (UNODC, 2007). Despite the decline in 2005, consumption estimates and expert opinions solicited from UN Member States suggest that cannabis use has been growing faster than the use of cocaine or opiates over the last decade (UNODC, 2007).

To keep up with growing demand, either more land area would have been needed for the crop, or technological innovation would have been required to make cannabis production more efficient. Both factors seem to have played a role in increasing supply over the last decade. In fact, in addition to some expansion in the area under cultivation, great strides have been made in improving cannabis plot productivity, particularly indoors in developed countries.

Cannabis herb production

As argued above, the unique properties of the cannabis plant have led to its widespread and diffuse cultivation. Over the 1995–2005 period, 82 countries provided UNODC with cannabis production estimates. For comparison, only 46 countries provided estimates for opium-poppy cultivation, and only five provided estimates for coca-leaf production (DELTA, 2007). But the fact that a country did not provide an estimate does not mean that no cultivation exists, as some countries simply lack the capacity to come up with estimates. However, there are also some other ways of identifying cannabis-producing countries.

UN Member States — as part of the ARQ — are asked to identify the source(s) of the cannabis consumed in their countries. While this anecdotal evidence is basically opinion data, it is often based on considerable experience in the field, and its value should not be underestimated. On this basis, 134 producer countries could be identified as likely cannabis producers (UNODC, 2007). A third list of producer countries can be generated by singling out those that report the seizure of whole cannabis plants. It is extremely inefficient to transport whole plants internationally, as only certain parts are useable as a drug. Thus, when a whole plant is seized, it is very likely that it was locally produced. Seizures of whole cannabis plants were reported in 146 countries during the 1995–2005 period. Combining these three lists results in the identification of 172 countries and territories where cannabis is produced, out of 197 countries reporting (87%) (UNODC, 2007).

Of course, evidence of some cultivation does not mean the practice is large in scale. Many of these 172 countries seem to produce primarily to satisfy local demand, but there are a number of countries that produce for mass export.

For example, Paraguay produces much of the cannabis consumed in its neighbouring countries, and European production hubs include Albania and the Netherlands. Other significant exporters include:

- in Africa: Nigeria, South Africa, Malawi, Lesotho and Swaziland;
- in the Americas: Mexico, Canada, Jamaica and Columbia;
- in Central Asia: Kazakhstan and Kyrgyzstan;
- in the Middle East: Egypt and Lebanon;
- in South Asia: India; and
- in South-East Asia: Cambodia, Thailand and the Philippines.

Quantifying this production is another matter. As discussed above, estimating the volume of global cannabis production is extremely difficult. The 2004 *World Drug Report* (WDR) provided an estimate of about 32 000 tonnes of cannabis herb production at the global level for 2001–2002. The 2005 WDR estimated global cannabis herb production to have amounted to 42 100 tonnes in 2003. Since the methods used in arriving at these two calculations were not identical, this should not be interpreted as a dramatic increase in just two years. Excluding demand-based production estimates, introduced for the first time in the 2005 *WDR*, the global estimate would have still increased to around 35 000 tonnes for 2004. Applying the revised methodology, as developed for the 2005 *WDR*, the 2006 WDR saw a further increase from 42 100 to 45 000 tonnes in 2004. The upward trend, however, did not continue for the subsequent year. Without any further change in methodology, the 2007 WDR saw a decline to 42 000 tonnes in 2005 — the first decline in several years — mainly due to declines reported from North America and

Africa, while production continued to rise in many other parts of the world. Despite this decline, production is still higher than a decade ago (Figure 1).

There are also other indications suggesting that global cannabis production has been increasing over the last decade before falling in 2005. Estimates of the number of cannabis consumers globally (based on survey data) and information on the quantities of cannabis seized globally by law enforcement have shown increases until 2004 and a decline in 2005. Where prevalence data and seizure data are available, such as in the USA, a strong correlation between the two datasets was identified in the past, suggesting that cannabis seizure statistics, in general, do reflect consumption trends rather well. The same is true, if looked at from a global perspective, for cultivation and production trends (UNODCCP, 1999) (Figure 2).

In terms of distribution, estimates made available to the UNODC suggest that the Americas account for some 47% of global cannabis herb production. About half of this, or close to 10 000 tonnes, is produced in North America. The second-largest producer is Africa, accounting for some 25% of global production. Asian countries account for about 22% of global cannabis production. Most of the cannabis in Asia is produced in South-West Asia and the Middle East. Production in Europe, estimated at less than 2 300 tonnes, accounts for 5% of global cannabis herb production.

Figure 1: Estimates of global cannabis herb production
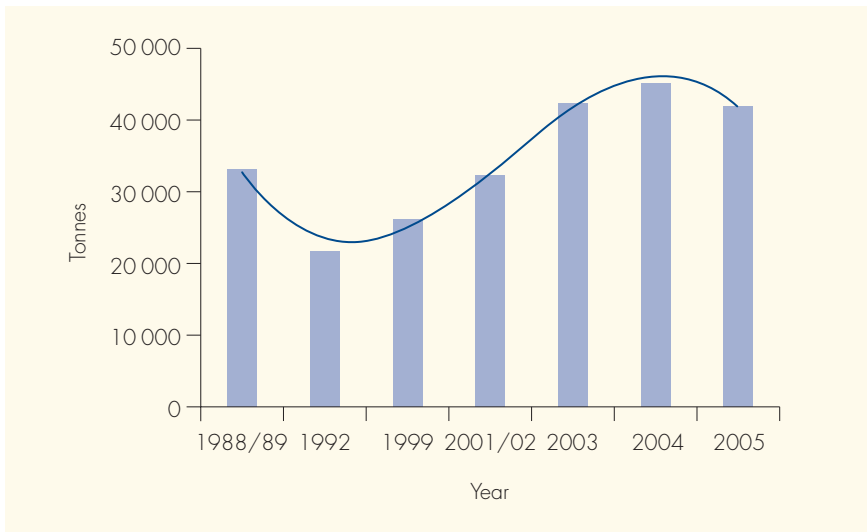
Sources: UNODC annual reports questionnaire data, other government reports and UNODC estimates.

Figure 2: Global cannabis herb seizures
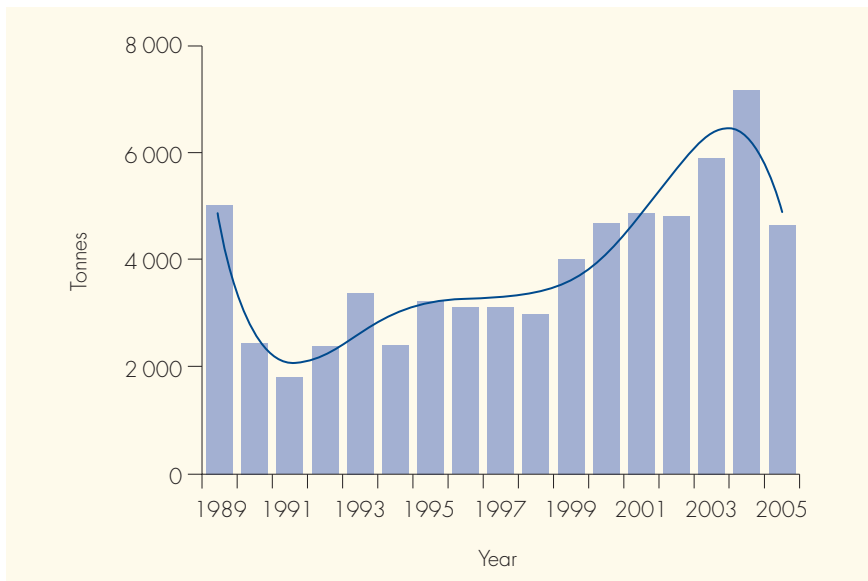
Source: UNODC annual reports questionnaire data.

As mentioned above, all of these must be considered as tentative estimates. For instance, for the USA, one of the best studied countries in the world, estimates based on cannabis eradication data ranged from 5 600 tonnes to 16 700 tonnes (Drug Availability Steering Committee, 2002) in 2000/2001 while demand-based estimates suggested production figures of around 1 000 tonnes (ONDCP, 2000). Eradication-based production estimates for 2006 ranged from 5 650 to 9 420 tonnes, with a mid-range estimate of some 7 530 tonnes. Estimates of net production (after eradication) ranged from 2 830 to 6 590 tonnes with a mid-range estimate of 4 710 tonnes for the USA in 2006 (US Department of Justice, 2007) (Figure 3).

There has been some debate as to whether potency has increased in recent decades. This debate is complicated by the fact that comparable potency data are available for only a small number of countries throughout the world. A review of the potency evidence in Europe was undertaken by EMCDDA in 2004 (see King, this monograph). It remained sceptical about overall increases in Europe. Unfortunately, this analysis conflated herbal and resin markets.

In fact, the potency of cannabis resin — which is mainly imported into Europe from Morocco — seems to have remained stable. However, there is strong evidence that herbal cannabis, which appears to be growing in popularity in a number of European countries, is becoming more potent, largely due to the increasing availability of indoor-produced sinsemilla, a trend seen both in Europe and in other developed countries.

Figure 3: Distribution of cannabis herb production, 2005 (42 000 tonnes)
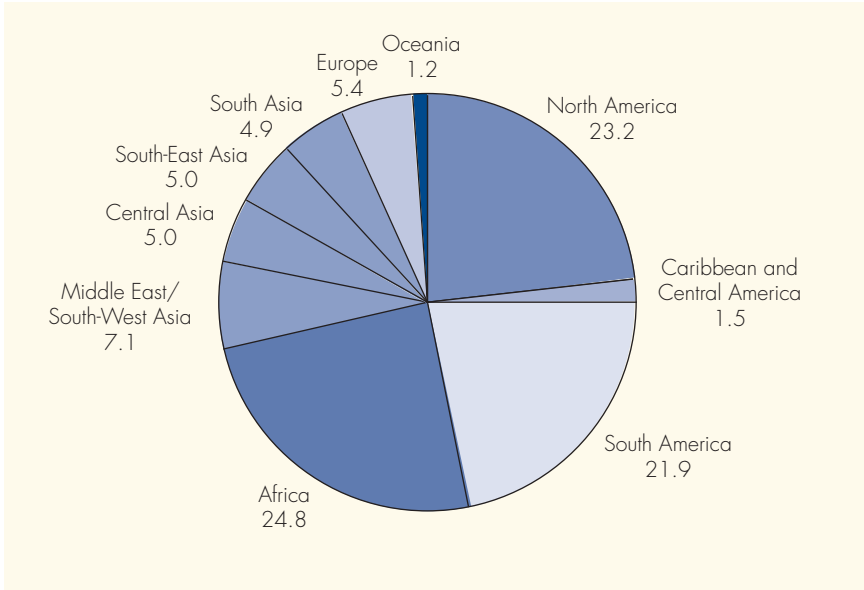
For example, Dutch sinsemilla, which accounts for the bulk of the cannabis market in the Netherlands, doubled in potency in just five years, from about 9 % in 1999/2000 to about 18 % in 2004–2005 (Niesink et al., 2005). In Germany, the European country with the largest sample base, no distinction is made between sinsemilla and commercial cannabis. Despite this, aggregate herbal potency has doubled in less than a decade. In 1996, samples averaged about 5 %, rising to about 11 % in 2004. (Bundeskriminalamt, 2005). In the United Kingdom, sinsemilla potency doubled between 1995 and 2002, from about 6 to about 12 % (King *et al.*, 2004). In the other two countries for which comparable data are available, the USA and Canada, cannabis potency is also increasing (Second Technical Conference on Drug Control Research, 2004). In the USA, the *Cannabis Potency Monitoring Project* found an increase in the average potency of cannabis from less than 2 % in 1980 to around 4 % in the late 1980s, around 5 % in the late 1990s and 8.5 % in 2006 ([1]). This total included an average sinsemilla potency of over 14 % in each year since 2002, up from 8 % in the mid-1980s (University of Mississippi, 2007) (Figure 4).

([1]) The proportions were calculated based on 59 369 cannabis herb samples, 1 225 cannabis resin samples and 443 cannabis oil samples analysed by forensic laboratories in the USA over the 1975–2006 period. Two-thirds of the 2006 samples were obtained from law enforcement seizures and purchases, and the remaining were from domestic eradications. The law enforcement seizures were obtained from 45 different states across the USA (University of Mississippi, 2007).

Figure 4: USA — average cannabis potency, 1980–2006
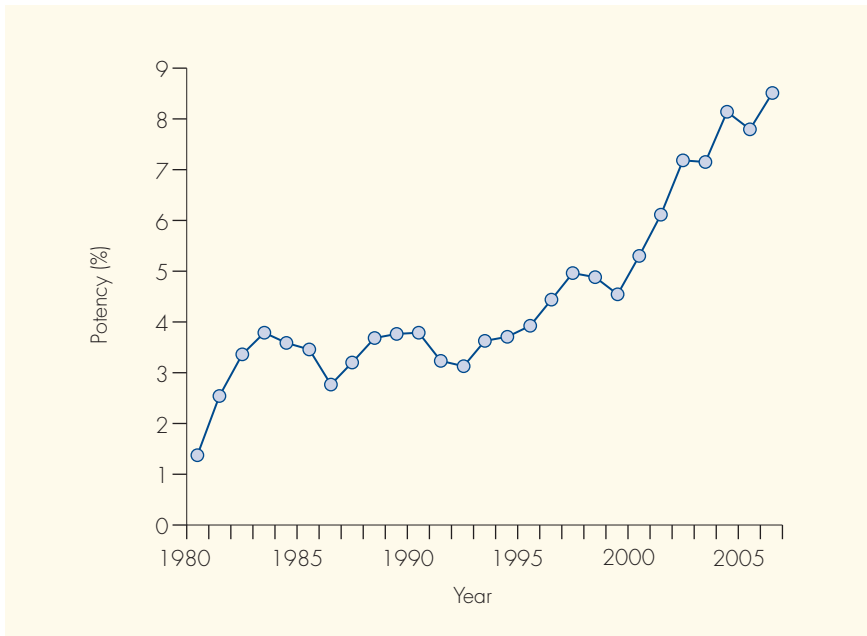
Increases in potency may be also linked to a growing share of the herbal cannabis market in developed countries being produced domestically, with a declining share being the relatively low-potency product traditionally imported from developing countries. In the United Kingdom, it is estimated that as much as half the cannabis consumed is domestically grown, and this share has been on the increase in recent years (Hough et al., 2003). In Iceland, 'domestically cultivated marijuana has become increasingly competitive with imported marijuana, and current estimates indicate it makes up anywhere from 10 to 50 percent of the total cannabis market' (INCB, 2005). Again, this trend appears to be occurring in a number of other developed countries as well. In 1986, it was estimated that one-sixth of cannabis consumed in the USA was produced within the country (President's Commission on Organized Crime, 1986), whereas more recent estimates are closer to a third (Williamson, 2005), and it would appear that this trend is continuing (National Drug Intelligence Center, 2005 and 2007). In Canada in 1985, only 10 % of the cannabis consumed was produced domestically (Stamler et al., 1985), but by 2002 it was estimated that 'well over half' was Canadian grown (RCMP, 2002).

In most developed countries, an increase in the share of domestic production means an increase in the share of indoor production, and thus an increase in sinsemilla in the

market ([2]). Unfortunately, time-series data on the share of the herbal cannabis market commanded by sinsemilla in Europe are scant. In discussing the results of their surveys of regular cannabis users, Atha *et al.* concluded that 'skunk' (sinsemilla) was the only type of herbal cannabis to improve its market share in the United Kingdom between 1994 and 1997, up just under 10 % (Atha, 2002). Sinsemilla is now said to comprise about half of the United Kingdom and Irish herbal markets (King et al., 2004). Outside Europe, the share of eradicated cannabis cultivation operations that are located indoors in the USA has increased in recent years, from 2 % indoor in 1985 (DEA, 2005) to more than 6 % in 2005 (National Drug Intelligence Center, 2006). According to the US National Drug Threat Assessment 2005, the prevalence of sinsemilla is continuing to grow in the USA (National Drug Threat Intelligence Center, 2005). In Canada between 1997 and 2000, some 78 % of cannabis production operations detected in British Columbia, which produced over 40 % of the detected cultivation operations in Canada, were indoors. The number of detected indoor operations tripled during the same time period (Plecas et al., 2002). On a national level, a slightly lower share of all operations detected were indoors (RCMP, 2002). In New Zealand, the number of national survey respondents who had ever used 'skunk' increased from 10 % in 1998 to 14 % in 2001 (Wilkins et al., 2002). After many years of winning market share from both imports and a remarkable outdoor industry, hydroponic production is now also the most commonly detected method of cultivating cannabis in Australia (Australian Crime Commission, 2004, reconfirmed in Australian Crime Commission, 2007).

Cultivation for personal use is also a significant source of supply in many areas, and in many developed countries this is likely to mean indoor cultivation. In the United Kingdom, one study found that 63 % of a sample of regular users reported having grown the drug at some point in their lives, growing an average of 24 plants. The authors estimated that 30 % of the cannabis used by regular users in the UK was home-grown in 1997 (Atha et al., 1999). In Spain, legal constraints on carrying — but not consuming — cannabis have led to an increase in production for personal consumption since 1992 (Gamella and Jimenez Rodrigo, 2004). Cultivation for personal use is also common outside Europe, in Oceania, for example. In New Zealand, a household survey found that 10 % of all current users grew at least some of their own supply (Wilkins et al., 2002). The share of people cultivating for personal use is much higher among those who use the drug frequently. A survey of regular users in Australia found that two-thirds of respondents grew some cannabis for their own use, and nearly half grew all or most of the cannabis they used (Reilly et al., 1998).

([2]) The terminology in this area can be confusing. While it is possible to produce seeded cannabis indoors, most indoor operations of any scale produce sinsemilla, and as do nearly all hydroponic operations. And while there is extensive outdoors production inside consumer countries like the USA, in many developed countries there is a substantial overlap between domestically produced cannabis and indoor-produced cannabis, due to poor climate and the presence of law enforcement, as well as a desire to enhance yield and potency through available technology. The term 'skunk' is also used for high potency strains of cannabis in parts of Europe and Oceania, a reference to an early 'Indica/Sativa' cultivar that forms the basis of many modern breeds.
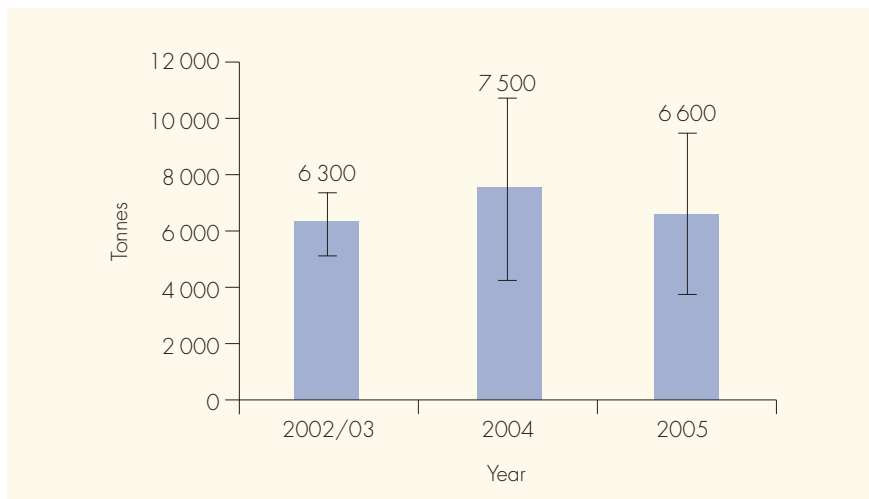
Cannabis resin production

Global cannabis resin production estimates are derived from estimates of hashish production in key producing countries, seizure information and intelligence information about the importance of various markets. Another approach has been to estimate cannabis resin production backwards from estimated cannabis herb production, applying the global distribution of cannabis resin to cannabis herb seizures. The two approaches give a range of the likely cannabis resin production from 3 800 to 9 500 tonnes for 2005, and a mid-point estimate of around 6 600 tonnes. Previous year's estimates, based on the same methodology, resulted in a range from 4 200 to 10 700 tonnes with a mid-point estimate of some 7 500 tonnes. These results reflect falling cannabis resin production in the world's largest hashish producing country, Morocco. The declines in Morocco were, however, partially offset by rising levels of cannabis resin production in other parts of the world, notably Afghanistan. As a side-product of the annual village surveys undertaken as part of UNODC's Afghanistan Opium Survey, data on the area of cannabis cultivation are also collected. These surveys found that the area under cannabis (resin) cultivation in Afghanistan rose from some 30 000 hectares in 2004 to 50 000 hectares in 2005–2006 and 70 000 hectares in 2007 (UNODC, 2007, and UNODC, Afghanistan 2007) (Figure 5).

Attempts to break down global cannabis resin production in 2002–2003 suggested that more than 40% of the global cannabis resin supply is being produced in northern Africa and more than a quarter in the Near East and Middle East. These two regions thus

Figure 5: Global cannabis resin production

Sources: UNODC estimates based on UNODC and government of Morocco cannabis surveys 2003, 2004 and 2005 and UNODC annual reports questionnaire data.

accounted for more than two-thirds of global cannabis resin production. Central Asia and South Asia accounted for less than 10% each; South-East Europe for some 5% and the Caribbean for some 3% of global production (UNODC, 2005).

When UN Member States were asked about the source of cannabis resin in their countries, Morocco was also the most often cited country (27% of all mentions over the period 2003–2005 period), followed by Pakistan and Afghanistan. Other important source countries identified are Nepal and India, the Commonwealth of Independent States (CIS) countries, notably Kazakhstan and Kyrgyzstan, the Netherlands and Albania in Europe, Jamaica and Paraguay in Latin America, as well as the Lebanon and Egypt in the Near East. If compared with a similar exercise done previously, data suggest that the importance of Morocco is declining: 31% of all mentions over the 1999–2003 period versus 20% in 2005 (UNODC, 2007) (Figure 6).

Morocco remains, nonetheless, the world's most significant cannabis resin exporter. In recent years, about 80% of cannabis resin seized in Western Europe originated in Morocco. By 2005–2006, it is estimated that this proportion declined to around 70%. Since resin is the primary form of cannabis consumed in most of Europe, an analysis of

Figure 6: Main source countries of cannabis resin, 2003–2005 (based on information from 61 countries)

* including mentions of the transit countries, Spain and Portugal
** including mentions of Syria
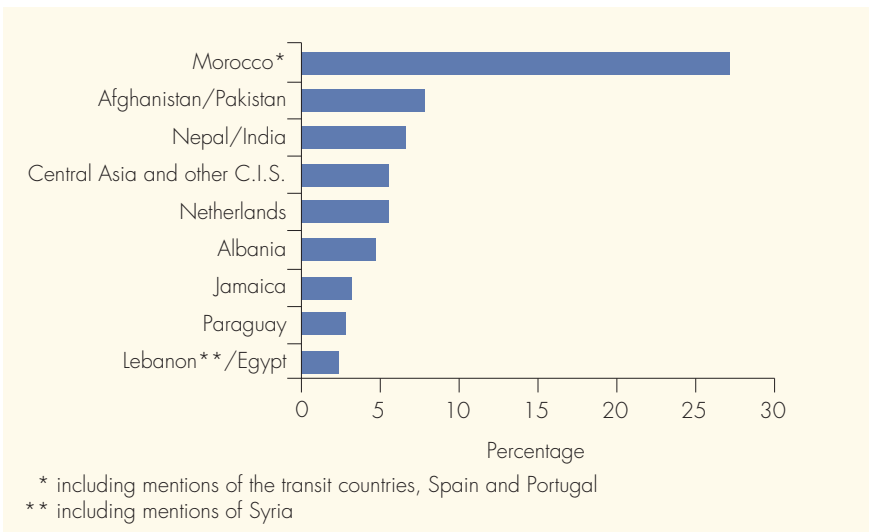
Note: the percentages reflect the number of times a country was identified — by other countries — as a major source country for cannabis resin, expressed as a proportion of all such mentions. Source: UNODC annual reports questionnaire data, other government reports and UNODC estimates.

cannabis production for the European market must focus on Morocco (see Gamella and Jiménez Rodrigo, this monograph).

UNODC and the government of Morocco conducted comprehensive cannabis resin surveys of the country in 2003, 2004 and 2005. The resulting estimates are based on the analysis of satellite photos (SPOT 5 and IKONOS) [3] covering the whole of the Rif area of northern Morocco, and subsequent ground truthing. The 2003 survey placed total resin production at about 3 070 tonnes, cultivated on 134 000 hectares of land in the Rif region (equivalent to 10 % of the total land or 27 % of the agricultural area in the five provinces [4] investigated) by some 96 600 families, providing income for some 800 000 people in the region. This was significantly higher than the previously estimated 80 000–85 000 hectares for the late 1990s by the EU (US Department of State, 2000) or the 44 500 hectares estimated by the Moroccan authorities in 1995 [5].

The 2004 survey showed a 10 % decline in the land dedicated to cannabis cultivation (120 500 hectares) compared with a year earlier, with production falling to 2 760 tonnes (UNODC, 2004) [6]. This decline was mainly due to lower levels of cannabis cultivation in the provinces of Taounate (–43 %) and Al Hoceima (–54 %), an indirect consequence of the earthquake in early 2004, which led to increased 'interest' and assistance by the authorities. Most cannabis was produced in the province of Chefchaouen (50 % in 2003, 62 % in 2004) (Figure 7).

The 2005 survey showed a further strong decline (–40 %) in the area dedicated to cannabis cultivation in Morocco to 72 500 hectares. Cannabis resin production declined to 1 066 tonnes. The area under cultivation was, thus, also lower than the levels in the late 1990s. Declines were reported from most provinces, including Chefchaouen (–46 %). The largest areas under cannabis cultivation continued to be in the province of Chefchaouen (56 % of total), followed by Taounate (17 %) and Al Hoceima (16 %).

The overall area dedicated to cannabis cultivation in Morocco in 2005 was less than the area found in a previous UNODC cannabis survey in Kazakhstan (330 000 hectares in 1998–1999; though most of this was 'wild cannabis') (UNODCCP, 1999) and less than opium-poppy cultivation in Afghanistan in 2005 (104 000 hectares) but more than opium-poppy cultivation in Myanmar (32 800 hectares) or Laos (1 800 hectares). It was

[3] The survey was based on the analysis of 16 SPOT5 (multi-spectral, 10 m resolution) and 13 IKONOS (panchromatic, 1 m resolution).
[4] The five provinces were Al Hoceima, Chefchaouen, Larache, Taunate and Tétouan.
[5] It should be noted, though, that all cultivation estimates prior to 2003 have not fulfilled strict scientific criteria and must thus be treated with caution.
[6] Some of the decline appears to have been a consequence of an earthquake, resulting in increased attention being given by the national authorities and the international community to the region concerned.

Figure 7: Area under cannabis cultivation in Morocco, 1986–2005
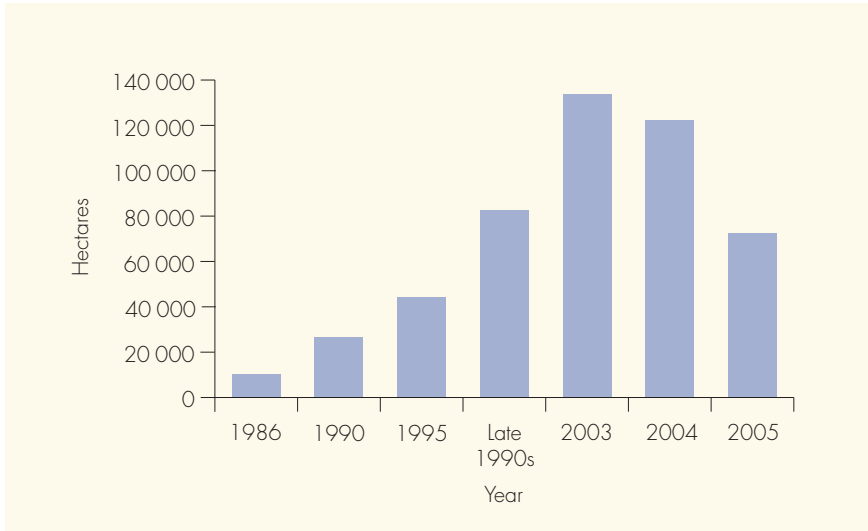
also less than the area under coca cultivation in Colombia (860 000 hectares), but more than the area under coca cultivation in Peru (48 200 hectares) or Bolivia (25 400 hectares) in 2005 (UNODC, 2007).

The yield estimates for 2004 were based on a scientific study, conducted on 30 plots across the five provinces. The yield on rain-fed land was found to amount to 750 kg/ha; the yield on irrigated land was, on average, 1 270 kg/ha in 2004. The rain-fed area amounted to 106 100 hectares; the irrigated area was 14 500 hectares. The overall yield of herbal material amounted, thus, to 813 kg/ha. Total production of cannabis material was estimated at 98 000 tonnes. Out of this cannabis material the farmers produced 1 019 tonnes of first-quality resin, 921 tonnes of second-quality resin and 823 tonnes of third-quality resin, that is, in total some 2 760 tonnes of cannabis resin. This was equivalent to 2.8 % of all cannabis material (UNODC Morocco, 2007).

A subsequent yield survey, conducted in 2005, based on data from 87 plots across the cannabis producing provinces, found overall lower results. While average cannabis production on irrigated land increased to 1 821 kg/ha, due to an increasing concentration of cannabis production in more fertile areas of the Rif region, cannabis production on non-irrigated land declined, due to a drought, to just 459 kg/ha. Given the distribution between irrigated and non-irrigated land in the Rif area (14 750 hectares

irrigated; 57 728 hectares non-irrigated), the overall average yield amounted to 735 kg/ha, yielding 53 300 tonnes of raw cannabis. The conversion ratio from dried raw material to cannabis resin — based on the analysis from 87 plots — fell to 2 kg of cannabis resin per 100 kg of cannabis raw material in 2005, down from 2.8 kg in 2004. Total cannabis resin production thus amounted to 1 066 tonnes in 2005, down from 2 760 tonnes a year earlier (UNODC Morocco, 2007).

In parallel to the decline in production, cannabis farm gate prices doubled, from 25 Dh/kg in 2004 to 50 Dh/kg in 2005 (i.e. from EUR 2.3/kg to EUR 4.5/kg); cannabis resin farm gate prices almost tripled, from 1 400 Dh/kg in 2004 to 4 000 Dh/kg in 2005 (i.e. from EUR 127/kg to EUR 363/kg) (UNODC Morocco, 2007). No such price changes were, however, reported from European countries in 2005 (UNODC Morocco, 2007).

The income for the farmers from the production of cannabis resin was around EUR 260 million in 2004, equivalent to 0.7 % of GDP. In 2005, high prices led to an increase to EUR 325 million. The amount of money earned with this Moroccan cannabis resin in Western Europe (deducting seizures made in Morocco and in Western Europe) was estimated at around EUR 10.8 billion in 2004. As cannabis resin prices were not reported to have increased significantly in European countries in 2005, the value of the smaller amounts of cannabis exported from Morocco and sold on European markets is estimated to have declined to some EUR 4.6 billion in 2005 (UNODC Morocco, 2007).

The analysis of the THC content, done by the Laboratoire de Recherches et d'Analyses Techniques et Scientifiques, MARATES, based on samples from the 30 plots in 2004, revealed that the dry cannabis leaf had, on average, a THC content of 1.2 %; the dried flowering tops had a THC content of on average 2.7 % (confidence interval 2.1–3.4 %) and the cannabis resin had on average a THC content of 8.3 % (confidence interval 7.1–9.4 %) with a THC content of the samples analysed from 5.5 to 11.3 % (UNODC Morocco, 2005).

Trafficking

Survey data from a number of countries suggest that much of the cannabis consumed is not 'trafficked' in the traditional sense of the word, but rather grown on a small scale and distributed within social networks. As discussed above, cultivation for personal use is widespread in many countries. In the United Kingdom, Atha et al. note that 'most home grown (cannabis) is not sold' and they estimate that 30 % of the cannabis used by regular users in the UK was home-grown in 1997 (Atha et al., 1999). If this is correct, a significant share of the cannabis used in the UK at that time was produced and distributed free within the country. A second study concurs, 'domestic production is

on the increase and as much as half of the cannabis consumed in England and Wales may be grown here. Some cultivation is on a commercial basis, but much is on a small scale, for personal use or use by friends' (Hough et al., 2003). As this second study suggests, what these small growers do not use or give away, they often sell within their social circle. According to survey data from the United States National Survey on Drug Use and Health, most (78 %) of those who say they bought the drug in the last year say they bought it from 'a friend'. Similar figures were found in an international comparative study of cannabis users in Bremen (80 %) and San Francisco (95 %) (Borchers-Tempel and Kolte, 2002) ([7]). The 2006 National Survey on Drug Use and Health revealed that 53 % of the persons who used cannabis in the last year at least once, obtained it most recently for free (i.e. they shared someone else's cannabis); 42.8 % bought it; 1.19 % traded something for it; and 0.9 % grew it themselves (SAMHSA, 2007). Distribution along social lines thus undercuts many of the negative effects associated with drug markets dominated by organised crime, but it also facilitates access to the cannabis market.

In terms of volume, cannabis remains the most extensively trafficked drug worldwide. Expressed in drug units (doses), 70 % of all drug units seized in 2003 concerned

Figure 8: Global cannabis seizures, 1985–2005
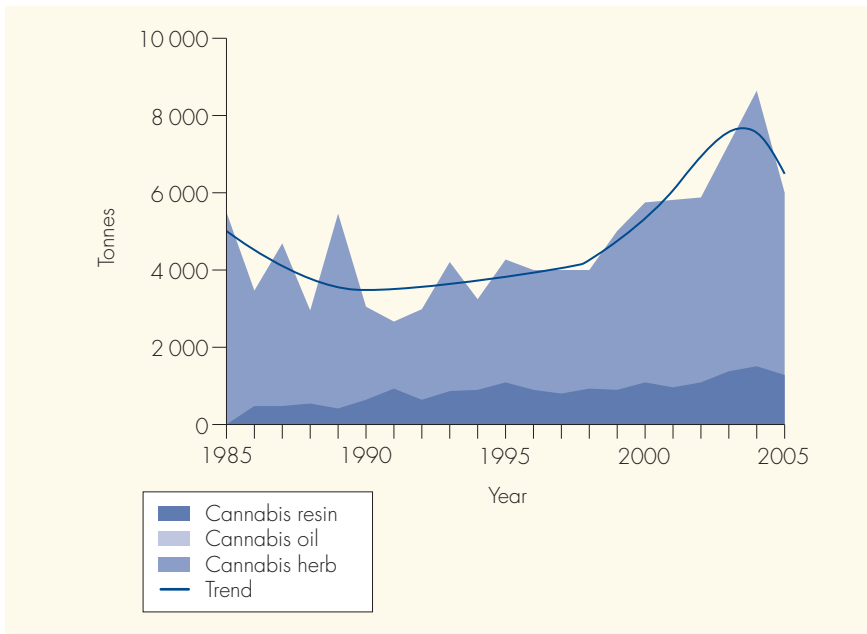
Source: UNODC, annual reports questionnaire data/DELTA.

([7]) This study also included users in Amsterdam, most of whom bought their cannabis from a coffee shop.

cannabis (DELTA, 2005). By 2005, this proportion declined, however, to 59 %, followed by cocaine (24 %), opiates (12 %) and amphetamines (4 %) (UNODC, 2007). In contrast to other drugs, most of the cannabis-related trafficking arrests — in most countries — are accounted for by nationals of the respective country (DELTA, 2007).

Cannabis end-product seizures showed a small downward trend in the late 1980s, strong increases in the 1990s and in the first years of the new millennium, but declined by 31 % in 2005 to around the levels reported in 2002. Cannabis herb seizures amounted to 4 644 tonnes, cannabis resin to 1 302 tonnes and cannabis oil to 0.7 tonnes in 2005. Cannabis herb seizures thus accounted for 78 % of all cannabis end-product seizures in 2005. In addition, 32 million cannabis plants and more than 600 tonnes of cannabis plant material were seized worldwide in 2005. This corresponded to a decline of close to 70 % compared with 2003 (DELTA, 2007) (Figure 8).

Following years of increase in the 1980s, the 1990s and the first years of the new millennium, cannabis seizures declined by 18 % in Europe in 2005. While cannabis herb is the predominant type of cannabis product found globally, cannabis resin is the predominant form of cannabis seized in Europe, accounting for almost 90 % of all cannabis end-product seizures in 2005. Most of these seizures have been made by the Spanish authorities (Figure 9).

Figure 9: Cannabis seizures in Europe, 1985–2005
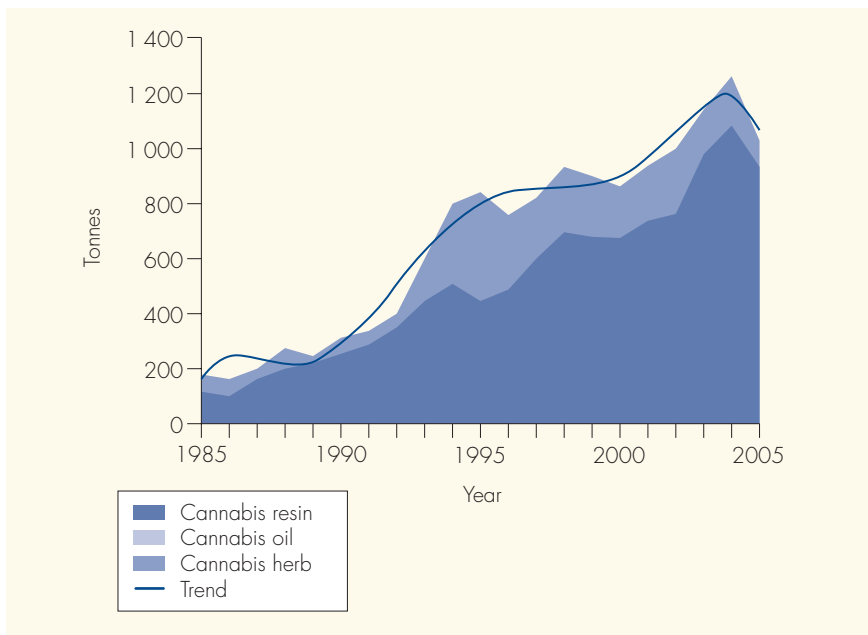
Source: UNODC, annual reports questionnaire data/DELTA.

The global market for cannabis herb in 2003 was estimated at production level to amount to some EUR 8 billion, at the wholesale level to some EUR 28 billion and at the retail level to some EUR 107 billion. The global market for cannabis resin was estimated at the production level to amount to some EUR 0.6 billion, at the wholesale level to some EUR 10 billion and at the retail level to some EUR 27 billion in 2003. In value terms, the cannabis market accounted for 44 % of the global drug market (EUR 304 billion) while in terms of the number of drug users (161 million) about 80 % of all drug users (200 million) were estimated to consume cannabis (UNODC, 2005). Though no new estimates are available, one could assume that the global cannabis market in 2005 was of similar magnitude.

Trafficking in cannabis herb

More cannabis herb is seized, in a wider range of locations, than any other drug in the world. Out of 182 countries and territories reporting seizures to UNODC over the 2003–2005 period, 165 reported seizures of cannabis herb, more than for heroin (150), cocaine (150), cannabis resin (119), amphetamines (96) or ecstasy (97). Cannabis herb seizures declined, however, by 35 % in 2005 to the levels reported in 2000, but were still 92 % higher than in 1990 (DELTA, 2007) (Figure 10).

Figure 10: Cannabis herb seizures — regional breakdown, 1985–2005
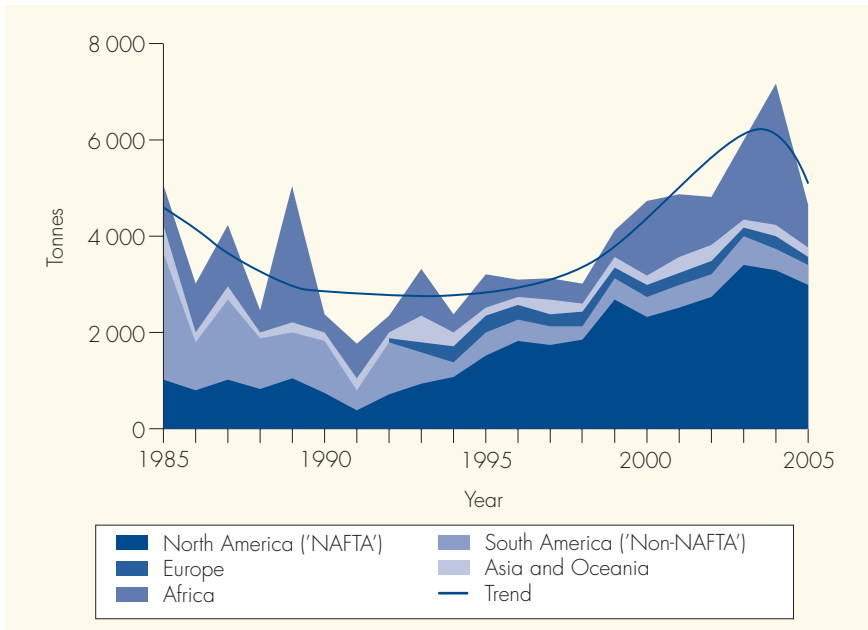
Source: UNODC, annual reports questionnaire data/DELTA.

In 2005, 63 % of global cannabis herb seizures occurred in North America, followed by Africa (18 %) and South America ('non-NAFTA') (11 %). The remainder took place in Asia (5 %), Europe (2 %) and the Oceania region (0.1 %). This distribution of seizures, with most cannabis herb seizures being reported from North America followed by Africa and South America, has been consistent for most years since 1994. The proportion of seizures made in North America rose from 32 % in 1990 to 63 % in 2005 reflecting stronger efforts to fight cannabis trafficking, while the proportion of seizures made in South America declined over the same period from 46 % to 11 % as cannabis production increasingly shifted to North America, where cannabis with a higher THC content is being produced. The proportion of seizures made in Africa increased from 16 % of global cannabis herb seizures in 1990 to a peak of 41 % in 2004 (DELTA, 2007), in line with reports of ever larger areas under cannabis cultivation. In 2005, however, the proportion fell back to 18 % as eradication efforts were intensified in a number of countries. This decline in cannabis herb production may not be sustainable, however (UNODC, 2007).

The world's largest cannabis herb seizures in 2005 were made by the law enforcement agencies of Mexico (1 781 tonnes or 38 % of the total), followed by those of the USA (1 112 tonnes, or 24 % of the total). These two countries have led the world in cannabis seizures since 1994 (except for the year 2000, when the USA ranked fifth). The next largest seizures in 2005 were reported by South Africa (6 % of total), followed by Brazil, Tanzania, India, Colombia and Nigeria (3 % each). The largest seizures among European countries were shown by the Russian Federation (rank 15), followed by the UK (rank 18) (DELTA, 2007).

The share of Europe in global cannabis herb seizures increased from 1 % in 1985 to 13 % in 1994 as consumption increased, before falling gradually back to 2 % of global seizures by 2005. In 2005, cannabis herb seizures declined in Europe by 40 % compared with a year earlier, thus exceeding the global decline in that year (−35 %). Declines were also reported from Africa, North America and the Oceania region, while seizures increased in Asia and in South America (DELTA, 2007). The decline of cannabis herb seizures in Europe seems to reflect primarily changes in law enforcement priorities in a number of European countries. In addition, the decline may have been due to a decline in cannabis herb imports into Europe, as supply is increasingly shifting towards domestic sources. The fall in seizures does not appear to be due to any significant decline in consumption. Lifetime usage among 15- to 16-year-olds in Europe increased by more than 80 % between 1995 and 2003 (UNODC, 2005) and cannabis use also increased among the general population over the last decade. In recent years, cannabis use seems to have reached a plateau in several European countries and started falling in others. However, these declines have been far less important than the reported declines in seizures (UNODC, 2007).

Trafficking in cannabis resin

Global cannabis resin seizures declined in 2005 by 11 % compared with a year earlier, dropping to 1 302 tonnes, below the levels reported in 2003. Resin seizures declined at a rate above average in Europe (–15 %), reflecting falling levels of cannabis resin production in Morocco (DELTA, 2007).

Out of global cannabis resin seizures, Europe accounted for 922 tonnes, of which 916 tonnes (70 % of the total) was seized in West and Central Europe, 18 % in the Near and Middle East/South-West Asia and 8 % in North Africa. The largest seizures worldwide were reported by Spain (670 tonnes, or 51 % of the total), followed by Pakistan (94 tonnes, or 7 %), Morocco (92 tonnes, or 7 %). Significant amounts were also seized by the authorities in Iran (69 tonnes, or 5 %) and Afghanistan (42 tonnes, or 3 %) (DELTA, 2007). The largest seizures in Europe, after Spain, were reported by France (6 % of total in 2005), the UK (5 %), Portugal (2 %) and Italy (2 %) (Figure 11).

The main destination of cannabis resin is West and Central Europe. About 70 % of the cannabis resin destined for the West and Central European market in 2005–2006 is estimated to have originated in Morocco, down from around 80 % a few years earlier (UNODC, 2007). Much of the cannabis resin transits Spain and the Netherlands before

Figure 11: Cannabis resin seizures — regional breakdown, 1985–2005
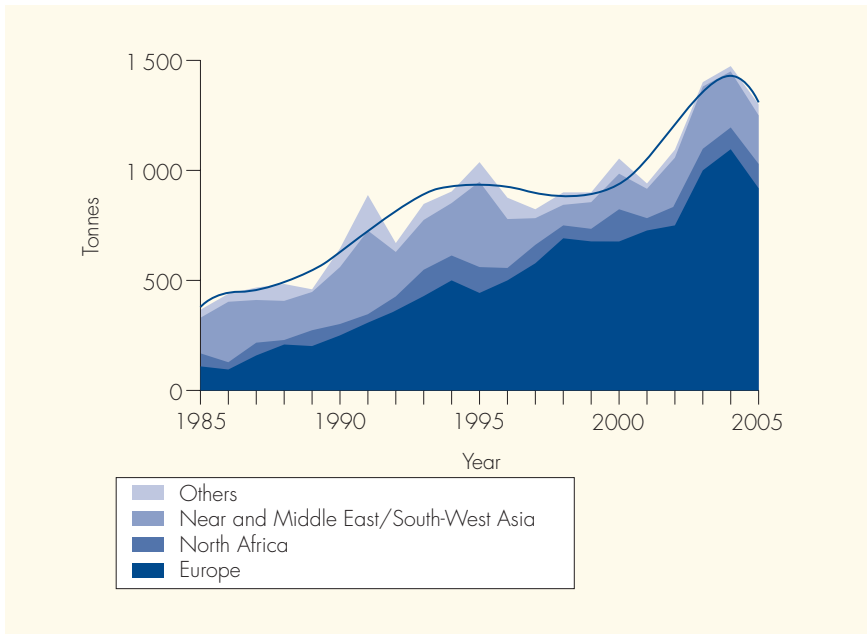
Source: UNODC, annual reports questionnaire data/DELTA.

being shipped to other countries (see Gamella and Jiménez Rodrigo, this monograph). Most of the remainder of the resin supply originates in Afghanistan/Pakistan (e.g. 59 % in Greece, 30 % in Turkey, 30 % in the Czech Republic, 14 % in Belgium, less than 10 % in France and Italy), in Central Asia (mostly for the Russian Federation, other CIS states and some of the Baltic countries) or from within Europe (mainly Albania, supplying the markets of various Balkan countries and Greece) (DELTA, 2007).

The second-largest destination of cannabis resin is the Near and Middle East/South-West Asia region. This region is mainly supplied from cannabis resin produced in Afghanistan and Pakistan and, to a lesser degree, from cannabis resin originating in Lebanon. Some of the cannabis resin from Afghanistan/Pakistan is also being shipped to Canada and to countries in Eastern Africa.

North Africa makes up the third-largest market and is predominantly supplied by cannabis resin produced in Morocco. The importance of other markets is limited. Nepal is a source country for cannabis resin exports to India and to some other countries and Jamaica is a source country for cannabis resin exports to some other countries in the Americas.

More research required

Generating sound estimates of global cannabis production levels is likely to remain a slippery subject for many years to come, but there are several areas where data could be improved greatly:

•   There is a need for more scientific surveys on the areas under cannabis cultivation. These should help to identify the areas under 'wild cannabis' and the areas where cannabis is cultivated, on irrigated and on rain-fed land. This may be expensive, but remote sensing technology is becoming more readily available and is being used in other areas of agriculture. Using a sampling approach, a growing number of countries should be in a position to undertake such surveys if control of cannabis cultivation is deemed a priority. Where satellite imagery is not available, UNODC has developed methods to identify illicit crops by means of a sampling approach and helicopter over-flights, as well as through ground surveys. The 'know-how' for such surveys is readily available in UNODC to be shared with Member States. The situation is more difficult when it comes to indoor cultivation which, in general, cannot be identified through the analysis of satellite photos or helicopter over-flights. Nonetheless, more reliable estimates on the extent of outdoor cultivation of cannabis could form the basis for reasonably good estimates on the likely extent of such indoor cultivation activities, in combination with eradication data and forensic analyses of cannabis seizures.

- There is also a need for scientific yield data across a wide typology of cultivars and cultivation styles. Feral or semi-cultivated strains found in Kazakhstan are likely to differ greatly in productivity when compared with intensively grown cannabis in Morocco, or informal plots in South Africa, or indoor operations in Canada. These figures will remain imprecise, but at the very least, a plausible range of values needs to be compiled.
- Distinction between the various cannabis products is essential: a standardised definition of sinsemilla would be useful to differentiate this drug from other herbal cannabis.
- The quality of reported seizure data should be analysed. One possible source of the discontinuity between supply- and demand-based production estimates could be inflated seizure data, based on either inaccurate plant-to-product conversion rates or the inclusion of bulk plant material not suitable for sale. Finally, there is a general danger of double counting once various law enforcement bodies are involved.
- There remains a need to analyse, on a systematic basis, the THC content of cannabis found on the market, and its development over time. Standards to undertake such analyses in an internationally comparable way would need to be developed. Forensic analysis could also help to identify the sources of the cannabis.
- It would also be useful to have studies made of the distinction between the drug as sold and the drug as used. Herbal cannabis users, including sinsemilla users, clean their product before consumption. This could help to explain some of the significant differences between supply and demand-side estimates.

On the demand side, more data are required on cannabis consumption (amounts consumed per cannabis user). While some data exist on the number of days of use amongst annual users, the data on volumes consumed remain dubious. Scientific study needs to be made of the standard dose for inexperienced users and the rate and extent to which tolerance develops. In addition to this, empirical observation of actual use patterns needs to be made across a wide range of cultural contexts. User surveys would benefit if they were to distinguish between herbal cannabis and cannabis resin consumption.

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Chapter 13
Monitoring cannabis availability in Europe: issues, trends and challenges

Keywords: availability – cannabis – market – prices – supply

Setting the context

In most of Europe, few would argue that cannabis is difficult to obtain for those who seek to use it. Nonetheless, when looking at issues of supply and demand, sellers and buyers, products and distribution, there are numerous pieces of the picture which need to be assembled to gain an insight into how policymakers may tackle the drug's distribution. This chapter looks at the broader concept of *availability* of cannabis, a concept that goes beyond market analysis and embraces further issues such as price and the perceived ease of purchasing a drug.

Cannabis is the most frequently used illicit drug in the EU. Some commentators have suggested that the drug has become more readily available, yet the concept of availability is one that is both difficult to define and to measure. Nonetheless, it is possible to look at a number of indirect indicators that, when taken together, allow for the construction of a more general picture of cannabis availability in Europe.

In this chapter, data on drug seizures, prices, potencies and perceived availability among the general public are used to explore overall trends in the availability of cannabis products in Europe between 1998 and 2003. Analysis is presented for EU Member States and Norway.

Data analysis at this level is always challenging and a range of methodological issues and data limitations means that conclusions must be drawn with caution. In particular, the amount of missing data on some measures presents a serious problem for analysis. Despite these difficulties some clear trends do seem evident in some of the indicators. However, when taken together no coherent picture emerges, with some datasets supporting the assumption that cannabis availability has been increasing whilst other information suggests a more stable situation.

Further reading

Cyclical sources of data on drug supply

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Monitoring cannabis availability in Europe: issues, trends and challenges

Chloé Carpentier, Meredith Meacham and Paul Griffiths

Towards a conceptual framework for exploring drug availability — approaches and data sources

The availability of illicit drugs is an important concept for drug policy, and reducing availability can be found as an explicit policy objective at both European and national levels ([1]).

Rationale

Policy interest in drug availability can be broadly characterised as focusing on two topics. The first topic is the relationship between availability and demand and rests upon an implicit assumption that changes in the availability of drugs will be associated in some way with levels of use. At EU level this has resulted in a fairly pragmatic monitoring strategy of collecting and analysing information that may allow changes over time in drug availability to be charted. Currently, as described below, EMCDDA activities in this area focus on improving the reliability and comparability of data sources to allow better monitoring of trends in availability at street level for the more prominent groups of drugs.

The second topic of interest is to understand what factors can have an impact on the availability of different drugs, in order to inform the development of interventions with the aim of addressing these factors. Answering this sort of question goes beyond simply monitoring and requires more complicated research or statistical modelling exercises.

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(1) Drug availability appeared in the EU political debate in the mid- to late-1990s. One of the four initial aims of the UK 10-year (1998–2008) Drugs Strategy, 'Tackling drugs to build a better Britain' (UK Government, 1998), was 'to stifle the availability of illegal drugs on our streets'. It was soon followed by a similar target (Target 4) at the EU level in the EU Drug Strategy 2000–2004 (European Council, 1999), 'to reduce substantially over five years the availability of illicit drugs', while the EU Action Plan 2000–2004 (European Council, 2000) emphasised a monitoring approach of this issue in its call for the development of 'indicators of availability of illicit drugs (including at street level) and drug seizures' to be supported by the EMCDDA and Europol.

Defining 'availability'

From an operational perspective it is clear that defining availability is not simple: the word has been interpreted differently in different contexts. In a general sense, availability might be treated as synonymous with 'access', and in the drugs field the concept has sometimes been simply associated with 'drug supply data'. For example, one report from the USA on cocaine availability produced various estimates based on a model derived principally from production and interdiction data (ONDCP, 2002).

Data from demand-side indicators have also been used to estimate drug availability, most simply in questionnaires that ask respondents to rate, in some way, the availability of drugs in their locality. Additionally, data on drug consumption or offers of drugs have also been used as indirect indicators. Currently, the developing consensus supports a conceptual framework for assessing drug availability that includes both supply and demand elements, though these elements have been made operational in a variety of ways and no common approach currently prevails.

Nonetheless, it does appear reasonable to consider drug availability as consisting of a synthesis of the following elements:

- the amount of illicit drugs physically on the market (drugs produced and trafficked but not seized — drug supply to the market);
- the structure of drug flows and distribution (retail outlets, dealers, drug scenes); and
- the relationships between drug users/non-drug users and this distribution structure (access).

A further valuable analytical distinction is between *global availability* and *street level availability*. In the context of the EU, *global availability* might be defined as drug availability at the upper/wholesale level of the market, or at the trafficker's level, as a result of the interaction between drug supply and drug control strategies at that level of the market. *Street level availability* might be defined as drug availability at the retail level of the market, or at the user's level, as a result of the interaction of global availability, distribution processes and strategies, drug control strategies at retail market level and access of various groups of users/non-users to different illicit products. Except for data relating to seizures, a common link between global and street level availability, this paper will focus on the street level of availability.

Current indicators

The current EMCDDA approach has been to develop a set of indicators of drug availability, with particular focus on street level availability. As drug availability is an ill-defined concept, a multi-indicator approach has been adopted with the objective

of bringing together these different data sources into a more general measure of availability. Information is provided annually through the Reitox network of national focal points and covers areas including: drug prices at retail level, contents of drugs and potency, drug seizures and the perceived availability of drugs at street level.

Clearly, none of these information sources produce a simple or unproblematic reflection of the availability of drugs in Europe and any analysis must be made with caution. The corroboration of contextual and qualitative information is particularly important if erroneous inferences are to be avoided. Drug seizures, for example, are influenced by the level and efficiency of law enforcement activity (which vary both between and within countries over time) as well as the availability of drugs in a particular market. Despite this problem, seizure data do appear to be useful in looking at trafficking routes (UNODC, 2005) and in many cases it seems fair to make the assumption that drug seizures in a given country are at least somewhat correlated to the amount of drugs imported or smuggled into that country. It has even been assumed in international discourse that drug seizures represent a relatively stable proportion of the drug supply (often assumed to be about 10 %) and could therefore be considered as an indicator of drug availability on the national market. In the case of cannabis, seizures of plants have also been taken as an indicator of the extent of domestic cannabis cultivation or cultivation in neighbouring countries (Pietschmann, this monograph).

Similarly, both price and the potency of illicit drugs may have an impact on the perceived availability of illicit drugs and reflect important supply-side factors that affect access. This relationship is often not a simple one, but both price and potency can be considered as indirect indicators of drug availability. Drug prices may vary according to many factors including the level of the market or volume at which they are traded. Prices are also likely to reflect the basic laws of supply and demand. In this respect, lower prices would in theory seem to indicate a higher availability (or a greater supply), or, although it is perhaps less likely, reduced demand.

For a number of methodological and practical reasons, interpreting data on potency is a complicated task — and these difficulties are particularly apparent for cannabis (see below). However, this information is collected in some EU countries principally as a legal requirement for criminal prosecutions, but also, in some cases, as part of drug monitoring activities. Although establishing a direct link between potency and availability is difficult, changes in the overall potency of drugs, especially when prices are moving in an opposing direction, can be regarded as a useful indirect indicator of availability — albeit one to be interpreted carefully.

Finally, school and adult surveys sometimes include questions on the perceived availability of drugs in the communities from which the respondents are drawn. Although important methodological questions exist, such as the influence on such perceptions of

different kinds of exposure to drug use and the overall reliability of perceptions reported in drug surveys, this kind of data can also provide indirect yet complementary data on drug availability.

What do the available data tell us about cannabis availability in Europe?

Due to methodological issues and a simple absence of complete and detailed time-series data, limitations are imposed on any attempt to answer this question. Despite this setback, it is possible to some extent to construct a general picture of the different indicators of cannabis availability in Europe. Taking the year 2003 as an example, below we describe the information available and explore to what extent a coherent picture of trends in cannabis availability can be established.

Seizures

The EMCDDA dataset on drug seizures dates back to 1985, and the data records both seizures and quantities of drugs seized. Data availability has varied as countries have improved their reporting capacity, but considerable work remains to be done on improving the comparability of measures used. These data relate to all seizures made over the course of a year by all law enforcement agencies (police, customs, national guard, etc.). Although generally rare, double-counting may occur within the data presented by some countries.

The implications of looking at quantities seized or numbers of seizures can be different. A major proportion of the number of overall seizures usually comprises small seizures made at the retail or street level of the market. Quantities seized may fluctuate from one year to another due to a few exceptionally large seizures of drugs made further up the distribution chain. For this reason the number of seizures is sometimes considered a better indicator of trends — although a count of the number of seizures is sometimes less available. A further complication for cannabis arises because of the different types of cannabis available in Europe. Only since 1995 has it been possible to begin to make a distinction between different types of cannabis products — that is, plants, herb and resin — and some countries are not able to do this. Therefore, the corresponding time series are sometimes incomplete, making the analysis of EU trends more difficult ([2]).

([2]) Caution is required on the reporting of herbal and plant seizures, as practices might vary by country, possibly leading to the incorrect categorisation of one type of substance into either herbal or plant seizures.

Seizures of cannabis plants

Cannabis grown within the EU is beginning to represent a significant part of the market. Data on seizures of cannabis plants from EU reporting countries and Norway in 2003 amounted to 8 600 ([3]) seizures of about 1.6 million plants and 8.9 tonnes of the same material. The highest numbers of seizures were reported by the United Kingdom, followed by Hungary and Finland ([4]), while the largest quantities were recovered in the Netherlands, followed by Italy, Poland and the United Kingdom.

Not all countries can provide data for the period 1998–2003 but based upon the information available a decline was evident in the number of seizures of plants reported until 2001, followed by a subsequent increase. Since 1998, overall quantities seized have been increasing with peaks in 2000 and 2001, mainly due to exceptionally large seizures made by Italy in these years (1.3 and 3.2 million plants, respectively).

Seizures of cannabis resin

About 200 000 seizures ([5]) and 1 025 tonnes of cannabis resin seized were reported in the EU and Norway in 2003, with Spain accounting for the biggest share by far, both in terms of numbers and quantities seized, and reflecting the importance of the Iberian peninsula as an importation route for Moroccan-produced cannabis entering Europe (see Gamella et al., this monograph). France and the United Kingdom, which represent relatively large markets for cannabis, also stand out as countries seizing significant quantities of the drug. Both in terms of numbers and quantities, overall cannabis resin seizures increased during the period 1998–2003. However, in 2003, the number of seizures declined while quantities increased highly due to large amounts recovered in Spain.

Seizures of herbal cannabis

In the EU herbal cannabis is less commonly seized than resin — illustrated by the fact that in 2003 the total amount of herbal cannabis seized was 79 tonnes, or less than 10 % of the amount of resin seized, with the United Kingdom recovering the largest quantities every year, followed by Italy. Numbers of seizures of herbal cannabis have been increasing overall since 1998, though they remained stable in 2003, as opposed to figures for quantities seized, which have been declining for most years.

[3] Reported by 17 countries (data not available for Denmark, France, Italy, Cyprus, Latvia, the Netherlands, Poland, Slovenia and Sweden).
[4] However, data on the number of seizures made were not available for countries seizing the largest quantities — Italy and the Netherlands.
[5] Reported by 19 countries (data not available for Denmark, France, Italy, Cyprus, Latvia, the Netherlands and Slovenia).

In analysing seizure data a useful distinction can be made between police and customs seizures, based on the assumption that police seizures may better reflect retail level activity and that customs seizures are at a wholesale level and may include drugs in transit to third countries. Since 1995, data collection at the European level have included a request for a breakdown by seizing entity. This dataset requires further development as not all countries are currently able to provide this information nor is it possible at present for some countries to make a distinction between different cannabis products. Therefore, due to missing data, totals will represent an underestimate of the true situation.

Despite these limitations, data show that from 1998 to 2003 there was a general increase in the number of police seizures of cannabis (all material included) whilst the number of reported customs seizures remained relatively stable. Quantities of cannabis seized by both police and customs authorities increased during this period at about the same rate. For both seizing entities Spain was responsible for a major share of the quantity of drugs recovered. A gross calculation of the average sizes of cannabis seizures ([6]) over the period 1998–2003 shows that police seizures are usually smaller than customs ones, with size ratios up to 1:100 in Spain and the United Kingdom.

Retail prices

Data on retail prices of cannabis products come from a range of different sources, the comparability of which is often unclear. These sources include test purchases, interviews with arrested dealers/consumers, police intelligence and surveys of drug users. Sampling strategies used for calculating price estimates also vary considerably and in some countries the representativeness of these data is questionable. The EMCDDA is working with national experts to improve the comparability of data and methodological approaches of collecting price data at the street or retail levels. Although caution is required when drawing any firm conclusions from the currently available dataset, it is possible to obtain a general picture of overall trends.

Because prices vary by product type, efforts have been made to distinguish between different types of cannabis. The main breakdown by product type is made between herbal cannabis and cannabis resin. Whenever possible, a further distinction is made between different types of herbal cannabis, as the herbal cannabis market often contains a number of distinct products. In particular, high potency types of cannabis, such as some forms of domestically produced product, attract a premium price. However, it has only recently become possible to make this sort of distinction, and further analysis is hampered by a lack of data on the dynamics of the European cannabis market.

([6]) Dividing quantities seized by numbers of seizures.

Prices in 2003

Data for 2003 on the price of resin and herbal cannabis are available from 24 and 21 European countries respectively. The ranges reported for minimum and maximum prices of cannabis resin and herb are relatively narrow compared with potency data (see below). Although considerable variation is seen between the cheapest and most expensive countries, considerable overlap also exists between many countries with respect to average prices reported. The average price of resin varied from EUR 1.4/g in Spain to EUR 21.5 in Norway, with about half of all countries reporting average prices in the range of EUR 5–11. Most countries reported a lower price for herbal cannabis than resin, again with a considerable range of EUR 1.1/g in Spain to EUR 12 in Latvia, and most countries reporting average prices between EUR 5 and 8 per g. The importance of looking at sub-types of herbal cannabis was illustrated by the Netherlands and the United Kingdom, where analysts were able to provide a separate estimate for home-produced cannabis, the price of which was higher — on average EUR 6/g in the Netherlands and EUR 8.2/g in the United Kingdom.

Because cannabis prices may be higher in countries where other goods are more expensive or there is a higher standard of living, in order to attempt to explain differences in cannabis prices between countries, it is possible to look at correlations between a country's average prices of cannabis products and the country's demographic and socio-economic situation in the same year, as represented by two indices — the human development index (HDI) [7] and gross domestic product per capita in purchasing power parity (GDP per capita in PPS) [8]. Analyses show that there is no clear correlation between such indicators and cannabis prices (by product) when considering all the reporting countries together. However, further distinction between groups of countries suggests that prices of both resin and herbal cannabis are positively correlated to both the HDI and GDP (per capita in PPS) in the countries from the EU-15 [9]. In the new EU Member States, there is either a negative or non-existent correlation between prices of both cannabis products and the HDI and GDP (per capita in PPS). However, it should be noted that the negative correlations found in this group of countries were stronger for herbal cannabis than for resin [10].

[7]   The Human Development Index is a composite index measuring the average achievements in a country in three basic dimensions of human development: a long and healthy life (measured by life expectancy at birth); knowledge (measured by the adult literacy rate and the combined gross enrolment ratio for primary, secondary and tertiary schools); and a decent standard of living (measured by GDP per capita in purchasing power parity (PPP) US dollars) (UNDP, 2005).
[8]   Taking as a basis EU-25 = 100 (source: http://epp.eurostat.ec.europa.eu).
[9]   The correlation coefficients in the EU-15 in 2003 were: 0.66 between resin price and HDI; 0.46 between resin price and GDP (per capita in PPS (purchasing power standard)); 0.54 between herbal cannabis prices (type unspecified or imported) and HDI; and 0.59 between herbal cannabis prices (type unspecified or imported) and GDP (per capita in PPS).
[10] The correlation coefficients in the new Member States in 2003 were: –0.16 between resin price and HDI; –0.05 between resin price and GDP (per capita in PPS); –0.50 between herbal cannabis prices (type unspecified or imported) and HDI; and –0.34 between herbal cannabis prices (type unspecified or imported) and GDP (per capita in PPS).

Though this analysis is tentative, it does suggest some relationship between cannabis prices and national demographic and socio-economic situations in the older EU Member States, where cannabis markets are relatively long established. The picture is less clear for the new Member States, where there are not only questions of data quality but also the possibility that markets in these countries are subject to strong change. Other indicators have suggested that cannabis use is increasing, though often from low initial levels, and that these cannabis markets should be considered relatively 'young' and far less established. Routes of cannabis trafficking might also explain some of the differences observed between EU countries in the retail level price of cannabis products — particularly by noting the proximity of Morocco for producing cannabis resin and the increasing importance of Albania for producing herbal cannabis. Countries that are closer to these producing regions are likely to experience lower transport costs during trafficking and, therefore, lower prices.

Long-term price trends

An analysis of long-term trends in prices is hampered by the fact that although a few countries have been reporting data on cannabis products since the mid-1990s or earlier, it takes several years for the dataset to grow sufficiently large enough to explore trends at a European level. It should also be noted that data from the new EU Member States have only been available since 2002. The EU mean (arithmetic mean) of average prices of cannabis resin (corrected for inflation ([11])) in reporting countries slowly decreased in the period 1996–2003 (see Figure 1). A more detailed analysis of such prices in countries that have been reporting for four years or more shows that overall trends for 1999–2003 ([12]) were either stable or declining in all countries, with the exception of France and Luxembourg, where a modest increase was noted.

Changes in the average prices of herbal cannabis are less clear than those of cannabis resin. Indeed, Figure 2 does not show a clear overall EU trend of such prices in reporting countries, except for a fall in 2003 in a majority of countries. Over 1996–2003, however, the EU mean ([13]) of reported prices increased overall, with a peak in 2001 and a fall since then ([14]). In most of the countries reporting for at least four years, herbal cannabis prices have remained stable or have decreased ([15]), while an upward trend was reported by the Czech Republic, Latvia, Luxembourg and Portugal. The average price of locally produced herbal cannabis has been declining in recent years in both of the countries that are able to report on the price of these products separately (Netherlands, United Kingdom).

([11]) Taking 1996 as a base year for the value of money in all countries.
([12]) Taking 1999 as a base year for the value of money in all countries.
([13]) Arithmetic mean.
([14]) Taking 1996 as a base year for the value of money in all countries.
([15]) Taking 1999 as a base year for the value of money in all countries.

Figure 1: Average retail price of cannabis resin (EUR/g) — adjusted to inflation — in the EU Member States and Norway, 1996–2003

Figure 2: Average retail price of herbal cannabis (EUR/g) — adjusted to inflation — in the EU Member States and Norway, 1996–2003
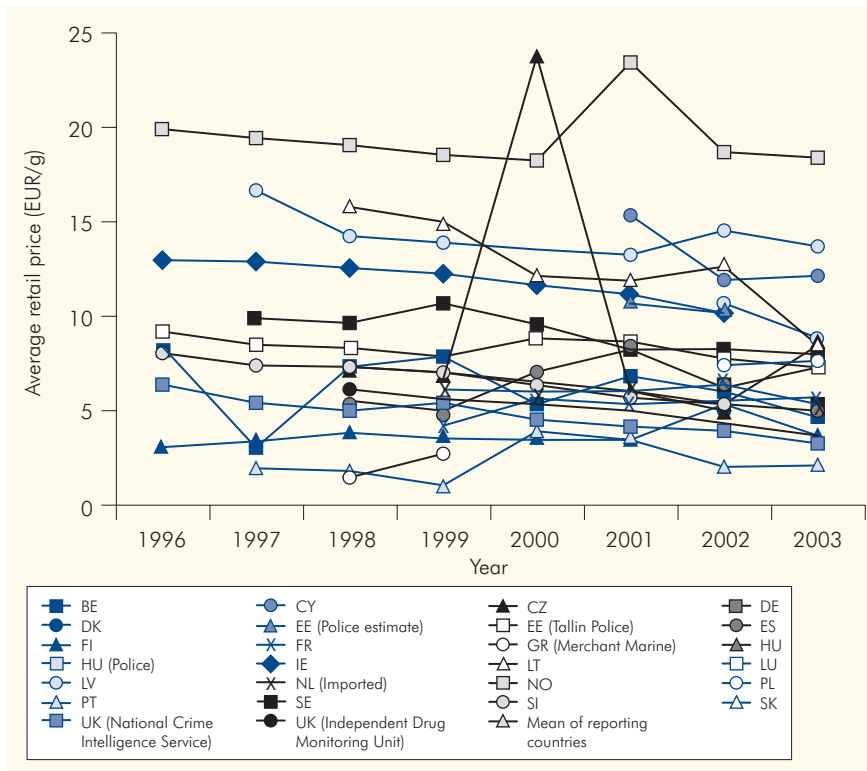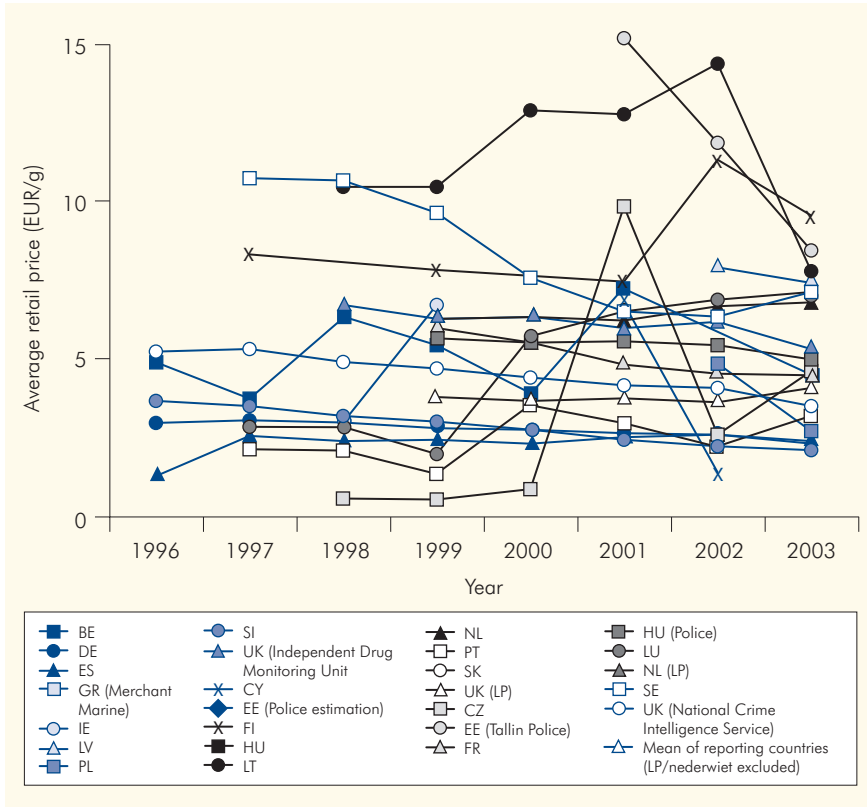
Notes: LP refers to 'nederwiet', usually locally produced cannabis herb. Prices were adjusted to inflation, taking 1996 (for all countries) as a base year. Hungary: the figure reported as average is actually the modal, or 'typical' price. The Netherlands: 1999 data refer to 1999/2000; 2000 data refer to 2000/2001; 2001 data refer to 2001/2002; 2002 data refer to 2002/2003; 2003 data refer to 2003/2004. United Kingdom: figures submitted as 'nederwiet' refer to 'skunk'. Belgium (1996, 1997, 1999, 2000, 2003); Czech Republic (1998–2003); Germany (2002); Latvia (2001–2003); Poland (2002–2003); Slovakia (2003); Slovenia (1996–2003): figures reported as averages are actually middle points between minimum and maximum prices. *Source*: Reitox national focal points.

Time trends of the average price of both resin and herbal cannabis have also been reported by 15 EU Member States ([16]). Comparisons between prices of both products ([17]) show that over the period 1996–2003, the average price of resin was overall higher than that of herbal cannabis in all but two of the reporting countries, although this difference was not often strongly pronounced. Additionally, trends in the average price of both products by country are similar in all the reporting countries, except France, which reported an overall fall in herbal cannabis prices and an increase in average resin prices. Lastly, reported data show a possible convergence between average prices of cannabis resin and herb in many countries.

Potency

The potency of cannabis products is a topic considered in detail elsewhere in this monograph and so will only be briefly considered here. Potency of cannabis is usually defined as the *tetrahydrocannabinol* (THC) content by percentage. Both practical and methodological difficulties mean that data on cannabis potency must be viewed with some caution. For example, the number of samples analysed varies greatly between countries (from four to over 3 000 samples in the 2003 data submitted to the EMCDDA) and, thus, the representation of samples in a given user population may be questionable. Furthermore, there are analytical difficulties in the precise and accurate determination of the potency of cannabis products (EMCDDA, 2004) and considerable variations in both the practice of taking samples from cannabis cultivation sites for analysis and that of sampling parts of the material to be analysed (ENFSI, 2005). All of these reasons mean that there is a need to improve and standardise approaches in this area if the reliable monitoring of cannabis potency is to be achieved. As stated above, it is important to distinguish between different types of cannabis (resin and herbal cannabis) — especially when considering potency. Theoretically, a further distinction should be made whenever possible between imported herbal cannabis and home-produced herbal cannabis, although in practice very few countries can systematically report data separately. For all types of cannabis the assessment of trends over time are hampered by a lack of historical data, with only a couple of countries reporting before 1999.

([16]) Belgium, Czech Republic, Germany, Ireland, Spain, France, Cyprus, Latvia, Lithuania, Luxembourg, Netherlands, Portugal, Slovenia, Sweden, United Kingdom.
([17]) In each country, we have taken the first year of the series of data available (from 1996 onwards) as a basis for the value of money.

Cannabis resin potency

Compared with prices, cannabis potency is reported by fewer countries but still shows considerable variation. Average potencies of cannabis resin in 2003 varied between less than 1% and nearly 25%, with a majority of countries reporting average potencies between 7% and 15%. The range of values upon which average potencies are calculated was very wide in some countries — raising questions about how meaningful the reported average values are for describing the cannabis market. An extreme example is in Slovakia, where there is a difference of 53 percentage points between the lowest and the highest potencies found. Out of the 16 countries reporting data on resin potency in 2003, eight report minimum values under 1% while seven report maximum values over 25% (three of which report maximum values of 40% or over). Given that much of the cannabis resin consumed in Europe is produced in North Africa under similar conditions, these differences are difficult to explain (see Gamella, this monograph). Data available show an overall (moderate) increase in the average potency of cannabis resin since 1999, although there has been a decline in 2002 in a majority of reporting countries.

Herbal cannabis potency

The average reported potency of herbal cannabis in 2003 was generally lower than that of resin in all countries, with the exception of the United Kingdom. Reported values ranged from less than 1% to nearly 14%, with half of the countries ([18]) reporting estimates of between 4% and 9%. Locally produced herbal cannabis is now available in most EU countries, and when produced under intensive conditions it can be of high potency. Only the Netherlands was able to provide a separate estimate in 2003 for this type of product (20.3% THC on average). It is hard to observe any overall clear trend for the EU in the potency of herbal cannabis in general over the last five years (see Figure 3). At a national level some countries reported a modest increase. Elsewhere, a relatively stable situation can be observed. Overall, the mean value ([19]) of the reported averages of herbal cannabis shows little variation over the period 1999–2003 ([20]). The reported potencies of locally produced herbal cannabis where these data are available show an increase in the Netherlands, and a relatively stable situation in the Czech Republic. In both countries the estimated potency of home-produced herbal cannabis exceeded that of cannabis resin from 2002.

([18]) Seven out of a total of 14 countries reporting data on the average potency of herbal cannabis in 2003.

([19]) Arithmetic mean.

([20]) It is actually slightly decreasing over 1999–2003, but variations in the mean can be explained by the fact that the number of countries reporting data has varied over the period, thus affecting the number of countries upon which the mean is calculated; indeed five countries reported data on the average potency of herbal cannabis of type unspecified or imported for 1999 and 14 for 2003. Indeed, the calculated means of the data from the nine countries reporting over 2001–2003 and of those from the seven countries reporting over 2000–2003 are both slightly increasing.

Figure 3: Average potency of herbal cannabis, measured as percentage of THC content, in the EU Member States and Norway, 1996–2003
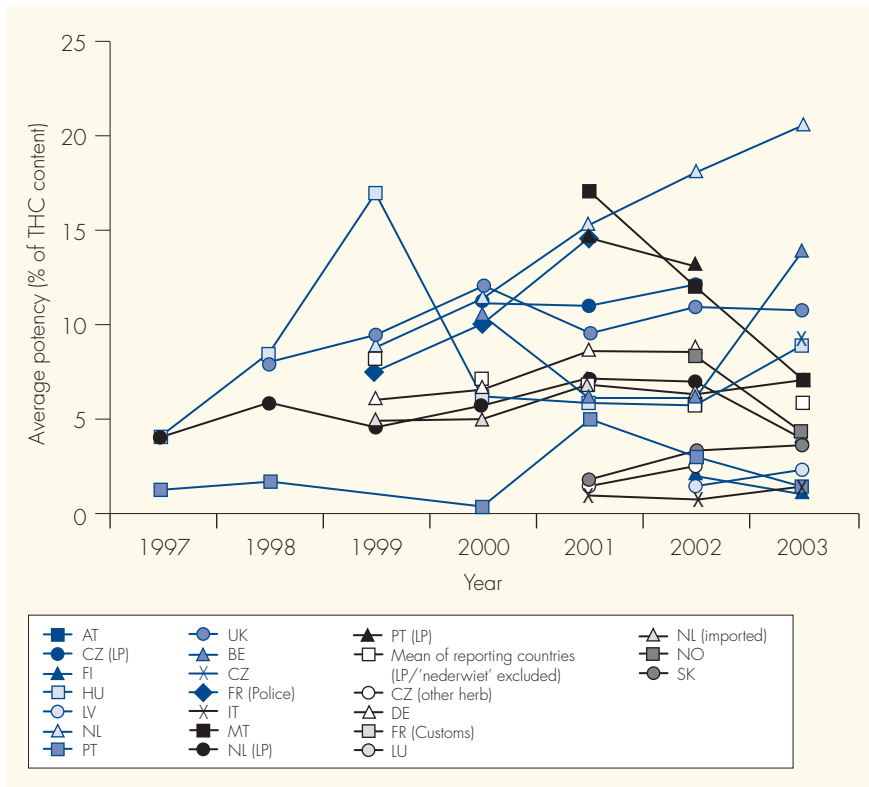
Notes: LP refers to 'nederwiet', usually locally produced cannabis herb. Czech Republic: figures reported as average are actually middle points between minimum and maximum potencies. Figures reported as 'nederwiet' refer to more potent cannabis herb, such as sinsemilla or 'skunk' (locally produced as well as imported). Figures reported as 'other herb' refer to cannabis herb of type other than 'nederwiet'. Germany: figures reported as average are actually the median. The Netherlands: 1999 data refer to 1999/2000; 2000 data refer to 2000/2001; 2001 data refer to 2001/2002; 2002 data refer to 2002/2003; 2003 data refer to 2003/2004. Portugal: data are based on users' reports until 2001 and since 2002 on users/traffickers and traffickers' reports. Portugal LP: although these are resin samples, given the high THC% found, it is suspected that they might be locally produced herbal cannabis. *Source*: Reitox national focal points.

Similar trends in resin and herbal cannabis potency?

Data available from 12 countries allow a time trend comparison of the average potency of both resin and herbal cannabis. Although resin potency was estimated as higher in 2003, this was not necessarily the case in previous years: only two countries reported resin as having a consistently higher potency than herbal cannabis. Overall trends are difficult to define. Data available show similar trends in resin and herbal cannabis potencies in France (customs data) [21], the Netherlands and Slovakia. In France both resin and herbal potencies showed a moderate increase from 1997–2002 and then a decrease in 2003. In the Netherlands and Slovakia, average potencies of all cannabis products have been increasing (1999–2003 in the Netherlands, 2001–2003 in Slovakia), although the increase for resin (and locally produced herb in the Netherlands) was much steeper. In the United Kingdom too, overall trends in the potency of resin and herb in the period 1998–2003 are similar, although the potency of resin increased steadily while the potency of herbal cannabis fluctuated greatly within the general upward trend. Austria (2001–2003) and Italy (1999–2003) [22] reported the opposite trend in resin and herbal cannabis potencies. In Austria, resin potency decreased from 2001 to 2002 then increased in 2003, while the potency of herbal cannabis increased and then decreased. In Italy, cannabis resin potency increased until 2002 then decreased, while the potency of herbal cannabis decreased then increased. Although these reports must be checked against data for future years, trends reported in 2003 suggest a convergence between potencies of cannabis resin and herbal cannabis in some countries — Belgium, Italy, Latvia and the United Kingdom [23].

Perceived availability

In addition to market information, the availability of drugs has been a part of questions posed in surveys of both general and school populations. Surveys allow researchers to get information on the perception of availability and behaviours of the population in terms of reported use or non-use of illicit substances. Availability questions have been used in a number of surveys in Europe, though with no standardisation of approach. Thus, differences in formats, variables and answering modalities make comparisons and analysis difficult at the EU level. The EMCDDA is currently working with Member States to develop a new module on drug availability in the existing European Model Questionnaire (EMCDDA, 2002) for population surveys. Recently, guidelines have

[21] This is also the case in France for the data from the police, but this source reports only data for 2002 and 2003, which limits the analysis of time trends.

[22] As well as in Latvia and Norway, but these countries report only data for 2002 and 2003, which limits the analysis of time trends.

[23] In Germany, too, a convergence was reported, but only in 2001 and 2002 since 2003 data were not available.

been developed to include questions on exposure (offers or propositions of drugs and opportunities to use drugs), perceived availability (subjective assessment of drug availability based on current individual circumstances) and access to drugs (how, where and from whom to get drugs in individuals' current situations).

Currently, the only cross-European source able to provide standardised data on perceived availability is the ESPAD (2005) school survey series (European School Survey Project on Alcohol and Other Drugs) (see Hibell, this monograph). This is a repeated survey carried out among 15–16-year-old students in 26 to 35 European countries in 1995, 1999 and 2003. The survey allows a comparison to be made on the perceived availability of cannabis across the EU Member States and Norway for the age group sampled. Results for 2003 show that getting 'hashish or marijuana' was reported to be 'fairly easy' or 'very easy' by 40–60 % of the students in the Czech Republic, Denmark, Ireland, France, Italy, Slovenia, Slovakia and the United Kingdom; by 25–40 % in Poland, Portugal and Norway; and by 10–25 % in Estonia, Greece, Cyprus, Latvia, Lithuania, Hungary, Malta and Sweden. The percentage of those finding it fairly or very easy to get cannabis has been increasing overall since 1995 in the Czech Republic, Estonia, Italy, Lithuania, Hungary, Poland, Slovenia and Slovakia, and at a more moderate rate in Cyprus, Denmark, France ([24]), Latvia, Malta, Portugal, Finland, the United Kingdom and Norway, while the reported ease of getting cannabis decreases in Ireland, Greece ([25]) and Sweden.

These differences broadly reflect patterns found in consumption data in the EU Member States and Norway between aggregated data on perceived availability of cannabis and lifetime prevalence of cannabis use in this population — demonstrated by a strong linear correlation for the years 1995 ($r = 0.91$), 1999 ($r = 0.81$) and 2003 ($r = 0.90$). There is also a relatively strong correlation between changes in perceived availability of cannabis and changes in lifetime prevalence of cannabis use, between 1995 and 1999 ($r = 0.83$) and between 1999 and 2003 ($r = 0.62$).

Discussion

Clearly, many methodological challenges exist regarding the interpretation of data on seizures in general ([26]), the analysis of data on price and potency, and understanding data on perceived availability in general and school populations. One of them, not

([24]) Based on 1999–2003 only.
([25]) Based on 1999–2003 only.
([26]) It is now widely acknowledged that, across countries, drug seizures do not represent the same proportion of the amount of drugs being smuggled into or circulating in a given country, especially as this may vary according to trafficking routes and location of production areas. We have assumed for this analysis that there is a somewhat positive relationship between cannabis seizures and its availability on the national market.

Table 1: Comparative analysis of national cannabis trends (seizures, prices, potency, perceived availability) during the period 1998–2003							
Country	Seizures						
	Nb plant	Qty plant	Nb resin	Qty resin	Nb herbal	Qty herbal	Nb police
Belgium		(+)	+	+	(+)	(+)	
Czech Republic	(+)	(=)	(=)	(+)	(+)	+	
Denmark						(+)	
Germany	–	–	–	+	=(– rec)	–	
Estonia		+	+	+	=	–	
Ireland	=	–	–	+	+	+	
Greece	(=)		(+/=)	+	(–/=)	–	(–)
Spain	(+)	+	(+/=)	+	(+)	+	+
France	(–)	(–/=)k (=/+)p	(+)	+	(+)	+	–
Italy		=		=		–	
Cyprus		+		(–)		=	
Latvia							
Lithuania		(+)		(+)	+	–	(+)
Luxembourg		–	+/=	+	+	+	+
Hungary	(+)		(+)		(+)	+	
Malta	(=)	(+)		+		(+)	
Netherlands		+		=		–	
Austria	+	+	–	+	+	–(+ rec)	
Poland		+	+	+	+	+	+
Portugal	+	(+)	=	+	+	+	=
Slovenia	(=)	(+)	(=)	=	(+/=)	+	
Slovakia	+	+	=	=	+	–	(+)
Finland	+	+	+	=/+	+	+	–
Sweden	(=)	(=)	+	=/+	+	+	+
United Kingdom	=	–(+ rec)	–	–(+ rec)	+	+	–
Norway	+	+	=	+	+/=	+	

Notes

Nb, number of seizures; Qty, quantity seized; PAV, perceived availability ('fairly easy' and 'very easy' to get cannabis).

Prices adjusted to inflation (taking as a basis the initial year of the series for each country).

+, increasing; –, decreasing; =, stable; +/=, slightly increasing; –/=, slightly decreasing; =/+, rather stable, although very slightly increasing; =/–, rather stable, although very slightly decreasing.

rec, recent change in the trend; LP, locally produced herbal cannabis; IMP, imported herbal cannabis; H, herbal cannabis of type unspecified; k, quantities in kg; p, quantities in number of plants.

Qty police	Nb customs	Qty customs	Price		Potency		Perceived availability	
			Resin	herbal	Resin	herbal	95–03	99–03
+			–	=/–	+	+H		
	+	+	–	+	– (+ rec)	(+H)=LP	=/+	+
							+	–
			=/+	=/+	–	+		
	+	(+)	(=)				+	+
+	–	–	–	=/–			–/=	=/+
–	=	=/+						–
+	+	+	=	=				
	+	+	–		+C (+P)	= H/Cu		+
						(+/= H/Po)		
+/=		–			+	(–)H	+	=/+
–			(–)	(–)			+/=	+
			=	+	(–)	(+)H		+
(+)	(=)	(+)	–	=			+	+
+	–	+	+	+	+			
						(+)H		
						(–)H	+	+
			=	= H	+	+ IMP		
				= LP		+ LP		
					(–)			
+	+	+	(=)				+	+
+	+	+	+/=	+/=	+	=/+ H	+	+
						(–LP)		
(–)	(=)		–	–			+	+
(–)	(–/=)		(=)		+	(+)H	+	+
+	(–/=)	=(/+)	(–)			(–)H	+	=/–
+	+	–	–	–			–/=	–
+	–	–(+ rec)	–	–	=	+H	+/=	+
			=			(–)H		

For potencies in France: Cu, customs data; Po, police data.

Between brackets (…): to be taken with great caution as series might be too incomplete (only two years available or two last years missing), numbers might be too small or there might be a dramatic change in the last year.

Blank: no (trend) data available, or high fluctuations showing no clear trend.

yet mentioned, is that available data may indicate changes in different parts of the population. Indeed, changes in the perceived availability in one group of young people (which uses only a small proportion of all the cannabis consumed) may indicate something else than, for example, changes in seizures or potency. Yet, if analytical difficulties are put aside for a moment, a simple comparative analysis of the national trends in each of the indicators over 1998–2003 ([27]) can be constructed. This can be seen in Table 1 (pp. 232–233), which summarises the trends per indicator and per cannabis product that available data show.

Existing data point towards increasing availability of cannabis products in four countries. In Belgium, there seems to be a clear trend towards the increasing availability of both resin and herbal cannabis, based on an upward trend in seizure and potency data and a downward trend in cannabis prices. In the United Kingdom too, the availability of both products seems to be on the increase, although this is comparatively less clear-cut as seizure and perceived availability data experienced shifts in trends. Data from France point towards an increasing availability of herbal cannabis, while it is less clear that this is also true for resin. In the Netherlands, the availability of locally produced herbal cannabis seems to be on the increase, while that of resin and (imported) herbal cannabis might be said to have remained comparatively stable, or have slightly increased, during this period.

In other countries the picture is less clear, or there is simply insufficient information available to judge. In Italy, Lithuania and Slovakia data point to a possible increase in the availability of resin, while in Spain, Portugal and Slovenia data seem to indicate an increase in the availability of both resin and herbal cannabis. In Ireland it is not clear whether data point to an increasing availability of both herb and resin (especially at retail level as quantities seized by customs are decreasing) or to a stable trend. And in Poland there is a possible increase in availability of cannabis in general (data do not allow for more specificity). It should be noted, however, that data may point to decreasing availability in Greece at the retail level, in particular for herbal cannabis, and in Germany, with respect to resin.

Conclusion

It is not our intention here to suggest that this simple analysis can be anything but exploratory. However, it is helpful in illustrating the difficulties in producing an operational research and analysis framework for the concept of availability, especially for a drug like cannabis. The first of these difficulties is the simple observation that

([27]) However, trends in perceived availability in school surveys have been included for both 1995–2003 and 1999–2003, as considering only the latter trend means calculating a trend between only two measures, which is quite limited.

availability is a very difficult concept to separate out from that of prevalence. Trying to decide this from available indicators risks asking chicken-or-egg type questions. For example, perceived availability can be seen as closely associated with levels of use, as can some seizure data. That said, there may still be a use for a general concept of availability that is not simply reducible to an indirect reflection of prevalence. Clearly, both conceptual and modelling work is required here if a more robust and useful conceptual framework for thinking about drug availability is to emerge.

A second general observation regards the need to improve both the availability and quality of data sources. In all the data sources discussed above, some progress has been made in moving towards common approaches, definitions and reporting standards. But in comparison to other areas of monitoring much remains to be done and at present any attempt at identifying trends is severely limited by the available time-series data. This is a particular problem for cannabis because there are particular methodological and practical problems to overcome in some of the areas of data collection, such as assessing potency or the amount of plant material seized. Additionally, at least three, and possibly more, major product types exist and trends in availability vary by each type and may be different in different countries. Trends in the availability of herbal imported cannabis, cannabis resin and cannabis grown with the EU may all be different and yet at the same time are all important in understanding the overall availability of the drug. Currently, data sources are simply not sufficiently developed to elaborate this complexity adequately. In conclusion, if cannabis has, as many believe, become a more available drug in Europe, it is difficult to show it convincingly using the available data. If the concept of availability is to remain a key target for drug policy then investment is required in improving the availability of data necessary to measure changes in this area, as is conceptual work to better understand and define the concept of availability itself.

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Chapter 14
# Understanding cannabis potency and monitoring cannabis products in Europe

Keywords: cannabinoids – cannabis – potency – seizures – THC

Setting the context

Perhaps spurred by rises in treatment admissions and increased knowledge about the health-related harms of cannabis, much has been claimed in the past few years about a change in the potency of cannabis.

There are patterns in recent media coverage of cannabis potency. High-potency herbal cannabis is often contrasted with a purported milder substance smoked in the 1960s and 1970s. European languages use evocative words to label high-strength, indoor-grown cannabis —'skunk', 'nederwiet', 'summum'. There is a tendency for coverage of high-potency cannabis to share newspaper pages with extreme cases of cannabis-related psychosis, schizophrenia, treatment admissions or violent crime. Occasionally, high-potency herbal cannabis is linked to discussion of genetically modified crops, subverting identification of cannabis as a 'natural' drug.

There are historical precedents to such alarmism about cannabis potency. Higher strength has been attributed in the past to variants in cannabis products, notably Thai sticks in the 1970s. Authors often refer to an infamous response at a murder trial in 1938 in Newark, New Jersey: when the pharmacologist James Munch was asked about what happened when he himself had tried cannabis, he replied 'After two puffs on a marijuana cigarette, I was turned into a bat'. Such quotes reveal the difficulties we face when trying to discuss cannabis potency from an objective perspective.

This chapter, based broadly on the findings of a longer *Insights* publication produced by the EMCDDA in 2004, is refreshingly scientific and reassuring in tone. It suggests that overall recorded cannabis potency has not increased dramatically in Europe in recent years.

This is not to say that cannabis potency is a non-issue, but rather that the data in this area are incomplete and far from conclusive. This chapter should be read with the caveat that potency data were — and remain — very limited and that some forms of cannabis now grown in Europe show relatively high potency. More research would be welcome, for example, on how exposure to high potency cannabis affects different user populations, particularly young people and vulnerable groups. In terms of long-term trends, very little is known about the strength of the cannabis smoked in the 1960s and 1970s. And what is striking is that there is considerable variation in the potency of cannabis recorded in Europe. While press coverage tends to concentrate on the strongest THC concentrations rather than average potency, what is constant is the wide range in recorded potency, with only moderate variation in average potency for all cannabis consumed.

One complicating factor is that there has been a recent shift in consumption away from imported cannabis resin to indoor-grown herbal cannabis. While few question that high potency herbal cannabis is increasingly available, particularly in northern Europe, there is a need to track the precise nature of this shift in the market from resin to herb. Are people receiving higher THC doses today than before? Are they smoking fewer joints per session? How are they consuming alcohol and tobacco in combination with high-potency cannabis? Are they smoking joints on more, or fewer days each month? How does a resin joint smoked in the early 2000s compare with a herbal joint smoked today? Can we profile typical consumers of high-potency cannabis, and are they more at risk of problems? Is the shift to herb affected by the drop in supply of Moroccan resin to Europe?

Potency is thus far more complex than the basic task of measuring seized samples of cannabis. More research in particular is needed on titration (the potency–dose relationship) and whether high-potency cannabis is necessarily linked to patterns of problematic use (see Beck and Legleye, Volume 2 of this monograph). While a recent study in the Netherlands provided some findings that high-potency cannabis sourced from Dutch coffee shops can lead to a higher THC concentration in the blood, it also suggested that a core risk group exists (young males aged 18–45, smoking cannabis regularly) which will 'get as high as possible in one session' (Mensinga et al., 2006). Such insights help policymakers to make joined-up decisions that go beyond issues of strength alone, addressing risky use patterns and behaviour over time.

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Understanding cannabis potency and monitoring cannabis products in Europe

Leslie King

Abstract

The Δ^9-tetrahydrocannabinol (THC) content (potency) of herbal cannabis and cannabis resin imported into Europe has remained stable for many years at around 2–8 %. Yet cannabis produced locally by intensive, indoor cultivation (sinsemilla) typically has twice as much THC. In some Western European countries, where cannabis resin is the most commonly consumed product and herbal cannabis continues to be imported, the weighted average potency is largely unaffected by these modern developments. However, elsewhere not only is herbal cannabis the dominant product, but that market is largely supplied by sinsemilla. Few countries in Europe have THC measurements stretching back more than five years, and the data are somewhat compromised by analytical difficulties, sampling strategies and the varying nature of cannabis and cannabis resin. Also lacking is any evidence to show that users of high-potency cannabis have higher blood THC levels. The widely publicised claims that cannabis is now 10 or more times more potent than it was 10 or 20 years ago are not supported by the evidence from Europe.

Introduction

The potency of cannabis is defined as the concentration (%) of Δ^9-tetrahydrocannabinol (THC), the major active principal of the cannabis plant. As a broad guide, cannabis and cannabis resin typically contain 2–8 % THC. However, as will be discussed later, certain products may contain appreciably more. Cannabis grown for fibre production (hemp) will normally contain less than 0.3 % THC. Although references will sometimes be found in the literature to 'cannabis purity', this term is ambiguous and could refer to whether or not the material has been adulterated. For example, in the publication *Global Illicit Drug Trends* (UNODC, 2003), 'purity levels' of herbal cannabis and cannabis resin are either clustered around 1 to 10 %, where they probably reflect the THC content, or they are much higher, typically above 50 %, suggesting some other measure of purity.

The chemical structure of THC is shown in Figure 1(a). It is one of a large number of related substances known as cannabinoids. Other major constituents of cannabis and cannabis resin are cannabinol (CBN; Figure 1(b)) and cannabidiol (CBD; Figure 1(c)).

Figure 1: The structures of three major cannabinoids (THC, CBN and CBD)
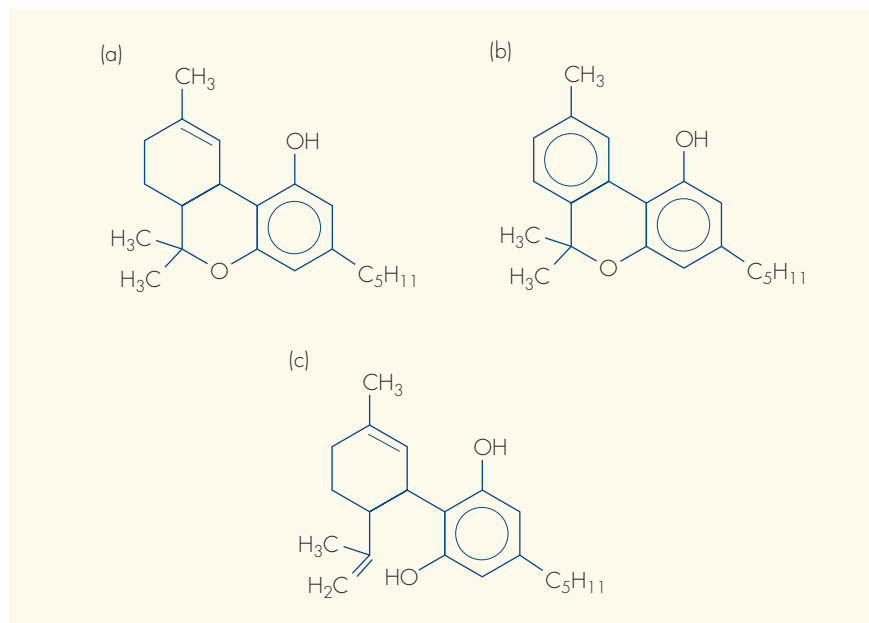
Notes: (a) Δ⁹-tetrahydrocannabinol (THC); (b) cannabinol (CBN); (c) cannabidiol (CBD).

It has been suggested that CBD can act as an antagonist of THC (Smith, 2005). This would be of some concern if, as THC levels increased, the CBD concentration stayed constant. However, as far as can be determined from the limited published analytical data, there is a positive correlation between the THC and CBD levels (King et al., 2005a). Cannabis resin has higher relative levels of CBD than herbal cannabis, but the pharmacological significance of this is unclear.

A large fraction of the THC may be in the form of Δ⁹-tetrahydrocannabinolic acid (THCA). When cannabis is smoked, THCA is converted to THC, although other substances are also formed (Hazekamp, personal communication, 2004). The active isomer Δ⁸-THC is found in much smaller amounts. The highest levels of THC occur in the resinous material produced by glandular trichromes, mostly situated around the flowers of the female plant. Fertilisation and consequent seed production cause a reduction in the level of THC. Much lower amounts are present in the leaves and in male plants, while the stalk and clean seeds contain almost no THC.

Atmospheric exposure of THC causes oxidation to cannabinol (CBN; Figure 1(b)) and other substances. In cannabis resin, Martone and Della Casa (1990) showed that, even when stored in the dark, the half life of THC was often less than one year, and in some cases THC had disappeared almost completely within two years. In a block of resin, this could lead to variations in the THC concentration between the outside and the inside. The rate of THC decomposition in cannabis at room temperature was estimated as

17% per annum by Ross and ElSohly (1997–1998). Since CBN is almost entirely absent from fresh cannabis, these authors suggest that the ratio CBN/THC could serve as a measure of the age of a sample. The relevance of this to questions of potency can be understood when it is realised that some imported products may have been harvested or manufactured many months before consumption or analysis. By contrast, local production will lead to a fresher product containing more THC.

During the past few years, some concern has been expressed that the potency of cannabis could be much greater than it was. It has been suggested that the THC concentration may have increased so much that the illicit drug now bears little resemblance to the cannabis that was used only 30 years ago. A widely publicised example of this is the statement by the so-called 'drug czar' in the USA (Walters, 2002), published in the *Washington Post*, that '*parents are often unaware that today's marijuana is different from that of a generation ago, with potency levels 10 to 20 times stronger than the marijuana with which they were familiar*'. In a similar vein, Henry (2004) commented on the apparent increase in association between cannabis and deaths recorded as accidents and suicides. He is quoted as saying, '*until the early 1990s, there was less than one per cent tetrahydrocannabinol in most cannabis. Now the most potent form, skunk, contains up to 30 per cent*'. Most cannabis is smoked, and according to Ashton (House of Lords, 1998), '*a typical "joint" today may contain 60–150 milligrams or more of THC*'.

Meanwhile, in some European countries the numbers of those entering specialised drug treatment centres, who are reported as having cannabis-related problems, have been rising (EMCDDA, 2004) and it has been suggested that high-potency cannabis may be a factor in this trend. High dose cannabis may also be a consideration in evaluating the impact of cannabis on the development of mental health problems such as psychosis, depression and schizophrenia (see, for example, Arseneault et al., 2004).

However, the potency question is not new. Nearly 20 years ago, Cohen (1986) noted that '*material ten or more times potent than the product smoked ten years ago is being used, and the intoxicated state is more intense and lasts longer*'. But Mikuriya and Aldrich (1988) pointed out that the cultivation of sinsemilla and its superiority to other forms of cannabis was well known to the British government in India in the 19th century. So what is the evidence that the potency of cannabis has increased in recent decades?

Changes in cannabis potency in Europe

The THC content of cannabis products is routinely determined in many European and other countries. Analyses are usually carried out in forensic science laboratories on behalf of law enforcement agencies, in some cases to provide evidence of cultivation/

production. Some information on cannabis potency since 1998 can be found in the EMCDDA's *national reports* (Standard Table 14). However, these data are rather limited, and no clear trends can be detected. In a recent study (King et al., 2004), much more data were collected, although information on potency trends over five years or more was only available from five countries and a number of methodological problems and information gaps existed. The participants in that survey were asked, by means of a questionnaire, to provide annual mean values of THC percentage in cannabis products, together with information on sample sizes, sampling strategies, method of analysis, the relative consumption of different cannabis products and other information. Despite the limitations, a fairly clear pattern emerged from the survey. Firstly, the potencies of resin and herbal cannabis that have been imported into Europe have shown little or no change, at least over the past 10 years or so. This is hardly surprising since these products have been made by traditional methods that have probably remained the same for generations (see Gamella and Jímenez, this monograph). A brief summary of those findings and a discussion of the implications has been provided by King et al. (2005b). Figure 2 shows the potency of cannabis resin over the period 1997–2003 in the original

Figure 2: Mean potencies of cannabis resin in seven European countries
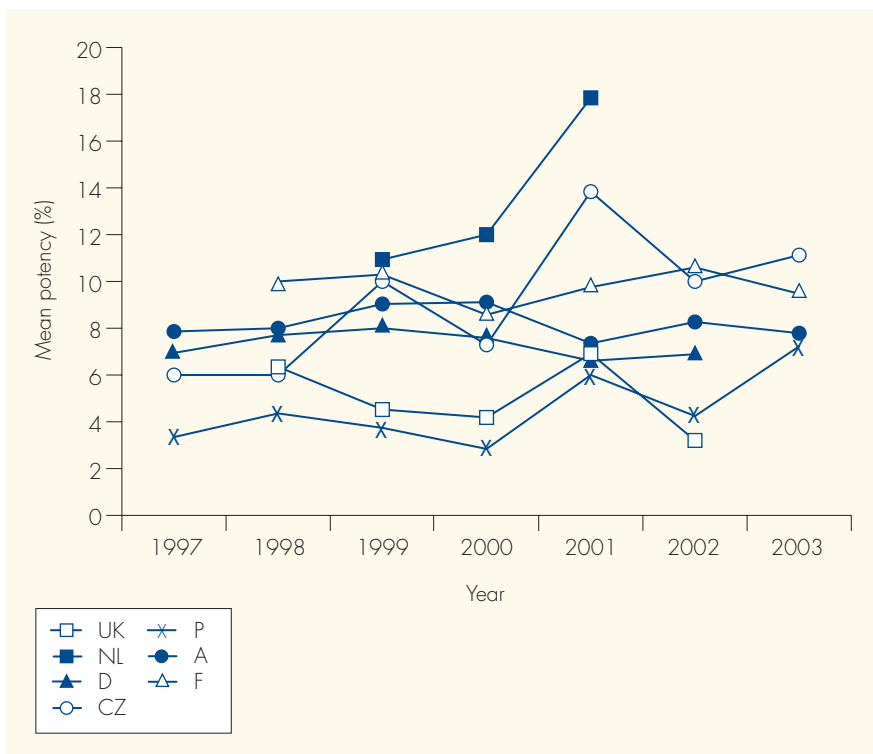
Notes: UK, United Kingdom; NL, Netherlands; D, Germany; CZ, Czech Republic; P, Portugal; A, Austria; F, France.

six countries reported by King et al. (2004) together with data subsequently received from France (OFDT, 2005).

The rapid rise in potency in the Netherlands after 1999 can be explained by the local production of cannabis resin. This material, known as *nederhasj*, is not only uncommon in the Netherlands, but is almost unknown elsewhere. When the data from the Netherlands are excluded from Figure 2, no overall trend is apparent in the overall mean potency. In the United Kingdom, THC measurements date back 30 years, and the annual mean potencies of cannabis resin as shown in Figure 2 are, if anything, slightly lower than those in the period 1975–1989 (Baker et al., 1980, 1981, 1982; Pitts et al., 1990; Gough, 1991). Cannabis (hash) oil is uncommon in Europe, but its THC content has also shown no clear trend over many years (Baker et al., 1982; Gough, 1991; King, 2001).

What has changed throughout Europe and elsewhere is the appearance, from the early 1990s, of herbal cannabis grown from selected seeds by intensive indoor methods. This material, best described as domestically produced 'sinsemilla' (from the Spanish, 'without seeds'), is also known as 'skunk', 'buds', 'tops' or 'nederwiet'. Its hydroponic cultivation, with artificial control of 'daylight' length, propagation of female cuttings and prevention of fertilisation, certainly does produce cannabis with a greater potency; on average, it may be twice as high as imported herbal cannabis. Further information on the production of sinsemilla can be found in the reviews by Szendrei (1997–1998) and Bone and Waldron (1997–1998).

Figure 3: Mean potencies of two types of herbal cannabis examined in the United Kingdom
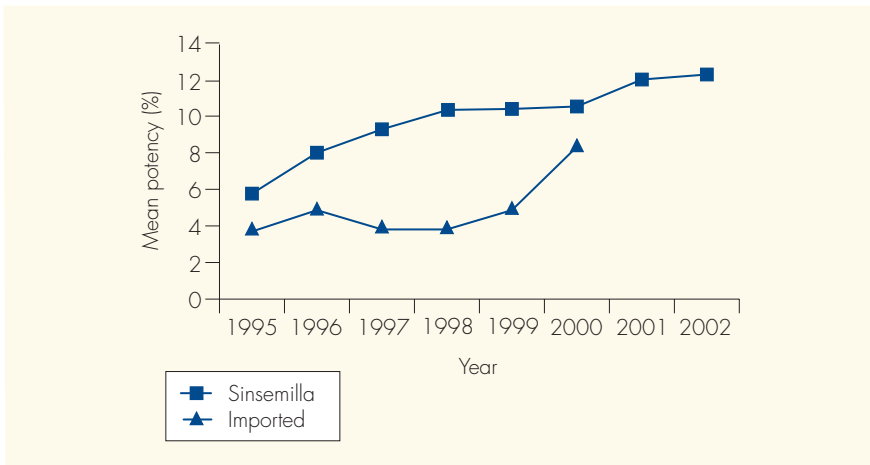
Note: The total sample sizes were: sinsemilla = 938; imported herbal = 117. *Source*: Forensic Science Service.

The THC content of herbal cannabis in the United Kingdom is shown in Figure 3. However, it must be recognised that it is not always possible for a forensic scientist to distinguish the two forms of herbal cannabis. To a large extent, the definition of material as sinsemilla must rely on other circumstances, such as the characteristics of the plantation or 'grow room'. This information may not always be provided by law enforcement agencies and hence some confounding of the two forms may occur. This is illustrated in Figure 3 where the rise in the potency of imported herbal cannabis after 1998 could be an artefact. A similar, albeit modest, rise in the potency of herbal cannabis was also found in Germany (see Figure 4) although no distinction was made between traditional (i.e. imported) herbal cannabis and material produced by hydroponic methods. A small rise in the potency of herbal cannabis was reported by the Czech Republic, but no information was available on the sampling strategy or sample sizes. Further evidence that sinsemilla has a higher potency than imported cannabis can be seen in data produced by the Netherlands (Figure 5). Potency data for herbal cannabis in France are shown in Figure 6, and represent the overall annual mean values for both police and customs seizures (OFDT, 2005). No distinction was made between traditional imported herbal cannabis and sinsemilla, but in each year the mean potency of material examined by the police was close to the mean potency of customs cases. Furthermore, for both herbal cannabis and resin in France, there was little difference in the THC content, according to whether the samples had been seized by law enforcement agencies or the samples had been collected from users (Bello et al., 2005). As with the other countries for which trend data were supplied (Austria and Portugal), little evidence was found for an increase in the potency of imported herbal cannabis.

Figure 4: Mean potencies of all herbal cannabis in Germany
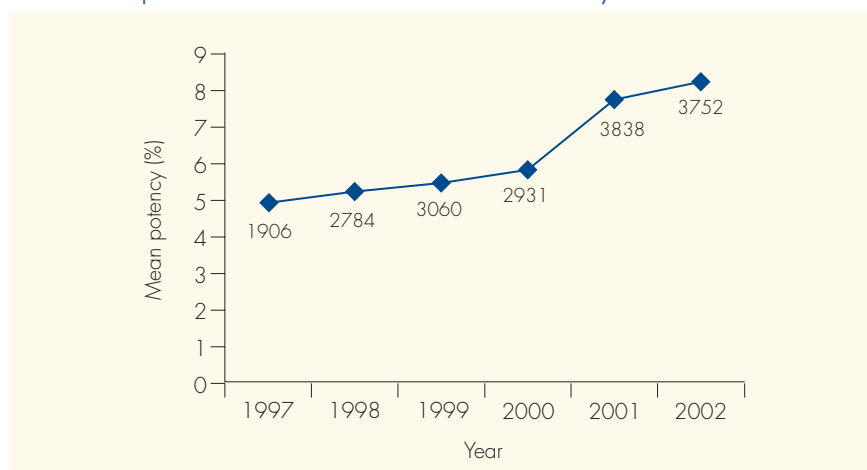
Note: Figures against each point represent the number of measurements.

Figure 5: Mean potencies of two types of herbal cannabis in the Netherlands
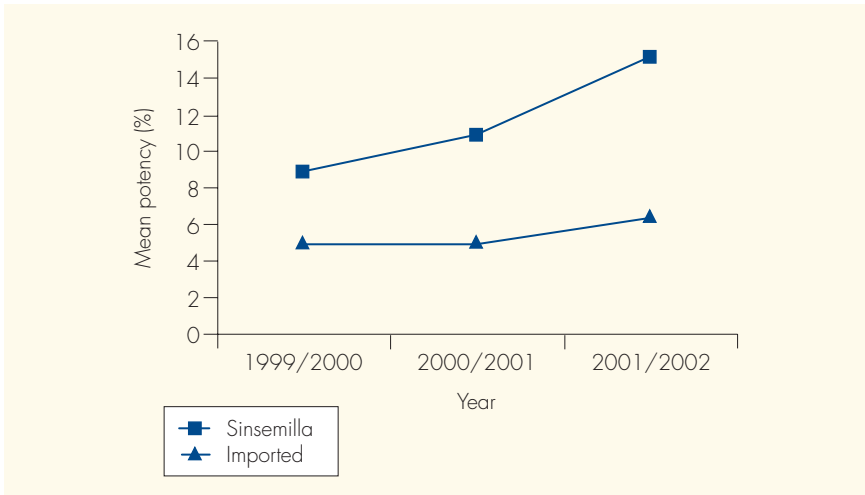
Figure 6: Mean potencies of all herbal cannabis in France
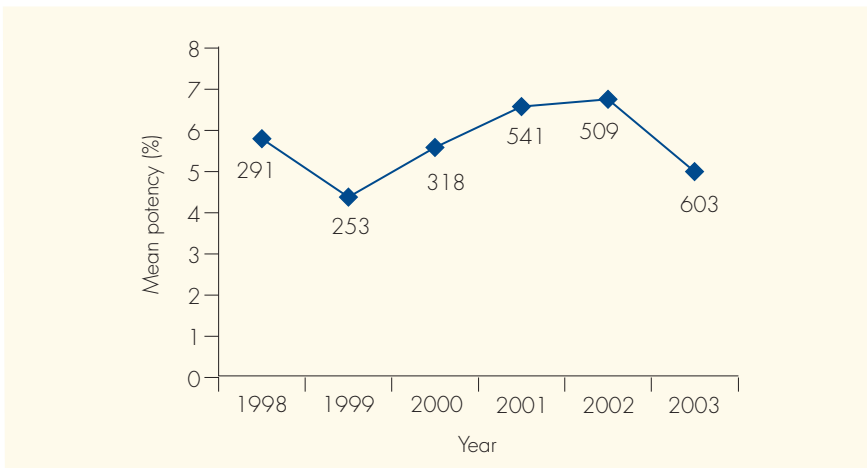
Note: Figures against each point represent the number of measurements

The most recent data from the Netherlands (Pijlman et al., 2005) show that the THC content of cannabis products has increased even further than illustrated in Figure 5. However, these data need to be interpreted with caution since the Netherlands is anomalous for several reasons. Firstly, in all other countries in the EU the available THC data derive from the analysis of law enforcement seizures. In the Netherlands, the material examined has been purchased in coffee shops: establishments that are permitted to sell small amounts of cannabis (see Korf, this monograph). The samples purchased were generally of better quality material and may not have been necessarily

Figure 7: Frequency distributions of THC in herbal cannabis examined in the United Kingdom
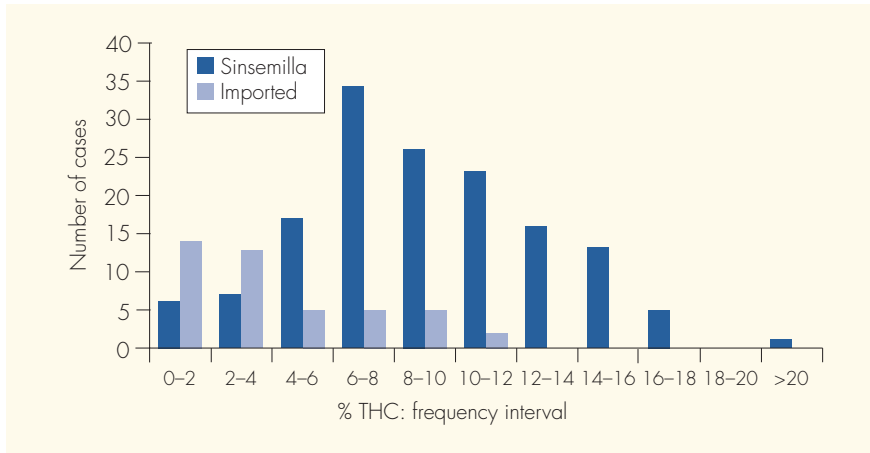
representative of all cannabis products consumed. This may explain the finding that the cannabis resin purchased for analysis also had a much higher THC content than is seen elsewhere in Europe. Secondly, as noted elsewhere in this report, the relative consumption and origins of cannabis products available in the Netherlands is quite different to other countries.

There is little doubt that, on average, sinsemilla has a higher potency than imported herbal cannabis, but it is also clear that the two potency distributions overlap, as shown in Figure 7. Some samples of imported cannabis are, and always have been, of high potency. The increased THC content of herbal cannabis produced by indoor methods is a consequence of a number of influences. These include: genetic factors (selected seed varieties and cultivation of female plants); environmental factors (cultivation technique, 'pruning' during harvesting, prevention of fertilisation and seed formation); and freshness (production sites are close to the consumer and storage degradation of THC is thereby reduced).

More recent data from the UK for 1999 to 2005 (Figure 8) show that the THC content of sinsemilla may have increased further, probably as a result of continual improvements in technique. Figure 8 also shows, for comparison, the frequency distribution of THC in cannabis resin. Whereas the shape of the distribution of THC in sinsemilla is reasonably symmetrical, the distributions of both imported herbal cannabis and cannabis resin are strongly skewed, with the most common values occurring at the lowest end of the scale.

The increases that have occurred with time in the potency of some types of cannabis must be put into the context of the relative consumption of the various products in

Figure 8: Frequency distributions of THC in cannabis resin and sinsemilla examined in the United Kingdom
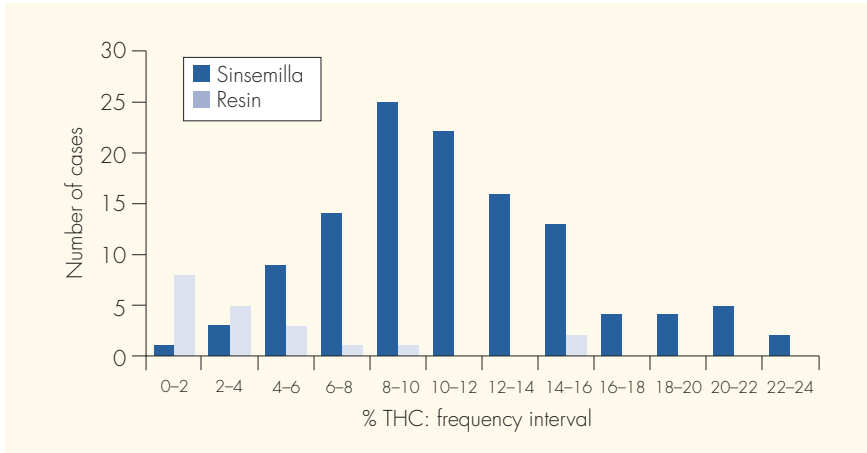
Source: Forensic Alliance, 1999–2005.

Table 1: Relative consumption (%) of cannabis products in European countries since 1999

Country	Imported cannabis	Cannabis resin	Sinsemilla	Domestic resin
Belgium	80 (¹)	20 (²)	–	–
Czech Republic	90 (¹)	10 (²)	–	–
Germany	40 (¹)	60 (²)	–	–
Estonia	85 (¹)	15 (²)	–	–
Ireland	5	90	5	–
Netherlands	3	29	67	1
Austria	70 (¹)	30 (²)	–	–
Portugal	10 (¹)	90 (²)	–	–
United Kingdom	15	70	15	–

(¹) All herbal, imported or not.
(²) All resin, imported or not.

different countries. Table 1 sets out estimates of the relative proportion of each cannabis product on the domestic market in recent years. These estimates are shown for those countries where data were either available in the published literature, were supplied directly in response to a questionnaire in the EMCDDA study (King et al., 2004) or were derived indirectly from the relative number of samples examined in each case.

Using both potency data and a knowledge of the relative consumption of different products as shown in Table 1, it is possible to derive the weighted mean potency, that

Figure 9: Effective potency of cannabis products in several European countries
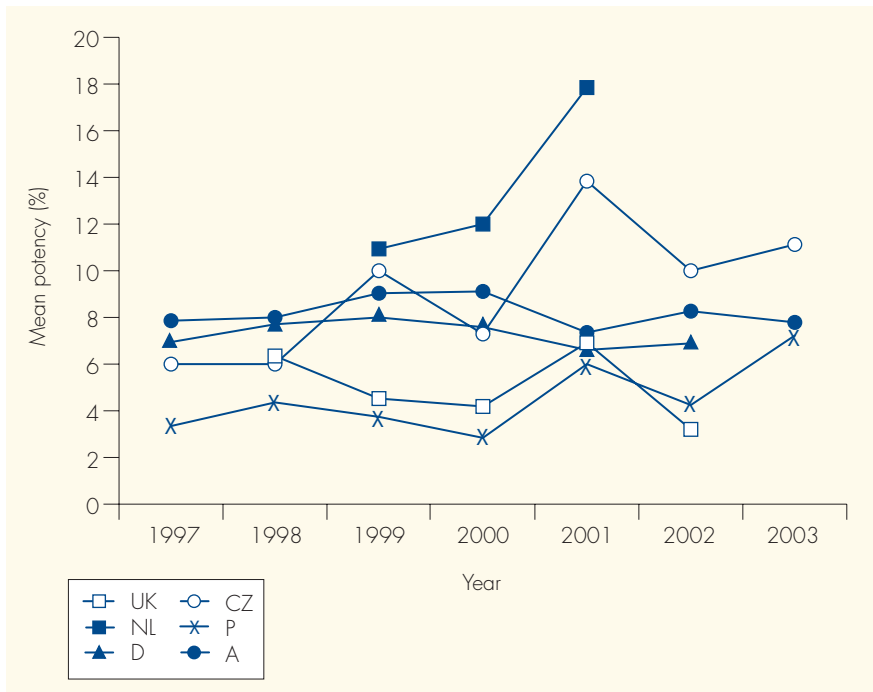
Note: UK, United Kingdom; NL, Netherlands; D, Germany; CZ, Czech Republic; P, Portugal; A, Austria.

is, the effective THC concentration as would be perceived by the average user. Figure 9 shows the effective potency averaged over all cannabis products in several European countries.

Except for the Netherlands, where it is a dominant product, the limited market share experienced by sinsemilla in other countries suggests that, other aspects of behaviour being constant, users have not been exposed to significantly larger amounts of THC. Although not shown graphically here, UK data for the earlier period 1975 to 1989 indicate that the effective potency in the UK has been around 6% for the past 30 years. In Ireland, where resin is also the main product, the effective potency in 2000 was closer to 4%.

If the effective potency of cannabis had shown an appreciable rise over the past 10 to 20 years then it might be assumed that users would need to consume less cannabis on a weight basis. However, the content of reefer cigarettes (also known as joints or spliffs) examined in the UK over the past 20 years has been remarkably constant (Figure 10). Thus, the typical reefer contains 150–200 milligrams of cannabis or cannabis resin, equivalent to around 10 mg of THC (Humphreys and Joyce, 1982; Bal and Griffin,

2001). Similar results were found in Ireland (Buchanan and O'Connell, 1998). The assertion by Ashton (House of Lords, 1998) that *a typical "joint" today may contain 60–150 mg or more of THC*', suggests a potency of over 50%.

Figure 10: Mean herbal cannabis and cannabis resin content of reefer cigarettes examined in the United Kingdom over a 20-year period
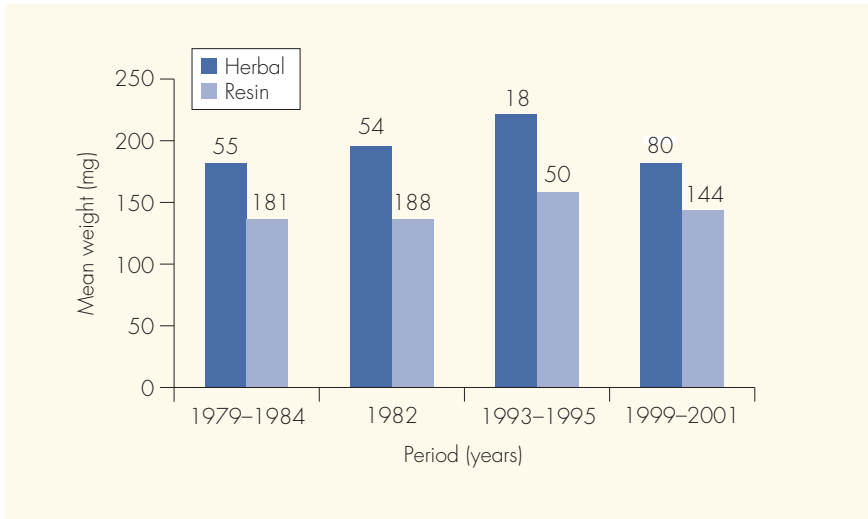
Note: The sample size in each case is shown. *Source*: Forensic Science Service.

Areas for improvement in analysis and interpretation

If a more accurate picture of potency trends is to be obtained then a number of areas require attention. Apart from a purely quantitative need to obtain more data, these improvements include the following.

Nomenclature of cannabis products

A particular need is the use of an agreed scheme for describing and naming imported herbal cannabis and sinsemilla. At present, a wide variety of terms are in use by authors, including 'seeded cannabis', 'skunk', 'tops', 'buds' and 'nederwiet'. Even the term 'imported', usually implying a source such as the Caribbean, Africa or Asia, may not be ideal since, in some cases, sinsemilla may be imported from elsewhere in Europe. As noted earlier, confusion may still occur if the growing conditions of the plant material are uncertain, since visual examination of isolated plant material is not always

conclusive. Yet, the alternative possibilities for classification (THC content, size of seizure, type of cultivation, such as indoor or outdoor or level of sophistication) also seem unsuitable.

Relative consumption of cannabis products

In most countries, estimates of the relative consumption of different cannabis products are based largely on seizure data. Such data have limits and may not directly reflect the relative market share of different cannabis products or availability as experienced by drug users. One way forward would be to complement statistics from drug seizures with data from user surveys carried out at the retail level. This might also include information from seed suppliers and shops selling growing equipment/paraphernalia.

Proxy measures of potency

Few countries have published data on the herbal cannabis or cannabis resin content of reefers. This information would be useful as a proxy measure for potency as well as a means of tracking methods of consumption (i.e. use with or without tobacco). In Europe, information is collected routinely by the EMCDDA on drug prices at retail level. However, the quality and comparability of this information needs to be reviewed and standard methods for collection and reporting developed. Data from the Netherlands suggest a close relationship between potency and price (Trimbos Institute, 2002).

Extent of domestic production

It is important to have a better understanding of the extent of domestic cannabis production, the different types of production methods used, as well as the use of domestically produced cannabis products compared with imported products and how this varies within Europe and over time. Furthermore, home-produced cannabis may not always benefit from hydroponics or other sophisticated growing techniques.

Data presentation

When compiling data, many laboratories calculate simple mean values (often called averages: the sum of all values divided by the number of values). In a few cases, weighted means may be calculated. These take account of the fact that not all samples may be of equal size. Few authors consider whether the distribution of potency is normally distributed or if other measures of central tendency such as the median or mode would be better. Ideally, data collections should always indicate details about the sampling strategy, sample size, the mean, and where possible more detailed descriptive

statistical information (e.g. mode and median values, standard deviation and treatment of outliers).

Sampling

Sampling is probably the most important variable relating to the measured potency of cannabis. Cannabis, and to a lesser extent cannabis resin, is an extremely inhomogeneous material. As noted earlier, the THC content of different parts of the plant shows considerable variation. As well as the flowering tops of the female plant, where most of the THC is located, a sample may contain varying amounts of stalk, seeds and leaves, none of which contains much active drug. If potency is to be compared between different laboratories, or even within the same laboratory at different times, then a standard method of sample preparation is required.

Laboratory analysis

Assuming that the THC in cannabis and cannabis resin can be solvent-extracted with total, or at least a known, efficiency, then most laboratories use gas chromatography, often with flame-ionisation detection (Raharjo and Verpoorte, 2004) to determine THC concentration. This has the merit that the naturally occurring precursor (THCA) is decarboxylated to THC, just as occurs during smoking. Cannabinoids can also be determined by high-performance liquid chromatography, a method suited to profiling ('chemical fingerprinting') and the separate measurement of THCA. To measure the total THC content by HPLC, the sample must be heat treated before analysis (Lehmann and Brenneisen, 1995; Rustichelli et al., 1998; Kanter et al., 1979).

The major issue to arise in the analysis of THC concerns the accuracy (closeness to the 'true' value) of the measurement process. Poortman van der Meer and Huizer (1999) claimed that in a series of proficiency tests, using standard solutions of THC, and organised in 1997 for 30–40 European laboratories, the relative standard deviation was about 29 %, whereas cocaine and amphetamine gave less than 5 % and 8 % respectively. This means that around one-third of results for THC were either more than 29 % above or more than 29 % below the mean value. It is clear that even worse precision could be expected if the measurement error caused by the sampling and extraction process were to be included.

As a reference standard, THC is usually only available from chemical suppliers in the form of an ethanolic solution and may be labelled, for example, as 'approximately 95 %'. Not only could confusion arise if analysts assume the concentration to be 100 %, but Poortman van der Meer and Huizer (1999), using the response of a flame-ionisation detector, found that one sample of a commercial THC solution had only 90 % of the

concentration of a different commercial solution. These authors recommended that THC quantification should be based on cannabinol or cannabidiol as the internal standard and a correction made for the expected detector response from the effective carbon number of the respective substances. They claimed that this method had been used in Germany for the past 10 years. It was also the method used by Maguire (2001) to study the cannabinoid content of (mostly fibre-type) cannabis in Ireland. However, as far as could be determined in the EMCDDA study (King et al., 2004), other European laboratories continue to prepare standard dilutions of stock THC solution to construct calibration curves.

To a large extent, and excluding the special situation of locally produced Dutch nederhasj, the cannabis resin consumed in Europe in recent years has originated mostly from North Africa, with smaller amounts coming from South-West Asia. Since resin is rarely adulterated, it could be argued that, in any given year, all laboratories have been measuring broadly similar material. Despite the variation of THC content in cannabis products discussed above, if those laboratories had made sufficient measurements, then the mean potency of cannabis resin in any year should be found to be similar for all countries. Inspection of Figure 2 shows that not only is there no time trend, but there is considerable variation in the reported THC levels, both against time in any one country and between countries at any one time. It is not obvious why there should be consistently less THC in cannabis resin in Portugal compared with cannabis resin in, for example, the Czech Republic or France. This finding raises questions about the accuracy of measurement of THC in different laboratories. In other words, if all analysts had used the same THC reference standard for instrumental calibration, then these differences might not have occurred.

Pharmacology

In Europe, cannabis is normally smoked often in a mixture with tobacco in a reefer cigarette, but some is smoked in a water pipe (a bong). By contrast, in the USA where little resin is consumed, cannabis is usually smoked alone. Furthermore, the sources of cannabis and cannabis resin consumed in North America are not the same as those in Europe. Nearly all studies on the smoking of cannabis and its relation to potency have been carried out in North America, and it is clear that this research may not translate well into the European situation. Thus Matthias et al. (1997) found some evidence that those who smoke more potent cannabis are less exposed to noxious smoke components than those who use less potent forms. But in Europe, or at least in Ireland and the United Kingdom, where a reefer cigarette typically contains only 150–200 milligrams of cannabis (Buchanan and O'Connell, 1998; Bal and Griffin, 2001; Humphreys and Joyce, 1982), much of the tar, carbon monoxide and other combustion products will derive from the concomitant tobacco.

The concerns that have been expressed about a possible rise in cannabis potency often assume that users will necessarily consume more THC, but the evidence for this is equivocal. If the potency of cannabis products has shown a marked increase, then it might be expected that the typical user would need to consume less on a weight basis to achieve the desired effect. Given a choice, users preferred cigarettes with a higher THC content (Chait and Burke, 1994; Kelly et al., 1997). Ashton (1998) also argued that users would not titrate the dose of THC from cannabis in contrast to tobacco smokers. However, Heishman et al. (1989) found that those smoking cigarettes with a higher THC content tended to have a lower inhalation rate than control subjects. Yet little research has been conducted, particularly in Europe, to answer a crucial question: do those smoking high potency cannabis have higher blood levels of THC?

However, even if the strength of some forms of cannabis has increased, and even assuming that, as a consequence, users do have higher blood levels of THC, then it cannot be concluded that this will translate into a greater harm to the individual. Experience with alcohol suggests that the health consequences are not simply related to the alcohol concentration of what is consumed, but rather it is the total quantity of alcohol consumed that is important. As Hall et al. (2001) note, age of onset of use and frequency of use are likely to be more influential than changes in potency in determining consumption levels.

Medicinal cannabis

In any discussion about the health impact of high-potency cannabis, mention should also be made of cannabis used for medicinal purposes (see also Witton, this monograph). In the Netherlands, herbal cannabis is available as a prescription medicine (Office of Medicinal Cannabis, 2004). It is indicated for multiple sclerosis, certain types of pain and other neurological conditions. Patients are advised to consume the cannabis by means of a hot water infusion. However, Hazekamp (personal communication, 2004) has found that, even in boiling water, the conversion of THCA to THC can take some hours and other byproducts are formed. Remarkably, one of the forms of this medicinal product, known as 'cannabis flos', has a nominal THC content of 18 % and is locally produced by the same intensive indoor methods that are used for illicit cultivation. Not only is high-potency cannabis considered suitable as a medicinal product, but an assessment carried out by the Dutch Coordination Centre for the Assessment and Monitoring of New Drugs concluded that (illicit) higher-potency cannabis products did not pose any additional risk than those present for cannabis products as a whole, either to the individual, to society, to public order or criminality (W. Best, personal communication, 2004).

Conclusion

The potency, that is, the THC concentration, of herbal cannabis produced by intensive indoor cultivation can average over 10%, compared with an average of 5% for both imported cannabis resin and cannabis grown by traditional methods. For all cannabis products there is a wide variation about average values and some users will inevitably have been exposed in almost random fashion to higher than normal THC levels in their careers. The evidence from Europe does not support the widespread claims that cannabis potency is now 10 or more times greater than it was in earlier periods. Although not part of this present review, experience from outside Europe (King et al., 2004) comes to a similar conclusion.

Acknowledgements

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Chapter 15
Multinational export–import ventures: Moroccan hashish into Europe through Spain

Setting the context

In recent decades, Morocco has emerged as the world's largest producer and exporter of cannabis resin, or hashish. The Moroccan cannabis resin market is substantial: the country supplies over 70% of the cannabis resin consumed in Europe, and half of global production (EMCDDA, 2006). Within Morocco itself, hashish is one of the key agricultural products of the provinces containing the *Rif* mountain range in northern Morocco, and an estimated 760 000 peasant farmers (2.5% of the population) obtain their livelihoods from hashish. By 2003, Morocco's cannabis resin production had reached 3 070 tonnes, with a retail market value estimated at over EUR 12 billion by the UNODC. Since then, cultivation has decreased substantially, due both to crop eradication efforts, political pressure placed on the Moroccan government and the damage wrought by a major drought in 2005. The most recent UN figures put production at around 1 070 tonnes, resulting in a retail market estimate of EUR 4.6 billion.

The full picture of hashish trafficking is more complex. It is estimated that only about a tenth of the retail earnings are likely to end up in the pockets of Moroccan farmers, wholesalers and traffickers. The majority of profits are made lower down the supply chain once the resin has entered the EU. Most Moroccan hashish is exported through the Iberian peninsula, particularly Spain, a country that is today the crucial transit zone for Moroccan hashish sold in the European market. From Spain, cannabis resin is bounced through a complex network that unites producers, traffickers, dealers and consumers.

This chapter examines the export–import system of cannabis resin between Morocco and the EU through Spain. It combines a review of the literature on the Moroccan production

of hashish and a preliminary analysis of over 2 000 press reports using an event history analysis approach (Franzosi, 1995; Olzak, 1992). The result is data on 1 370 groups of importers and dealers apprehended during a 27-year period, and a first sketch of the structure of the multinational smuggling industry. The result is a typology of networks and groups who deal with hashish at different levels of a distribution pyramid, profiled according to the size of 'project' they manage. The chapter thus clarifies the importance of networks and hierarchies in illegal enterprises, the type of complex and impermanent structure that has received considerable attention in EU criminology literature (see Dorn et al., 2005).

A number of enforcement questions arise from this chapter. Given the strong decrease in Moroccan cannabis resin production, is supply moving elsewhere? A number of countries in northern Europe are reporting increasing use and domestic cultivation of cannabis herb (see Carpentier, this monograph), with an indirect effect on the potency of cannabis consumed (see King, this monograph). Recent press reports also suggest that Sub-Saharan Africa is stepping into a gap in the market: seizures of resin are increasing along the Saharan route via the North African coast, and countries such as Algeria, Libya, Niger and Mali have reported overall increases in seizures. However, given the fluctuation that characterises such seizure statistics, it is difficult to draw clear conclusions. Another question is whether Moroccan cannabis resin trafficking networks are diversifying into cocaine trafficking. This is a concern expressed by the Spanish and French authorities, together with Europol with some concern about cocaine seizures on the Cádiz coast, a traditional hashish route. Reported seizures of cocaine in Morocco have fluctuated greatly since 2000, peaking at 15.8 tonnes in 2002, yet with a wide range starting at 0.9 tonnes in 2000 to just over 4 tonnes in 2004 (UNODC, 2006).

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Multinational export–import ventures: Moroccan hashish into Europe through Spain ([1])

Juan Francisco Gamella and Maria Luisa Jiménez Rodrigo

Introduction

The production of cannabis is a global phenomenon; 134 countries have been identified as source countries of this substance (UNODC, 2007). Two regions, however, concentrate the largest markets for cannabis products, and the largest accumulation of revenues: North America, where two-thirds of all cannabis products are sold, mainly in the form of marijuana, and Europe, the largest importer and consumer of resin or hashish (for more detail on the world cannabis market, see Legget and Pietschmann, this monograph).

Figure 1: The Moroccan Rif

While the production of herbal cannabis is widely dispersed around the planet, including a growing number of European home-growers, the production of resin is centred in a few countries such as Morocco, Pakistan, Afghanistan, Lebanon and Nepal. Among them, Morocco has become the world's largest producer and exporter, supplying over 70 % of resin consumed in Europe (EMCDDA, 2007). Although statistics vary widely, in recent years Morocco's hashish production has declined from 3 070 tonnes in 2003 to 1 070 tonnes in 2005 (UNODC, 2007). Average retail prices for cannabis resin is reported in Europe at between EUR 2.30 and EUR 11.40 per gram, while cannabis resin seizures for 2003 in Spain and Portugal were reported at 809 tonnes, or just over a quarter of Moroccan production (EMCDDA, 2006). The UNODC's estimate of the annual international market for Moroccan cannabis resin has seen a decline from EUR 10.8 billion in 2004 to EUR 4.6 billion in 2005.

Most Morocco-produced hashish is exported through Spain, a country that is today the crucial transit zone for Moroccan hashish sold on the European market (Figure 1). In 2003, out of the 757 tonnes of Moroccan resin seized in the EU, 727 tonnes (over 90 %) were seized in Spanish territory or jurisdictional waters (UNODC, 2005). This binational industry has exploded in the last three decades from a traditional base of rural growers in the Ketama region, whose products were distributed from the late 1960s by hippie entrepreneurs. In the last decade, smuggling networks have begun to move faster and further, and to establish international connections with traffickers of other drugs, for instance with large cocaine exporters from South America, who are increasingly using the routes opened by the distribution of Moroccan hashish.

The 14 km of the Strait of Gibraltar, and the frontier around the Spanish enclaves of Ceuta and Melilla, make up one of the deepest socio-economic and cultural divides on the planet ([2]). Disparities in wealth, income, demographic structure, educational and labour opportunities are huge and stimulate a licit and illicit movement of persons that in many ways parallels the movements of drugs, money and manufactured products. This is a crucial frontier for the EU and its policies concerning development, immigration and drug control.

This chapter examines the export–import system of cannabis resin between Morocco and the EU through Spain. First, we will review what is known about the extent, location and organisation of cultivation and manufacture in northern Morocco. We will then explore the structure of the import industry using Spanish data. We will consider the type of organisations and networks that participate in this trade, their structure, and the tasks their members perform in their transactions. We will also examine the profile of

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[2] In 2004 the GNI per capita of Spain was 14 times that of Morocco; the GNI per capita of France was 20 times that of Morocco. By comparison, the US GNI per capita was six times that of Mexico, its southern neighbour (World Bank).

workers and entrepreneurs in these groups, and the changes that seem to have occurred in recent decades. We will also present some observations about the permanence of the smuggling networks and organisations, their strategies to avoid detection, and the pricing tendencies in this market. This information may help to clarify the importance of networks and hierarchies in illegal enterprises (Morselli, 2001; Natarajan and Belanger, 1998; Ruggiero and South, 1995; Reuter and Haaga, 1989; Adler, 1985; Reuter, 1984), and the nature of the cannabis industry.

Data sources

We use a combination of primary and secondary data sources, including prior studies and reports published by international agencies, data from our ethnographic fieldwork in drug trading environments and our ongoing research and analysis of seizure cases published in the Spanish press from 1976 to 2003. In this period, thousands of illegal deals were prevented. The press reports on these failed transactions provide important insights on the structure of hashish distribution and the character of drug trafficking organisations. We have applied to this topic the methodology of event analysis as it has been developed by historians in their study of collective actions along a wide time span (see Franzosi, 1995; Olzak, 1992; Tilly et al., 1975).

Production and manufacture in Morocco

In the past 20 years, cannabis cultivation has spread in all directions from the traditional areas in the central Rif, where it has been present since the 15th century (OGD, 1996). However, recent crop eradication efforts, together with the effects of a drought in 2005 have led to a strong decline in cultivation from 2004 until 2006. From the early 1980s to the 2000s, the area devoted to cannabis seemed to have multiplied by 20, and doubled every three to five years. There is considerable agreement in the literature about this rising trend in the various estimations available, notwithstanding their disparities (see Labrousse and Romero, 2001). This constant growth occurred despite the well-publicised campaigns by the Moroccan government in the 1990s to eradicate drug trafficking (Ketterer, 2001).

Recently the UNODC has undertaken detailed surveys of cannabis cultivation with the cooperation of the Moroccan government (UNODC, 2004, 2005, 2006). These surveys provide the most accurate data on the extent, characteristics and value of cannabis production in the country today. Table 1 summarises their results.

Most *kif*, as cannabis is locally known, is grown in four northern provinces along the Rif mountain chain. One province alone, Chefchaouen, accounts for 56 % of cultivation, followed by Taounate (17 %), Al Hoceima (16 %) and Tetouan (11 %). A further province,

Table 1: UNODC Morocco cannabis surveys, 2003, 2004, 2005 — main results

	2003	2004	2005
Total cannabis cultivation	134 000 ha	120 500 ha	72 500 ha
Number of households cultivating cannabis	n/a	96 600	89 800 (excludes Larache province)
Cannabis yield			
On rain-fed land	750 kg/ha	750 kg/ha	459 kg/ha
On irrigated land	1 270 kg/ha	1 270 kg/ha	1 821 kg/ha
Gross production of raw cannabis	109 000 tonnes	98 000 tonnes	53 300 tonnes
Potential production of cannabis resin	3 070 tonnes	2 760 tonnes	1 066 tonnes
Raw cannabis needed to produce 1 kg resin	35.4 kg	35.4 kg	
Distribution of farmers' sales			
Raw cannabis	66%	66%	
Cannabis resin	34%	34%	
Cannabis sale prices at farm gate			
Raw cannabis	Dh 35/kg	Dh 25/kg	Dh 50/kg
Cannabis resin	Dh 1 400/kg	Dh 1 400/kg	Dh 4 000/kg
Total farmers' income from cannabis	Dh 4.0 billion (EUR 362 million, USD 417 million)	Dh 2.9 billion (EUR 263 million, USD 325 million)	Dh 3.5 billion (EUR 312 million, USD 386 million)
Average income per household growing cannabis	n/a	Dh 30 000 (EUR 2 700, USD 3 300)	Dh 38 900 (EUR 3 600, USD 4 300)
GDP per capita Morocco	USD 1 484	USD 1 677	USD 1 725
Cannabis resin seized in Morocco	96 tonnes	87 tonnes	97 tonnes
Cannabis resin of Moroccan origin	946 tonnes	n/a	
Amount seized in Europe	757 tonnes	n/a	
Annual turnover of international trade in cannabis resin of Moroccan origin	EUR 12.4 billion, USD 15 billion	EUR 10.8 billion, USD 13 billion	EUR 4.6 billion, USD 10.8 billion

Sources: UNODC, Enquête sur le cannabis (2005), UNODC World Drugs Report 2005; IMF GDP per capita, current prices.

Larache, reported no significant cannabis cultivation following a crop eradication programme in the summer of 2005. In Chefchaouen a quarter of arable land was planted with cannabis in 2005, while in other provinces this share was between 3 % and 10 %. Cannabis was grown in three out of four *duars* (villages), mostly in smallholdings. Nearly 90 000 families grew *kif*, obtaining about half their income from cannabis (Dh 38 900 or EUR 3 600). About 760 000 peasants live from this illicit crop (UNODC, 2005) and other estimations are even larger ([3]). *Kif* has become a pillar of the economy.

A hectare planted with *kif* produces 2–8 tonnes of raw plant (2.3 tonnes on average) depending on soil conditions, irrigation, use of fertilisers, etc. The estimated resin production for 2005 was 1 066 tonnes. Productivity varies from year to year, often drastically. This is typical of dry farming conditions in the Mediterranean basin, due to great oscillations in rainfall. Part of the crop is locally consumed, mostly in the form of low-grade marijuana, which has been traditionally smoked in the region since the 16th century (OGD, 1996). Nevertheless, most of the production is exported to European markets in the form of resin or hashish. Programmes for substituting cannabis with alternative crops have failed so far, although significant progress was made from 2004 until the time of publication in 2008. *Kif* is 12 to 46 times more profitable than traditional cereal crops, such as wheat and barley (Labrousse and Romero, 2001). In fact, some of the best plots, previously devoted to food crops, are now used to grow cannabis, and forest land has been cleared to plant *kif*.

Manufacturing: from *kif* to hashish

Farmers sell both raw cannabis plants, and powder (*sandouk*). According to UNODC, 35.4 kg of raw cannabis are needed to make 1 kg of hashish. Extracting resin powder from plant material increases profits by about 13 % ([4]) (UNODC, 2005). Pascual Moreno offered different estimations. According to his fieldwork, extracting the resin dust from *kif* would increase profits by up to 66 % ([5]). However, the risks of being denounced to the police also increase (Labrousse and Romero, 2001). Thus, it seems that two out of three farmers sell raw plants to manufacturers and middlemen.

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[3] Pascual Moreno, an agronomist, director of an EU substitution program in the Rif, has worked for 25 years in the region. He estimated that over 200 000 smallholders cultivated cannabis in the Rif in the early 2000s, covering a total area of around 250 000 hectares and affecting from 1 to 1.5 million people (cited in Labrousse and Romero, 2001).

[4] The difference in price is from Dh 3 500 for 100 kg of raw cannabis to about Dh 3 950 for the 2.82 kg of resin obtained from them.

[5] According to Pascual Moreno, 100 kg of *kif* will get the farmer 5 200 Dh. The 3.5 kg of hashish that can be obtained from the 100 kg, Dh 8 750, a further profit of Dh 3 500 (Labrousse and Romero, 2001).

Hash oil is more concentrated and valuable than hashish itself, and is also easier to conceal and to transport. 10 kg of hashish is needed to produce 1 kg of oil. The techniques for hash oil production were introduced to Morocco in the 1960s following Lebanese and Pakistani methods, in what is claimed to be a dual initiative of both foreign and Ketami traffickers to address export demand and to increase the value of their products (Labrousse and Romero, 2001).

Farm prices and export prices

Cannabis offers a good source of income for small farmers in an underdeveloped region, even though the farmer only receives a small part of the retail price of hashish. According to UN data for 2003, farmers sell 1 kg of resin for Dh 1 400, or about EUR 130. In Spain, the same kilogram could be sold for EUR 2 725 at wholesale prices (UNODC, 2007) or around EUR 4 400 at retail prices (EMCDDA, 2006).

Export prices in Morocco vary considerably, depending on quality, amount purchased, place of acquisition, etc. If bought directly from the farmers, a gram of best quality hashish (*sputnik, doble cero*) could reach a price of EUR 0.45 to EUR 0.75 [6]. Second- or third-rate hashish will get a third of that (Labrousse and Romero, 2001). In our own research we have found prices as low as EUR 0.10 per gram, or EUR 100 per kg for larger quantities. A common price of second-rate hashish would be EUR 0.50 per gram for those who smuggle up to 1 kg. In one field trip to Chefchaouen in 2001, for instance, we knew of three Spaniards who bought 500 g of second quality hashish at Dh 8.5, about EUR 0.60, per gram. They felt cheated, because the sample they were shown in advance was of much better quality. However, they retailed most of the batch in Spain at about EUR 4.00 per gram, which paid for the costs of their trip, together with a small profit.

Comparing different sources, including our fieldwork, we estimate that export prices oscillate between EUR 0.10 and EUR 1.00 per gram of hashish. The total country earnings of the Moroccan hashish industry includes farmers' revenues, exporters' profits and remittances from Moroccan traders and dealers abroad. If about 2 200 tonnes of Moroccan hashish were successfully exported in 2003, earnings could be estimated in the range of EUR 1 billion to EUR 1.5 billion. In any case, earnings are multiplied by a factor of 8 to 10 when sold in Europe. Compared with the price paid by consumers, at about EUR 5.4 per gram of resin, the total turnover of the market for Moroccan cannabis could be estimated at EUR 12 billion. Yet most of this is generated in European markets and is invested in Europe.

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[6] In 2001 we noted that in a café in Chefchaouen, a 10 g egg of good quality hashish retailed at around EUR 1.50 for foreign customers.

The commodity chain of hashish: private and public actors

Smallholders in the *Rif* economy grow cannabis plants both in rain-fed and irrigated plots. They often hire labourers in summer months, mostly in August, to harvest the plant. Once harvested and dried, plant material is sold to middlemen who extract the sticky dust, especially from the tops of the female plants, press it into balls or blocks of hashish and often adulterate it. Intermediaries then stockpile large amounts of the product in central locations such as Tangier, Tetouan, Al Hoceima and Asilah and have the resin sent to Ceuta and Melilla or across the Strait of Gibraltar to Spain. From Spanish locations, the product is then distributed to all European countries directly, or to the Netherlands, which serves as a secondary distribution centre for northern Europe (Korf and Verbraeck, 1993; De Kort and Korf, 1992).

A pyramid-like structure may be at work, with middlemen buying *kif* or *sandouk* from peasants and producing blocks of hashish of different qualities, stockpiling them, and transporting them to storehouses (Labrousse and Romero, 2001).

Cannabis fields are visible from the roads, and there is no attempt to hide them. Every summer, busloads of workers arrive to work in the *kif* harvest and thousands of tonnes of plant product are moved, apparently within reach of police officers. Bribery may be widespread, and a local joke tells of traffickers who count distances by the number of bribes they have to pay (Labrousse and Romero, 2001; Ketterer, 2001).

Some cannabis resin networks use a legal business as a façade and have no difficulty recruiting from the young and unemployed in what is a poor region. Among the higher echelons, there is evidence that the hashish trade has become industrialised. The *Observatoire Géopolitique des Drogues* (OGD) notes that hashish exporters are involved in large Moroccan firms in agribusiness, fishing, transportation, and import–export operations. There is some speculation that this would mean a shift away from the Tangier cartels and toward the Casablanca cartels, which are more acceptable to the government because they do not contest state power in the same way (Ketterer, 2001).

Export practices serve to link expatriate Moroccans in different European countries with drug distributors in the target country. Drug money has changed the consumption patterns of the region. Ketterer recently described the scene:

> Driving east from Tangier along the Mediterranean coast, the signs of drug power are obvious: heavily guarded villas with strangely stylised pagodas, frequent roadblocks with police looking for the next payoff and an endless supply of young men going about their workdays in the drug business.
>
> (2001)

Corruption of public officials is part of the operating routine of illegal businesses (Reuter, 1984). In the case of the Moroccan cannabis resin trade, it is difficult to avoid the conclusion that involvement or interested acquiescence of law enforcement officials must be widespread, considering the level of cultivation, storage and export in place. Some scandals have revealed the involvement of powerful actors in the Moroccan political scene. For instance, in November 1995, data from a secret report of the OGD appeared in the French newspaper *Le Monde*, alleging public sector corruption had reached the highest political levels, including the royal entourage ([7]). The Moroccan government sued the newspaper. A backlash against the drug trade produced several notorious arrests and trials in the following months and years. These revealed the connections that operated in the hashish trade between public officials and entrepreneurs.

Two major drug traders had become leaders of networks in the north and had become a threat to state power. One of them, Yakhaoufi, was arrested in late 1995. His subsequent trial revealed a sophisticated and massive organisation with international scope. His own organisation transported hashish out of the central Rif, stockpiled it in Tetouan, shipped it to Spain by sea, then delivered it to wholesalers in Amsterdam. In addition to bank accounts in Morocco, Spain, Gibraltar and Canada, along with a yacht and 15 cars, Yakhloufi boasted of personal, commercial and political ties to the Castro regime in Cuba. These ties facilitated contacts with the Colombian cocaine cartels, which craved Morocco's easily penetrable borders as distribution points into Europe. Yakhloufi was sentenced to 10 years in jail and died of an apparent heart attack in 1998. 'He was too dangerous — he knew too much,' said one Tangier street dealer of Yakhloufi's death (Ketterer, 2001).

A second major figure in the cannabis resin trade in Morocco was H'midou Dib. He retains folk hero status in northern Morocco. A former fisherman, he constructed his own port in Sidi Kankouch on the coast north of Tangier, which was an embarkation point for a steady stream of speedboats. Dib constructed an enormous network of loyal foot soldiers and villagers eager to protect him. He supplied jobs, built mosques, delivered social services and kept the despised authorities at bay. Dib was also involved in complex real estate transactions in Tangier, money laundering operations and other elements of organised crime.

The Dib trial revealed other links between drug traffickers and government officials, including two advisors to former governors in the Tangier province, three civilian police colonels, the military police colonel in charge of coastal surveillance and three former chiefs of the Tangier urban judiciary and national security police services. Some of these officials were fired, arrested and tried, but it is clear that the cleansing campaign of the mid-1990s did little to curb the growth of the drug trade or its ties to official Morocco (Ketterer, 2001).

([7]) See www.ifex.org/en/content/view/full/60123 for further details.

Sociopolitical and ecological consequences

The cannabis industry has had powerful effects on the society of northern Morocco, the ecology of the region and its political relationships with the rest of the country. Cannabis plots have expanded so fast and so far into hillsides that they are causing soil erosion and the destruction of old forests (Bowcott, 2003; Labrousse and Romero, 2001). Moreover, they compete with the best land for traditional food products and now the region is dependent on food imports. On the other hand, the Rif has traditionally been an impoverished region, discriminated against in investment and infrastructure and driven by resentment towards the central government and the accumulation of wealth and power in the hands of a few. In the years after independence, people in the region revolted and were subjugated by military intervention that caused thousands of deaths (OGD, 1996).

Today, the economy of northern Morocco depends heavily on the *kif* trade and is becoming a society of smugglers, both of people and commodities into Europe, and manufactured goods into Morocco, with multiple links with Costa del Sol real estate business, Gibraltar offshore banks, and Ceuta and Melilla smuggling organisations. Furthermore, the drug trade affects the crime situation in the country. Some networks of drug traffickers are very often involved in other drug-related crimes and activities. Moreover, there are certain crime prevention-related phenomena inherent to the country and its traditions, namely child labour, some involvement of underage recruitment in liberation movements (mostly in the Western Sahara region), trafficking of human beings and smuggling of migrants (UNODC, 2003).

A young, growing and often restless population looks to the other side of the Mediterranean for jobs, money and a better future. As Ketterer (2001) observed, northern Morocco represents a challenge for the Moroccan state. The region has a potent mix of discontent, drugs, organised political opposition and religion. Morocco's drug barons have steadily become a serious crime problem and security threat, and also major players in the domestic political system. Moreover, there is a growing evidence that violent Islamist cells have become involved in the hashish trade both in Morocco and in Spain. Tragically, several major terrorists acts have been funded with hashish money (Wilkinson, 2003). The two most important so far are the bombing in Casablanca in May 2003, which left 32 people dead; and the train bombings in Madrid in March 2004, that killed 192 people and injured over a thousand ([8]).

[8] See, among others, 'La masacre financiada por el narcotráfico' [The massacre funded by drug trafficking], *El Mundo*, 15 April 2004.

The other side of the Strait: smuggling *kif* into Europe

Hundreds of tonnes of hashish are smuggled into Europe every year from the *Rif*. This is a multifaceted export–import industry which enriches thousands of people. Balls, blocks and packages of hashish and hashish oil are carried to Europe by speedboat, fishing boat, cargo ships, cars, vans, trucks, small aircraft, and individuals who carry the drug in their bags, their clothes or their bodies [9]. Hashish is hidden beneath vegetables, fish, wood and any other commodities crossing the Strait. Lately, Moroccan hashish and Latin American cocaine have been smuggled together, and South American networks are using West African connections with bases in Morocco to smuggle cocaine into Europe.

In Spain most hashish is seized at sea or in coastal areas, including docks, harbours, beaches and local roads. The most common route of entry crosses the provinces of Cádiz and Malaga, bordering the Strait of Gibraltar. However, more and more quantities have been seized as far away as Catalonia in the east, and Galicia on the north-west Atlantic coast, as drug smugglers use both faster and larger boats. One of the reasons for this displacement of smuggling routes may be the stricter control of the Strait trying to curb illegal immigration.

The constant growth of the hashish trade

If enforcement agencies' data on seizures are an indicator of this trade, and not of police resources or priorities, the evolution of cannabis seizures in Spain shows the substantial growth of this drug industry in the last 15 years. Spain has recorded a continuous rise in cannabis resin seizures since 1980, reaching over half a million kg a year by the 2000s (Figure 2). Spain alone seizes more hashish than the other 26 countries of the European Union (plus Norway) together. The increase might partly reflect the increase or improvement of police resources. However, the rise in confiscations in Spain parallels the spread of cannabis crops in the Rif, with the moderate tail-off reported for 2005 reflecting the reduction in cultivation reported since 2004. It is thus plausible that the increase in confiscations in Spain is mostly due to growth in the hashish trade. By comparison, seizures in Morocco have fluctuated throughout the last decade (Table 2).

[9] The World Customs Organisation splits cannabis resin seizures as follows: vessel, 56%; vehicle, 42%; air, 1%; mail, 0.1% (Pierre Bertrand, WCO RILO unit, meeting at the EMCDDA, 29 November 2004).

Figure 2: Seizures of cannabis resin in Spain (kg), 1981–2005
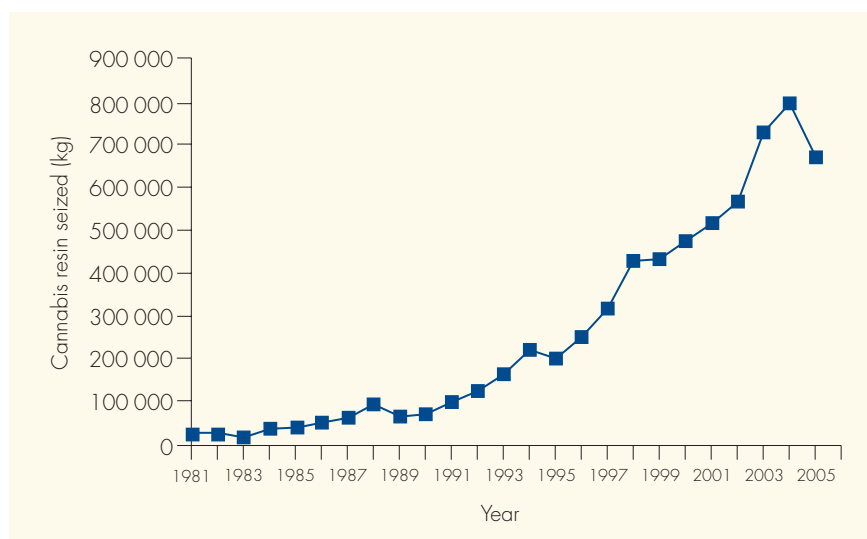
Demand/supply: prices in Spain and Europe

Retail prices for cannabis resin vary greatly within and between European countries (see Carpentier, this monograph), with average prices reported in Europe at between EUR 2.30 (Portugal) and EUR 12.50 per gram (Norway) (EMCDDA, 2006). Average prices of cannabis resin, corrected for inflation, fell over the period 1999–2004 in EMCDDA reporting countries except in Germany and Spain, where prices remained stable, and Luxembourg, where a slight increase occurred (EMCDDA, 2006). In Spain prices tend to increase as one moves north. In Seville or Granada, for instance, in 2003 retail prices of hashish ranged from EUR 2 to EUR 5 per gram, while in Bilbao or Barcelona they commonly ranged from EUR 3.5 to EUR 7. The quality of Moroccan hashish seems to oscillate considerably, although its potency has remained in a

Table 2: Seizures of cannabis in Morocco (kg), 1995–2005

	1995	1996	1997	1998	1999	2000
Herb	35 808	38 521	27 956	37 161	46 136	83 720
Resin	110 245	64 769	71 887	55 520	54 755	143 946
Total	146 053	103 290	99 843	92 681	100 891	227 666

	2001	2002	2003	2004	2005
Herb	68 169	88 529	69 058	318 610	115 000
Resin	61 356	66 394	96 306	86 800	92 423
Total	129 525	154 923	165 364	405 410	207 423

Source: UNODC, 2007.

range of 5–14 %, with little sign that it has increased in the last decade (see King, this monograph). If export prices range from EUR 0.15 to EUR 0.60, retail prices provide a margin of 16–80 times cost. This is an important price differential, and the main incentive for the international trade, but does not seem larger than other drug businesses (see Moore, 1977; Reuter, 1985; Reuter and Kleinman, 1986; Wagstaff, 1989; Reuter et al., 1990).

Event analysis from a sample of newspaper articles

We have applied to this topic an event analysis methodology developed by historians for the study of collective actions such as strikes and social protests across a wide time span (see Olzak, 1989; Franzosi, 1995). In this methodology, events are commonly defined as non-routine, collective, and public acts. The first step in this method is to establish formal rules for coding information on collective events using records from archives, newspapers, historical documents, and police and magistrate records. This allows information on different aspects of a particular type of collective action to be measured and compared across social systems or across time periods, as data are collected in commensurate dimensions (Olzak, 1989).

Historians have observed that newspapers provide the most complete account of events for the widest sample of geographical or temporal units (Tilly et al., 1975) and, despite the limitations of the newspapers as a source of socio-historical data, they often constitute the only available source of information. 'Exclusion of newspaper data would prevent research in fields where no alternative data are available' (Franzosi, 1987). This is especially apt in the case at hand. However, as Franzosi has noted, 'the validity of newspaper information is questionable: newspapers differ widely in their reporting practices and news coverage'. 'The values, routines, and conventions of news organisations constrain the amount and nature of coverage devoted to any story' (Kielbowicz and Scherer, 1986). Nevertheless, in using mass media reports, the type of bias more likely to occur 'consists more of silence and emphasis rather than outright false information' (Franzosi, 1987). In the study of illegal enterprises it is evident 'that no data source is without error, including officially collected statistics', but 'in the absence of systematic and comparative validation, there is no *a priori* reason to believe that data collected from newspaper would be less valid than other commonly used sources'.

The sample of events

We have reviewed over 2 000 news reports from the newspaper *El País,* concerning cannabis seizures from May 1976 to December 2003. They describe 1 370 failed

schemes or projects of smugglers or distributors. On average, these events represent 40.2 % of all cannabis seized during this period in Spain, with a considerable variation from year to year (standard deviation: 21.7). In total, our sample includes reports of about one out of every three groups detained in Spain for hashish trafficking in this 27-year period. We chose *El País* for the quality and consistency of its reporting concerning social issues, and because it is the only newspaper that is edited throughout Spain with local editions in all major regions, and, more importantly, because it has indexed all of its issues published since its first edition in May 1976. We have attempted to check the selected cases found in *El País* against other news and police reports of the same events. Our analysis is still ongoing, and the results we present here are provisional and tentative.

The organisation of smuggling and distribution of hash into Spain

We can draw some preliminary conclusions from our sample of events. In Table 3 we present the number of episodes described in our sample by the amount of cannabis seized. In most cases the substance confiscated was hashish, although some herbal cannabis was also seized, in particular during the 1970s and in the last decade.

When examining the 1 370 operations we found that over 800 regional distributors and importers were involved. Almost all of those arrested with over 500 kg of hashish were smugglers or large-scale distributors. It is important to note that some of the

Table 3: Number of seizures by amount seized, news events sample from *El País* (1976–2003) (*n* = 1 370)			
Amount (kg)	*n*	%	% accumulated
1 or less	86	6.3	6.3
2–9	76	5.5	11.8
10–49	156	11.4	23.2
50–99	94	6.9	30.1
100–499	331	24.2	54.2
500–999	197	14.4	68.6
1 000–4 999	363	26.5	95.1
5 000–9 999	37	2.7	97.8
10 000 or more	30	2.2	100.0
Total	1 370	100.0	100.0

groups or individuals caught with smaller amounts, even those arrested with less than 1 kg, were also smugglers. Large import operations of 1 000 kg or more became more frequent from 1990 onwards (Table 4). This is coherent with the growth of total seizures that surpassed 100 tonnes in 1990 and 1991. In the 2000s, the level of operations seems to have increased even more. We have found data on 430 groups that imported between 1 and 36 tonnes. On average, 3.4 tonnes were seized in these operations, although there is great variation in this sample (standard deviation: 4.5). On average, 7.4 people were arrested by project or police raid (mean: 4.5). The size of these groups varied a great deal (standard deviation: 10.6). In one case, 97 people were arrested in several European countries in a connection with a wide transnational ring of smugglers, distributors and money launderers; in some cases only one person was arrested, for instance, the driver of the truck.

Table 4: Number of seizures larger than 1 000 kg by period, total news events from *El País*, Spain, 1976–2003 (n = 1 370)

Years	n	%	% accumulated
1976–1979	5	1.2	1.2
1980–1984	10	2.3	3.5
1985–1989	27	6.3	9.8
1990–1994	120	27.9	37.7
1995–1999	122	28.4	66.0
2000–2003	146	34.0	100.0
Total	430	100.0	

Nationalities of smugglers and traders

We were able to identify the nationality of people arrested in 757 cases. Over a third of all groups (38%) were formed by Spaniards working with Spaniards (Table 4). Moroccans working with people of their nationality formed the second most frequent type (19%), and groups of nationals from other European countries formed the third most common type. When people from different nationalities cooperated within range of Spanish police, the most frequent combination was that of Spanish and Moroccan nationals (8% of all groups arrested). Spaniards working with other Europeans was also a common type of association, representing 5.5% of all episodes in our sample (Table 5).

We observed a correlation between the size of the haul seized and the nationality of the members of the distribution groups. Furthermore, nationality was linked to the dominant task of the organisation. Almost all retailing is done by Spaniards working alone or in small groups of same-country nationals. Moroccan immigrants were commonly

Table 5: People arrested for trafficking or distributing cannabis in Spain, 1976–2003 — composition of groups by nationality, news events sample (n = 1 370)

	1 kg or less		1–9.9 kg		10–99 kg		100–999 kg		1 000–4 999 kg		Over 5 000 kg		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Spaniards	50	86.2	33	57.9	64	41.6	74	28	60	32.4	6	15.4	287	37.9
Moroccans	1	1.7	7	12.3	43	27.9	67	25.4	20	10.8	4	10.3	142	18.8
Other Europeans	1	1.7	9	15.8	16	10.4	56	21.2	38	20.5	–	–	124	16.4
Spaniards–Moroccans	–	–	–	–	11	7.1	26	9.8	19	10.3	3	7.7	59	7.8
Spaniards–Other Europeans	1	1.7	–	–	5	3.2	15	5.7	18	9.7	3	7.7	42	5.5
South Americans	1	1.7	–	–	4	2.6	–	–	1	0.5	2	5.1	8	1.1
Other Europeans–Moroccans	–	–	–	–	–	–	8	3	8	4.3	4	10.3	22	2.9
Spaniards–Other Europeans–Moroccans	–	–	–	–	–	–	13	4.9	7	3.8	5	12.8	25	3.3
Other combinations	4	7	8	14	11	7.1	5	6.8	14	7.6	12	30.8	48	
Total	58	100	57	100	154	100	264	100	185	100	39	100	757	100

found in small smuggling and wholesale operations involving less than 100 kg. French, British, Dutch and other Europeans were also important in smuggling these quantities, and sometimes they transported cannabis from Morocco. Often, however, for these quantities the traffickers sourced the cannabis from Spain before shipping it to France, the UK and the Netherlands. In large-scale smuggling, the role of foreigners tends to be proportional to the size of the cargo. Besides Spaniards, French, Dutch and British nationals were commonly involved in smuggling between 1 and 5 tonnes of resin. In the largest, multi-tonne schemes, the groups tended to be more complex and international, and some of the combinations are not reflected in Table 4. For instance, South Americans appeared to be progressively associated with Spaniards and Moroccans in smuggling operations of over 5 tonnes.

We were able to collect information on the nationality of members of 224 groups of importers dealing with one or more tonnes of cannabis resin. Most of these groups were composed of non-Spanish Europeans (40 %), followed by groups in which Spaniards cooperated with other Europeans (30 %). It is important to note that the data cover only people who were arrested in Spain and do not provide information on all the members of transnational drug-dealing organisations. Thus, it underestimates the level of international cooperation in cannabis trafficking to Europe.

Hashish trafficking and gender

In 280 cases the sex of traffickers was specified, and about 19 % were women. Women were especially active in the lower ranges of the hashish trade. Thus, in the groups dealing with 1 kg or less, a third were women working alone or in association with men. In the range of over 1 kg to 50 kg, 29 % of all arrestees were women, often dealing in same-sex teams. In the higher echelons of the trade, however — defined as those involving 500 kg or more — less than 5 % of arrestees were women, and they always worked in groups led by men. Mixed gender teams were present in all levels of the trade; 11 % of all groups were of mixed gender. We found two culturally defined feminine roles culturally sanctioned in the hashish trade — one was sanctioned by the derogatory labels of 'culeras' and 'vagineras', or mules who conceal the drug in their rectums ('culo', 'ass') and vaginas. The other involved middle-aged women with grown-up sons and daughters leading family networks in unstructured families and destitute neighbourhoods. Evidently, this is a male-dominated market and women often experience processes of exclusion and exploitation.

Types of organisations and networks

We have found a variety of organisations and networks involved in smuggling and distributing cannabis resin into Europe via Spain. They vary in structure, strategy and main tasks. Case examples of the schemes and groups included in the newspaper corpus serve to illustrate key aspects of smuggling networks, such as their size, tactics, roles, tasks and permanence in the trade. These are crucial elements in the organisation of illegal enterprise (Haller, 1990; Dorn et al., 1992).

The smallest unit of smuggling and distribution

The smallest unit of smuggling and distribution is formed by individuals or by small groups of two or three people who carried the drug in their bags, clothes or within their stomachs, rectums or vaginas. They do not need much investment or organisation, and can repeat their schemes several times every month, or not at all. They are 'freelancers', in the typology proposed by Natarajan and Belanger (1998).

In the early 1980s, trips to the Spanish enclaves of Ceuta and Melilla in northern Africa or to Tangier or Tetouan to import small amounts of hashish, often within one's own body, became a sort of rite of passage for many novices of the Spanish drug wave. In slang, the adventure was known as *'bajar al moro'*. A theatrical comedy and the subsequent film of this title were commercial successes. The film, somehow, reinforced the gendered hierarchies of the trade, as the protagonist had to lose her virginity to be able to make such a trip to a 'Moorish' country. What follows are several examples of this level of trafficking.

Case 1 A 60-year-old 'mule'

In May 1985, a 60-year-old woman went to the emergency room at the hospital in Ciudad Real, a city in central Spain. She could not defecate the 96 10-g 'eggs' of hashish she had swallowed in Morocco. She had to undergo several surgical procedures to extract what had become a large pulp of hashish. She was later indicted for drug trafficking (*El País*, 1 May 1985). This case reflects the not infrequent involvement of older women in the hashish trade. They may transport drugs in order to pay for their family's needs, sometimes with the help of male members of the family.

Case 2 Three Frenchmen who loved oil

Three young Frenchmen bought 80 g of hash oil in Tetouan. They sealed it in packages made with condoms, swallowed them, and crossed into Spain through Algeciras. In

Madrid, one of them felt very sick and his colleagues took him to the hospital. The police were called (*El País*, 10 April 1980).

Case 3 An individual multikilo importer

In September 1989, a 28-year-old Moroccan was arrested in Almeria's harbour when getting off the Melilla ferry. He was carrying two suitcases with 45 kg of cannabis resin. He was on his way to Cordoba. Police estimated that the drugs were worth 9 million pesetas, or about EUR 1.20 per gram wholesale (*El País*, 12 September 1989).

Case 4 Small-scale smuggling from Spain into France

In November 1992, four women were arrested in Madrid's Chamartín train station when they were boarding the Bordeaux train with 32 kg of hashish in their bags. It seems that they were related. Two of them were Spanish, a 54-year-old woman and her 26-year-old daughter, and the other two were French nationals, a 26- and 19-year-old. They were travelling with two babies. They had arrived two days before, exchanged a large amount of French currency in the station bank, took a taxi to Madrid Airport, and flew to Malaga. Upon their return, their bags were searched by suspicious police officers. They had made similar trips in June and September of the same year (*El País*, 26 November 1992).

This appears to be a case of small-scale smuggling from Spain to France. It is possible that these women were wholesalers or retailers in France. There was some continuity in their projects, and they may be an example of a family business, in the typology proposed by Natarajan and Belanger (1998).

Smugglers for multiregional distribution

The second type or level of drug trade organisation includes networks that smuggle hundreds of kilograms using boats, trucks, or even small aircraft. Often they work together with importers or regional distributors in other European countries, and maintain, at least for a period, some continuity in their operations.

Case 5 By air: importation and regional distribution

In February 2000, Spanish police forces were suspicious of wholesalers in four provinces that followed similar routines. They were able to trace a common contact in Seville, and learned of an incoming shipment arriving at a makeshift airfield in the Cadiz countryside. There they seized 639 kg of 'pollen' or high-quality resin, and five high-end

cars. A light aircraft made the three-hour round trips from a small airport in Seville to Morocco and back, with an intermediate landing in countryside locations. Seven people were arrested at the landing grounds. The financier and an aide were arrested on their return from Morocco. In the financier's home the police found 40 million pesetas in cash (about EUR 240 000). All arrestees seemed mature, knowledgeable and careful. Their average age was 38. Police found that they had been conducting regular flights to Morocco, often at night, for several months.

This appears to be a case of importers linked to regional distributors and wholesalers, with a clear hierarchy and division of tasks based on resources, contacts and expertise. They seemed to work exclusively in Spanish regional distribution covering a large area. They exhibited some permanence and repeated the same modus operandi over several months.

Large-scale importers for an international market

A higher level of operations is reached when tonnes of hashish are smuggled into Spain and sent to other European countries for wider distribution.

Case 6 Middle-tier distribution network: smuggling to the wider Europe

In March 1977, the British yacht *Cynosure* was seized in Palma de Mallorca's harbour. In the yacht's stores the Spanish police found over 2000 kg of hash in sealed packages. Two French sailors were arrested on the spot. The captain and owner, a prominent businessman from the Balearic hotel trade, fled but was arrested in Amsterdam some weeks later and extradited. The cargo had been transferred to the yacht from a fishing boat in Betoya's Bay in northern Morocco. The two French sailors had been hired in Ibiza to sail the yacht from Morocco to Southern France. Near Mallorca the engines failed, and in their search for help they provoked police suspicion. There was evidence of previous trips by the *Cynosure* from Moroccan ports to Southern France, with stops in the Costa del Sol, Costa Brava and Mallorca. Here we see a small organisation, linking Morocco and France, with a minimal hierarchy and distribution of work, and some recurrence in their operations.

The industrial level

The higher level of the cannabis resin export–import industry is composed of groups that deal with dozens of tonnes at a time in industrial scale operations.

Case 7 Large-scale smuggling: an electric train in a cave

The sophistication of the higher echelons of the cannabis resin import industry was revealed in July 1988 when police discovered one of the largest stashes of hashish on record in a cove near the Costa Brava resort of Lloret de Mar in north-east Spain. Smugglers had constructed a 50-metre tunnel through a mountain that connected the beach to a cabin in a field via a small train. In the tunnel, police found 15 tonnes of cannabis resin. Another 2 tonnes were found in a farm nearby. Air conditioners and humidifiers maintained the hashish's quality, and refrigerated trucks took the product to markets in France, Britain and West Germany. Six people were arrested, all in their 40s and 50s. A Corsican and a Spaniard were the leaders of the group. The Spaniard had already been prosecuted in 1981 when found with 2.5 tonnes of hashish. Police claimed that 'The Corsican', as the second leader was known, was considered the chief of a ring of international smugglers (*El País*, 26 July 1988). He was a French citizen who owned several restaurants on the Costa Brava. One of these restaurants had been attacked with a bomb three years before. His arrest was world news, and he was related to the Corsican Mafia (see *Time* article, 'Smugglers On Ice', 8 August 1988). In 1992, when the trial took place, it became evident that the group had been operating for some time, and probably was responsible for the smuggling of hundreds of tonnes of hashish (*El País*, 16 July 1992). 'The Corsican' was arrested again in June 1997 in relation to another haul of 6 tonnes of hash seized near Barcelona. Six people were arrested. He had, at the time, been out of jail for less than a year (*El País*, 24 June 1997).

This is an example of a section of an international network, armed and well organised, with credit and capacity to invest in infrastructure and the trafficking of tonnes of cannabis resin in every operation. These traffickers had been in the business for over 15 years, although it seems that much of this time they were inactive.

Case 8 A freight cargo with fish meal

Early in 1996, customs officers in Marín, a small harbour in the Galician coast of north-western Spain unloaded thousands of 10-kg hashish packages hidden beneath fish meal in the storerooms of the *Volga One*, a 49-metre cargo ship registered in Panama that had arrived that day. Three months before, the same ship, with a different name, had unloaded a legal cargo of 260 tonnes of tuna fish. This time, 36 tonnes of Moroccan hashish were hidden beneath a cargo of 90 tonnes of fish meal. The ship picked up its cargo in Asilah, a small harbour in the Atlantic coast south of Tangier. Most of the eight crew members were Russians. This was the largest seizure of hashish on record, and 11 people were charged. A highly indebted businessman from the Canary Islands, with experience in food imports, appeared to be the financier and the contact with Dutch and Moroccan distributors. A Galician entrepreneur linked to tobacco smuggling and cocaine importers seemed to have organised the shipment and local storage. A trade

union leader and a prison officer were also charged. The 'Canario' entrepreneur had USD 2.5 million in cash, mostly in Dutch currency, when apprehended.

Here, we see a coalition of entrepreneurs working together on a large project. Individuals from at least four countries were playing roles according to their expertise and capacity: financiers and buyers of the drug, organisers, wholesalers, ship crews, transporters and Dutch importers. The network they had developed, however, seemed transitory, project-oriented, and non-hierarchical.

In this simplified overview, we have shown the emergent lines of a pyramid that includes various actors performing different tasks in association or competition. Our sample reveals only failed schemes, and of those, only the portion operating in Spain. Obviously, the limitations of our sample are considerable. Further work is necessary to document networks operating in other countries at both ends of the commodity and the financial chains followed by hashish and the money that pays for it. Thus, much work remains to be done in Morocco, Gibraltar, Costa del Sol and in the receiving European countries.

Violence in the hashish market

Violence in the hashish market seems to be much less frequent and serious than in the cocaine and heroin markets, although perhaps in both cases its effects tend to be exaggerated. As Reuter observed, 'there are many limitations on the use of violence as a tool for competition, that only in very narrowly defined circumstances can violence be used to suppress competition' (Reuter, 1984). We found violent acts in three realms of the hashish trade: in connection with large networks in which some associates abandon their duties; in retailing, where some dealers (in Spanish: 'camellos') and clients fight over prices, money, thefts, etc., and when traffickers react violently against enforcement officers. Here we present some examples.

In June 1990, a suspected hashish dealer was arrested in Madrid when he knifed a client in a central square notorious for the drug scene (*El País*, 27 June 1993). In the Costa del Sol there have been some cases of murders related to hashish trafficking, apparently related to unpaid debts (see *El País*, 20 January 1993). In 1996, a 'mule' who did not deliver the drug he was given in Morocco to bring to Spain inside his body was kidnapped (*El País*, 6 June 1996). There was also the case of an international criminal network that poisoned two importers who had apparently sold adulterated hashish. Following this incident, one of the dealers attacked became a police informant (*El País*, 10 May 1994). In another case, a group was using 15-year-olds to smuggle hashish within their bodies from Ceuta, and used intimidation and violence to coerce the minors (*El País*, 11 October 1995).

In our sample, episodes involving violent acts are few and far between, and the atmosphere in the hashish trade does not seem as threatening or violent as that of the cocaine industry. Violence and intimidation may be a means to solve disputes in the hashish market, and to enforce contracts and obligations. But, at least on the European side in Spain, there is little sign that it is used to maintaining monopoly or oligopoly conditions, which would prevent people from entering this trade.

Concluding comments

The market for hashish in Europe has grown substantially in the last three decades and has stimulated the spread of an illicit plantation and manufacturing economy on the other side of the Mediterranean. Today, 22.5 million Europeans are reported to have consumed cannabis in the last year (see Vicente, this monograph). Two major products dominate the European market: a relatively standardised cannabis resin, and domestically or Dutch-grown herbal cannabis. Most of Europe's cannabis resin originates in Morocco and is imported through Spain, and then often taken to the Netherlands to be distributed in northern countries (UNODC, 2007).

Cannabis-related policies are contentious issues in international relations. European countries have often been accused of leniency regarding cannabis use and possession, as occurred in the meeting of the United Nations Commission on Narcotic Drugs (UNCND) held in May 2002. The growing links and transfers of people, commodities and ideas from both sides of the Mediterranean have facilitated the explosion in the production of hashish. The multiple transactions and displacements to and from Morocco facilitate the smuggling of hashish.

The rapid growth of cannabis resin production in Morocco is a dramatic phenomenon. Cannabis resin is the most successful Moroccan export of the last quarter of a century. For northern Morocco it has been a mixed blessing. In the short term, it may be helping to alleviate some social and political tensions, providing a source of foreign currency in a region in which underprivileged, forgotten and resentful citizens are pitted against their government. However, it is also increasing corruption, raising local prices, and cutting incentives for local production of legal crops and other goods. Long term, the drug trade could produce nastier effects if it leads to an increase in the local consumption of hashish and other drugs, or if the European demand for cannabis diminishes and the Rif turns to other crops, for instance opium poppies. Growing links between hashish and cocaine traders may prove ominous.

The structure of drug export–import organisations

From our limited review of importers and distributors arrested in Spain, we will venture some observations concerning the types of organisations and networks involved in the trade.

First, the hashish trade, like most illegal markets, is a service industry and 'the bulk of total cost of getting the final good to the consumer is not production but compensation to those involved in the distribution of the drug from production point to the final consumer' (Reuter, 1984). Technologically, the hashish industry is very simple. There is little transnational cooperation in the manufacturing of the product, and chemical precursors are not needed. The hashish industry is mostly a storage and transport industry. Some initial investment is necessary for seeds and fertilisers, and to buy raw material from farmers. As in other drug industries, 'capital in this business consists almost entirely of an inventory which is turned over very rapidly and the "goodwill" built up by knowing good suppliers and customers' (Reuter and Haaga, 1989). Thus, the cost curve of cannabis resin distribution is likely to be determined by human factors (Reuter, 1984).

Second, although our data are partial and preliminary, they echo the findings of authors who have been analysing drug dealing networks or organisations from a relational or industrial organisation perspective. For instance, Reuter and Haaga explored careers and organisations in the upper levels of the cocaine and herbal cannabis markets, and found that successful operations did not require 'a large or enduring organisation'. More or less formal organisations may exist, but are not indispensable for 'operational or financial success'. Relationships between partners 'were more like networks than like hierarchical organisations' (Reuter and Haaga, 1989). Therefore, the relational aspects of the drug industry may play a crucial role in its structure, although few studies have focused on this topic. Morselli (2001) has recently reviewed the operational methods of a long-term distributor of hashish, and found that he never worked within an organisation but was able to operate via his own strong and weak links within a very wide social network.

As we have shown, the major groups working in smuggling hashish present a hierarchical division of roles and tasks, but this structure seems to be transitory and informal. As Reuter and Haaga noted, asymmetries of information 'would preclude formal organisation' (Reuter and Haaga, 1989). Participants often work as independent specialists or salesmen, hired for one project, more like freelancers or specialists. Thus, Morselli concludes that 'informal cooperation rather than formal organisation' is a more suitable notion to describe the links of those participating in drug importing (Morselli, 2001).

In sum, hashish smuggling and distributing firms tend to be informal, changing and decentralised, more cooperative than corporative. As Zaitch (2002) has found concerning cocaine import groups in the Netherlands, hashish trading organisations are more flexible than the notion of a 'cartel' suggests. Some are individual enterprises. Others adopt the form of temporary partnerships between two or three persons who collaborate in a single project. Individuals who function as brokers play a central role in bringing about these coalitions for specific transactions or projects (Zaitch, 2002; Morselli, 2001; Korf and Verbraeck, 1993). Larger operating groups rarely involve more than nine persons, and the division of labour is not rigid or compartmentalised along vertical lines, and despite the importance of kinship ties and the frequent use of relatives, few of these enterprises are 'family businesses' (Zaitch, 2002).

Our results indicate that the organisations in this trade seemed more cooperative than hierarchical, and were based on network modes of resource allocation where transactions occur neither through discrete exchanges nor by administrative fiat, but through networks of individuals engaged in reciprocal, preferential, mutually supportive actions (Morselli, 2001). It is probable that the structure of drug organisations is somehow different in Europe and Morocco, for a number of reasons. One area of difference stems from the varying roles of the state institutions and officials on both sides of the Strait. Furthermore, the need to grow, harvest, collect, manufacture and store the product on a yearly basis may promote more stable transactions and, perhaps, networks and organisations in Morocco. However, we know very little direct information about groups based primarily in Morocco.

Competition and disorganised crime

The hashish trade seems relatively open and competitive, although competition seems greater at the lower echelons of the market. There is no evidence of smuggling cartels or oligopolies operating in the Spanish side of the trade, and even the existence of large, stable organisations is doubtful. This is more difficult to ascertain for the Moroccan side.

We know that some entrepreneurs have been able to remain involved in the cannabis trade for decades, but for long periods of their careers they were inactive for their own reasons, or because they suffered arrests, trials and incarceration. In any case, most entrepreneurs seem to work 'without having the organizing force and support of a reputed and resource-yielding criminal organisation' (Morselli, 2001). Instead, they may rely on legal enterprise for a more permanent business structure and stable contractual relationships for some of their associates.

In some cases, one small group, even a single individual, runs the whole pyramid, buying from Moroccan farmers, smuggling it into a European country and retailing the drug to consumers. But larger operations reveal considerable complexity and

coordination of people in Morocco, Spain and other European countries buying, storing and transporting the product through several frontiers and selling it to wholesalers and smaller distributors.

There are competing views of how drug markets are organised. Most studies assume that organised crime plays a major role in structuring these markets through organisations that are hierarchical, relatively permanent and bureaucratic. Some authors posit the existence of 'corporations' in the drug trade. In parallel, there are explanations in which 'violence is typically regarded as the principal regulator of competition' (Morselli, 2001). This model does not seem to apply to our data. It appears that hashish dealers face few barriers to entry in the low and middle levels of the market, and also in the higher levels if they have the right contacts and funds. A successful operation does not require the creation of a large or enduring organisation, and it is possible to function as a high-level dealer without recourse to violence (Reuter and Haaga, 1989). Moreover, violence and intimidation do not have as much of a presence in the European hashish trade as in the cocaine business. There are cases concerning kidnappings and killings in our sample, but they are rare and usually connected with rip-offs, fights at the retail level or reactions against enforcement officers.

Regarding the origin of the agents of this market, Moroccan hashish importers both compete and cooperate with native Spanish and other European importers, and to a lesser extent with traffickers of other nationalities, which is similar to what Zaitch (2002) has recently found concerning Colombian importers in the Netherlands. All traffickers experience conditions that both promote and limit their opportunities. While some Moroccans may have privileged access to hashish supply, local entrepreneurs tend to have better access to human resources and infrastructure in their countries.

Prices, standardisation of products and economies of scale

Price data are a potentially important research tool for understanding the workings of drug markets and the effects of law enforcement (Caulkins and Reuter, 1998), but its collection has not been a priority in Europe. Thus, we lack historical data on such a crucial variable, which makes it difficult to understand the evolution of drug markets. With regard to cannabis resin and other cannabis products, European evidence shows a clear decrease in real prices, at least from 1989 to 2004, a period in which there has been a clear increase in demand of cannabis products. This appears to have also happened in other European countries, such as the UK. It seems that international groups which operate in a European common market for cannabis have developed economies of scale, with declining costs per unit of output, and this has resulted in a decrease of prices, the standardisation of supply, and a reduction in the diversity of the final product both in quality, origin and type of derivative.

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Chapter 16
An analysis of the significance of supply and market factors for variations in European cannabis use

Keywords: cannabis – seizures – supply – market modelling – trafficking

Setting the context

The chapter by Carpentier et al. (this monograph) discussed the broad concept of 'availability' as applied to the cannabis market in Europe. The chapters by Ballotta et al., Korf and Asmussen also suggest that governments across Europe are placing emphasis upon the stronger enforcement of the supply of cannabis. Despite this, our understanding of the cannabis market remains limited, as does our understanding of how variations in supply-side factors may influence demand. This short chapter provides a postscript to the previous chapter by Gamella and Jiménez Rodrigo on Moroccan cannabis resin, by describing an innovative approach to modelling the cannabis resin market. It analyses some recent initiatives that may increase our knowledge of supply-side factors, and discusses some differences between the markets for cannabis and those for other illicit drugs, in particular heroin and cocaine.

While correlations can be identified, there remains considerable work to be done in the area of mapping availability. It may prove useful to identify whether there are any regional correlations between prevalence and resin seizures, and to determine any cross-border patterns that are linked to supply lines.

Further reading

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An analysis of the significance of supply and market factors for variations in European cannabis use

Leif Lenke

Introduction

Various studies have noted that national cannabis policies, be they liberal or repressive, do not show a constant impact on demand (Reuband, 1998; Korf, 2002). It is therefore important to explore other factors that may contribute to the different patterns of cannabis use we find in Europe today. This chapter takes as its basis a co-authored study of heroin supply factors and market conditions, on which the author worked for the Council of Europe (Lenke and Olsson, 1998).

Developing a supply model for illicit psychoactive substances

The analysis for the Council of Europe study was based on a number of assumptions. These include:

- the geographical distribution of seizures is not random;
- some correlation exists between heroin consumption and distribution;
- the accumulation of large amounts of heroin at distribution points is generally avoided;
- the seizure of large consignments of narcotics is given priority, irrespective of the type of drug policy pursued; and
- a positive correlation would be expected over the longer term between quantities seized and quantities distributed.

The study suggested that it was possible to show a strong positive correlation for western Europe whereby increases in the amount of heroin seizures in a given country tended to be followed by an immediate increase in consumption, as measured by some indirect indicators, including fatal overdoses. Moreover, this model allowed conclusions to be drawn about the impact on these indicators of changes in the supply situation.

The development of a seizures-based model for analysing cannabis markets may not be as straightforward as that for heroin. The cannabis market is much broader than that

for heroin, and the profile of consumers more mixed. Further to this, important changes may be occurring in the nature of the European cannabis market. The long-term domination in many countries of Moroccan-produced resin trafficked through Spain is now called into question by data suggesting increases in home-grown or domestically cultivated herbal cannabis. This trend is likely to have shortened the distance between product source and consumer, and the extent to which cannabis is trafficked across borders. Nonetheless, cannabis resin still accounts for the bulk of the cannabis that is seized in Europe (Pietschmann and Legget, this monograph) and the analysis presented here focuses solely on resin and is therefore partial by definition.

In the Council of Europe heroin case study it was possible to show that the supply of heroin was a central factor for understanding consumption patterns. For example, proximity of different countries to the Balkan route was important: countries along the route had particularly serious heroin problems, while those at a greater distance, for example the Scandinavian countries, had been to some extent shielded. As cannabis resin consumed in Europe is largely produced in North Africa and imported via the Iberian peninsula, it is possible to explore the extent to which geographical proximity to resin trafficking routes is reflected in cannabis consumption indicators.

If the quantity of cannabis seized in proportion to the population size is analysed, it is possible to identify differences between countries, with those countries in Europe that have close contacts with Morocco tending to report larger seizures. For this purpose, 'close contact' refers not only to geographical proximity, but also social proximity resulting from colonialism and migration. This has been referred to in the American literature as 'pipelines', with reference to the Colombian involvement in the American cocaine market (Reuter and Kleiman, 1986). For the purposes of this exploratory analysis, each country has been allocated an 'exposure score', which was found to have a strong positive correlation (approaching $r = 0.90$) with the population-adjusted seizure total. Spain was excluded from the analysis as it was an extreme outlier due to its atypically high values for both seizures and cannabis consumption.

Important differences exist between the organisation of the cannabis market and that of other drugs. Among these is the involvement of a large number of actors, lack of clear hierarchy, and relative ease in which new operations can be established (see Gamella and Jiménez Rodrigo, this monograph). Profits can be substantial and relatively low investment is required to establish new operations. This low degree of organisation and the absence of a monopoly may manifest itself in relatively low and stable prices found for cannabis resin (see Carpentier et al., this monograph). However, again a geographical effect is apparent: prices reported in Norway and Iceland are over four times higher than those found in Spain and Portugal, for example.

Another important difference in the structural organisation of the cannabis market, as opposed to some other drug types, is that its operations tend to be European based, often involving nationals from or with good contacts in the target market. This means that trafficking networks have 'natural' contacts with the local distribution networks. This has often been a problem for the distributors on the heroin market where 'outsiders' can face difficulties in selling consignments of drugs directly on the local markets, and success is dependent on having reliable contacts with networks in both the production or trans-shipment country and the country of consumption.

How does drug supply impact on the consumption of cannabis?

In order to explore the question of how drug supply impacts on consumption an indicator of the extent of current or recent cannabis use is required. Methods to access the size and nature of the cannabis market are described elsewhere in this monograph (Vicente et al.). For the purposes of the exploratory analysis presented here, a good proxy measure, even if it is somewhat partial, is provided by the ESPAD data set (see Hibell et al., this monograph). The advantage of ESPAD is that it is conducted in a systematic fashion and guarantees anonymity to the participants and thus the level of comparability can be regarded as relatively high. The disadvantage is that the data is only available for 15–16 year-old students and patterns of use in the broader population may differ. However, as changes in deviant behaviour tend to manifest themselves earlier among the youngest age groups (Carlsson, 1972) this group may provide a useful window on changes in overall consumption patterns.

The result is that a clear — although not particularly strong — positive statistical correlation exists between last-month prevalence from the ESPAD studies and seizures. For 16 west European countries, the strength of the correlation lies at $r = 0.56$ ($F = 6.02$). Given the uncertainties involved in the measure of supply in particular (i.e. quantities seized), this can be interpreted as providing support for the hypothesis on the significance of supply for cannabis consumption.

The correlation between the supply of cannabis and 'recent use' is relatively strong among students; in countries with high prevalence, the quantities of cannabis seized are also high. Spain has again been excluded from the analysis as an extreme outlier. It is not as easy to comment on the correlation between quantities seized and recent use over time. This is due in large part to the absence of robust and comparable time series in which contrasts can be made. However, a general impression that emerges from the data that are available does suggest a relationship between seizures and consumption. It can be noted that the most substantial increases in cannabis use appear to have

occurred during the first half of the 1990s (UNODC, 2004). This was also the period that saw the greatest increases in the production of cannabis in Morocco and also the greatest increases in the quantities seized in Spain (Gamella and Jiménez Rodrigo, this monograph).

Concluding remarks

To summarise, the correlations reported here support the conclusion that a relationship exists between indicators of cannabis supply and the extent of cannabis use in western Europe. This factor has relevance for the discussion on the significance of drug policy choices in influencing the extent and trends in cannabis use over time. As such, the analysis offered here, although preliminary, supports the conclusions made by Reuband (1998) and Korf (2002) that the 'level of repression' found in different national cannabis policies does not appear to be a consistent central factor for explaining the variations found in the epidemiological data on cannabis consumption patterns.

That said, in the context of a discussion on the factors that do determine national variations in levels of cannabis use, it is not helpful to simply shift the point of focus from drug policy to drug supply. Clearly other factors are also likely to be important. The structure of the correlations provides little if any support for the contention that cannabis use is determined by demand at the macro level, however.

One factor that is often presented as an explanation of variations in cannabis use is that the drug is associated with specific cultural patterns, and in particular with specific patterns of youth subculture. These subcultural patterns arguably then determine the patterns of demand and consumption. Testing a hypothesis of this kind is difficult, although some types of drug consumption, at some periods of time, do appear to be closely linked with particular subcultural groups, for example ecstasy (MDMA) was associated with the emergence of rave culture in Europe. Linking today's widespread patterns of cannabis use to any specific subcultural group would appear, however, more problematic. A more reasonable interpretation of the relationships is that the supply of, and access to, drugs contributes to and intensifies the establishment of consumption behaviours. Such a relationship is exemplified by, for example, the drinking cultures described in the field of alcohol research, which are also, at least in part, determined by supply-side factors.

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Appendix: Grey literature list

Year of publication and publisher	Title, author	Pages	General monograph	Targeted monograph (Subject)?	Journal special issue	Countries and language
1994 Australian Government	Australian National Drug Strategy, Monograph No. 25 on The health and psychological consequences of cannabis use (Hall, Solowik, Lemon, 1994).	198 (109 000 words)	✓	Public health		Australia (EN)
1997 Lindesmith Center	Marijuana myths, marijuana facts — a review of the scientific evidence (Zimmer and Morgan, 1997)	241	✓			USA (EN)
1997 World Health Organisation	Cannabis: A Health Perspective and Research Agenda (WHO, 1997)	50	✓			Global — WHO (EN)
1997 UNODC Bulletin on Narcotics	Bulletin on Narcotics 1997, Issue 1		✓		✓ Bulletin on Narcotics, 1997 Issue 1	Global (EN)
1998 House of Lords Science and Technology Committee	Cannabis, HL Paper 151 (UK Government Stationery Office, 1998)	306	✓			United Kingdom (EN)
1999 Toronto: Addiction Research Foundation	The Health Effects of Cannabis (Kalant, Corrigall, Hall, Smart (eds.), 1999)	526		✓ Public health		Canada (EN)
1999 Swiss Federal Commission for Drug Issues (EKDF)	Cannabis Report (Swiss Federal Commission for Drug Issues (EKDF), 1999)	91	✓			Switzerland (EN)
1999 Institute of Medicine	Marijuana and Medicine: Assessing the Science Base (Joy et al. (eds.), 1999)	288	✓			USA (EN)

Year & Author	Title	Number	✓	Topic	Journal	Country (Language)
1999 Comunidad de Madrid (Spain)	*Cannabis: ¡hasta dónde! (Cabrera Forneiro, J. and Ramos Atance, J. (eds)., 1999), Comunidad de Madrid/Harcourt*	230	✓			Spain (ES)
2000 BISDRO Institute for Drug Research, University of Bremen	*Drug Dependence: Risk and Monitoring (DDRAM) Final Report: Comparative Study Between Newcastle, Groningen, Bremen, Rome and Dublin*	21		✓ Adolescent cannabis use		Germany (EN)
2000 UK Department of Transport	*Cannabis and driving: a review of the literature and commentary (UK Department of Transport, 2000)*	94		✓ Road safety		United Kingdom (EN)
2000 Plan Nacional Sobre Drogas (Spain)	*Monografía Cannabis (Bobes García and Calafat Far, 2000)*	330	✓		✓ *Addicciones*	Spain (ES)
2001 Australian Government	*The Health and Psychological Effects of Cannabis – 2nd edition, National Drug Strategy, Monograph No. 44 (Hall, Degenhardt, Lynskey, 2001)*	182	✓	✓ Public health		Australia (EN)
2001 National Commission on Ganja (Jamaica)	*A report of the national commission on ganja to Rt. Hon. P. J. Patterson, QC, MP, Prime Minister of Jamaica (Chevannes et al., National Commission on Ganja, 2001)*	25 000 words	✓			Jamaica (EN)
2001 Inserm (France)	*Cannabis: Quels effets sur le comportement et la santé ?, Synthèse et recommandations (Inserm, 2001)*	58		✓ Public health		France (FR)
2001 British Journal of Psychiatry	*British Journal of Psychiatry 178 (2), February 2001*	28		✓ Health; pharmacology; mental health; legislation	✓ *British Journal of Psychiatry*	United Kingdom (EN)

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Year of publication and publisher	Title, author	Pages	General monograph	Targeted monograph (Subject)?	Journal special issue	Countries and language
2002 Joseph Rowntree Foundation	Times they are a-changing: the policing of cannabis (May, Warburton, Turnbull, Hough, 2002)	74		✓ Policing (UK)		United Kingdom (EN)
2002 NIDA (USA)	Nida Notes: Articles on Marijuana Research (NIDA (ed.), 2002)	64	✓			USA (EN)
2002 Canadian Senate Special Committee On Illegal Drugs	Cannabis: our position for a Canadian public policy (Nolin et al., 2002)	843 (5 sections)	✓	✓ Legislation (Canada)		Canada (EN, FR)
2002 Canadian Senate Special Committee On Illegal Drugs	Physiological and psychological effects of cannabis: review of the research findings (Wheelock, 2002)	52		✓ Public health		✓ Canada (EN)
2002 Belgian Ministry of Public Health	The Cannabis 2002 report. Joint international effort at the initiative of the ministers of public health of Belgium, France, Germany, The Netherlands, Switzerland (Spruit et al., Belgian Ministry of Public Health, 2002)	142	✓	✓ Public health		Belgium, France, Germany, The Netherlands, Switzerland (EN)
2002 Association GT national – médecine générale et conduites addictives (France)	Quand le cannabis fait problème: la question des vulnérabilités (Association GT national, 2002)	140		✓ Public health	✓ Actes XV — Colloque Nationale: La Rochelle, Novembre 2002	France (FR)

Year / Organisation	Title	Number		Focus	Country
2002 Scottish Executive Effective Interventions Unit	*Drug treatment among young people: a systematic review of effectiveness and the legal framework* (Elliott et al., 2002)	135		✓ Treatment (adolescent focus)	United Kingdom (EN)
2002 Sociedad Española De Investigación Sobre Cannabinoides'	*Guía Básica sobre los Cannabinoides* (2002)	160		✓ Cannabinoids	Spain (ES)
2002 Advisory Council On The Misuse Of Drugs, UK Home Office	*The classification of cannabis under the Misuse of Drugs Act 1971*	22		✓ Legislation (UK focus)	United Kingdom (EN)
2003 Trimbos Institute	*Cannabis: Feiten en cijfers 2003* (Rigter, van Laar, Rigter, Kilmer, 2003)	61	✓		The Netherlands (NL)
2003 RAND Europe, on behalf of the Dutch Ministry of Health, Welfare and Sports	*Cannabis: Policy, Implementation and Outcomes* (van het Loo et al., 2003)	92		✓ Legislation (EU focus)	The Netherlands (EN)
2003 Rowntree Foundation	*A growing market, the domestic cultivation of cannabis* (Hough et al., 2003)	60		✓ Home-produced herbal cannabis	United Kingdom (EN)
2003 Swedish National Drug Policy Coordinator	*Is Cannabis a Harmless Drug?* (Swedish National Drug Policy Coordinator, 2003)	32		✓ Legislation; public health	Sweden (EN)
2003 Asociación Española de Estudio en Drogodependencias (AESED)	*Monográfico Cannabis — Revista Española de Drogodependencias Vol. 30, no. 1–2* (AESED, 2003)	>218	✓	✓ *Revista Española de Drogodependencias*	Spain (ES)

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Year of publication and publisher	Title, author	Pages	General monograph	Targeted monograph (Subject)?	Journal special issue	Countries and language
2003 Ministro del Interior (Spain)	*Folleto Cannabis (Ministro del Interior,* 2003)	36	✓	✓ Citizen advice		Spain (ES)
2003 Association Pistes	*SWAPS — Spéciale Cannabis 32/33* (Pialoux ed., 2003)		✓		✓ SWAPS	France (FR)
2003 ONDCP (USA)	*Marijuana: Myths and Facts* (ONDCP, 2003)	44	✓			USA (EN)
2003 Institute for Social Drug Research, University of Ghent (BE)	*Cannabis in Vlaanderen. Patronen van cannabisgebruik bij ervaren gebruikers* (Cannabis in Flanders: Patterns of cannabis consumption in experienced users.) (Decorte, Muys, Slock, 2003)		✓	✓ Long-term use of cannabis		Belgium (Flanders) (NL)
2003 New Zealand House of Representatives, Health Committee	*Inquiry into the public health strategies related to cannabis use and the most appropriate legal status, Report of the Health Committee* (Chadwick (ed.), 2003)	80		✓ Public health		New Zealand (EN)
2004 Advisory Council On The Misuse Of Drugs, UK Home Office	*Further consideration of the classification of cannabis under the Misuse of Drugs Act 1971*	36		✓ Legislation (UK focus)		United Kingdom (EN)
2004 Toxibase and Crips	*L'usage problématique de cannabis* (Hautefeuille (ed.), 2004)	84		✓ Public health		France (FR)

Year / Author	Title	Number		Topic		Country
2004 BZgA, Germany	Schule und cannabis, Regeln, Maßnahmen, Frühintervention (BZgA, 2004)	36	✓	Cannabis in schools		Germany (DE)
2004 OFSP (Switzerland)	Ecole et cannabis. Règles, mesures et détection précoce (Office fédérale de la santé publique, 2004)	38	✓	Cannabis in schools		Switzerland (FR)
2004 JSP/Center for the Study of Law and Society, University of California, Berkeley	What Does It Mean to Decriminalize Marijuana? A Cross-National Empirical Examination (Pacula et al., 2004)	34	✓	Decriminalisation (focus on Australia, Germany, Portugal, The Netherlands, USA)	✓ Center for the Study of Law and Society Jurisprudence and Social Policy Program Faculty Working Papers	USA (EN)
2004 National Institute of Public Health (Sweden)	Adverse Health Consequences of Cannabis Use: (Ramström, 2004)	130	✓	Public health		Sweden (EN)
2004 Fraser Institute	Marijuana Growth in British Columbia (Easton, 2004)	40	✓	Cannabis policy; economics (British Columbia focus)		Canada (EN)
2004 EMCDDA	Insights: An overview of cannabis potency in Europe (EMCDDA, 2004)	72	✓	Cannabis potency		European Union (EN)
2004 Grupo de Estudios sobre el Cánnabis	Informe Sobre el Cánnabis 2004: Análisis de situación y propuestas de actuación	32	✓	Drug policy	✓	Spain (ES)

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Year of publication and publisher	Title, author	Pages	General monograph	Targeted monograph (Subject)?	Journal special issue	Countries and language
2004 EMCDDA	Regular and intensive use of cannabis and related problems: conceptual framework and data analysis in the EU member states (Simon, 2003)	45		✓ Public health (EU focus)		European Union (EN)
2004 Bundesministerium für Gesundheit und soziale Sicherung	Cannabisbezogene Störungen: Umfang, Behandlungsbedarf und Behandlungsangebot (Cannabis related disorders (CareD): Prevalence, Service needs and Treatment provision) (Simon and Sonntag, 2004)	172		✓ Cannabis treatment (Germany)		Germany (DE)
2004 Drogues, santé et société	Cannabis (Ben Amar (ed.), 2004)		✓		✓ Drogues, santé et société, Vol. 2, No. 2	Canada (FR)
2004 Österreichischen Gesellschaft für Psychiatrie und Psychotherapie (ÖGPP)	State of Art-Paper der zum Thema: 'Cannabis' (Haller and Dittrich, 2004)	34	✓	(some focus on mental health and somatic effects)		Austria (DE)
2004 EMCDDA	Cannabis problems in context: understanding the increase in European treatment demands, Annual Report 2004 Selected Issue (EMCDDA, 2004)	8		✓ Public health (EU focus)		European Union (Official EU languages)
2004 National Advisory Council on Drugs, Ireland	An Overview of Scientific and other Information on Cannabis (Morgan (ed.), 2004).	133	✓			Ireland (EN)

Year / Source	Title		Number		Description	Country
2004 Deutsche Hauptstelle für Suchtfragen e.V.	Cannabis: Basisinformationen (Merfert-Diete, 2004)	✓	48			Germany (DE)
2005 Criminologisch Instituut Bonger, Universiteit van Amsterdam	Cannabis zonder Coffeeshop niet-gedoogde cannabisverkoop in tien Nederlandse gemeenten (Korf et al., 2005)		145	✓	Policy, policing; coffee shops in Netherlands	The Netherlands (NL)
2005 Rodin Foundation	Le Cannabis: Document de Travail	✓	221		Includes chapters on Belgium, USA, Canada, Australia, Spain, Morocco, The Netherlands, France, Germany, Sweden, Switzerland, United Kingdom,	Belgium (FR)
2006 PNSD (Spain)	Informe sobre cannabis (Comisión clínica de la delegación del gobierno para el Plan Nacional Sobre Drogas, 2006)	✓	78		Italy	Spain (ES)
2006 OFDT (France)	'Consultations cannabis' — Enquête sur les personnes accueillies en 2005 (Obradovic, 2006)	✓	109	✓ Tendances No. 50	France, epidemiology	France (FR)
2006 Ordre National des Pharmaciens	Synthèses: Le Cannabis (Karila and Reynaud, 2006) www.ordre.pharmacien.fr/upload/Syntheses/197.pdf	✓	6			France (FR)

Appendix: Grey literature list

Year of publication and publisher	Title, author	Pages	General monograph	Targeted monograph (Subject)?	Journal special issue	Countries and language
2006 UNODC	UNODC World Drugs Report 2006, Chapter 2: Why should we care about cannabis? (Leggett et al., 2006)	51		✓ Public health; trafficking		Global (EN)
2006 INPES	Repérage précoce de l'usage nocif de Cannabis (INPES, 2006)	4	✓			France (FR)
2006 Beckley Foundation Drug Policy Programme	Cannabis and mental health: responses to the emerging evidence (Hunt, Lenton and Witton, 2006)	16		✓ Mental health		United Kingdom (EN)
2006 Société Française d'Alcoologie	Alcoologie et Addictologie, Juin 2006	111		✓ History (France); adolescent use	✓ Alcoologie et Addictologie 2006; 28 (2): 93–204	France (FR)
2006 Mental Health Council of Australia	Where there's smoke … cannabis and mental health (Mental Health Council of Australia, 2006)	76		✓ Mental health		Australia (EN)
2006 Australian National Council on Drugs	Cannabis: answers to your questions (Copeland et al., 2006)	23	✓			Australia (EN)
2006 Australian National Council on Drugs	Evidence-based answers to cannabis questions: a review of the literature (Copeland, 2006)	89	✓			Australia (EN)
2006 Australian Ministerial Council on Drug Strategy	National Cannabis Strategy 2006–2009	40		✓ Government policy		Australia (EN)

2006 Comisión Clínica de la Delegación del Gobierno para el Plan Nacional Sobre Drogas	*Informe Sobre Cannabis* (Ministerio de Sanidad e de Consumo, 2006)	78	✓	✓ Public health (Spain)		Spain (ES)
2006 RAND Corporation	*The Evidence Base for the Classification of Drugs* (Levitt, Nason and Hallsworth, 2006)	86	✓	✓ Legislation		Europe (United Kingdom) (EN)
2007 EMCDDA	EMCDDA drugs profiles: Cannabis	6	✓			Europe (EN)
2007 Talk to Frank Campaign (UK)	*Cannabis Explained: Frank Action Update* (UK Home Office, 2007)	19	✓			United Kingdom (EN)
2007 Parliament of Australia, Social Policy Section	*Does cannabis use lead to mental-health problems?: findings from the research* (Buckmaster and Thomas, 2007)	7		✓ Mental health	✓ Research Note no. 21 2006–07	Australia (EN)
2007 OFDT (France)	*Cannabis, données essentielles*, Saint-Denis, (Costes, J.-M. (ed.) OFDT, 2007)	232	✓			France (FR)
2007 Instituut voor Sociaal Drugsonderzoek	*Cannabiskwekers in vlaanderen. Patronen en motieven van 748 telers* (Decorte, T. and Tuteleers, P., 2007)	268		✓ Homegrow		Belgium (NL)
2007 Joseph Rowntree Foundation	*The impact of heavy cannabis use on young people* (Melrose, M. (ed.), Joseph Rowntree Foundation 2007)	92		✓ Mental health		United Kingdom (EN)

Appendix: Grey literature list

Year of publication and publisher	Title, author	Pages	General monograph	Targeted monograph (Subject)?	Journal special issue	Countries and language
2007 Sociedad Española de investigación en cannabinoid (SEIC)	*Aspectos psiquiátricos del consumo del cannabis* (Ramos Atance, J. (ed.))	189		✓ Mental health		Spain (ES)
2007 Home Office (UK)	*The illicit drug market in the United Kingdom, Home Office Online Report 20/07* (Matrix research group, 2007)	101		✓ Trafficking; economic analysis		United Kingdom (EN)
2007 OFDT (France)	*Le trafic de cannabis en France* (Ben Lakhdar, C., OFDT, 2007)	25		✓ Trafficking; economic analysis		France (FR)

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The index below covers both volumes of this monograph. Volume number is denoted by the principal number in the index entry, e.g. 'absorption' can be found on p. 33 of Volume 1.

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The EMCDDA collects, analyses and disseminates factual, objective, reliable and comparable information on drugs and drug addiction. In doing so, it provides its audiences with an evidence-based picture of the drug phenomenon at European level.

The Centre's publications are a prime source of information for a wide range of audiences including policy-makers and their advisers; professionals and researchers working in the drugs field; and, more broadly, the media and general public.

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A cannabis reader: global issues and
local experiences

8

VOLUME II

European Monitoring Centre
for Drugs and Drug Addiction

EMCDDA
MONOGRAPHS

A cannabis reader: global issues and local experiences

Perspectives on cannabis controversies, treatment and
regulation in Europe

8 VOLUME II

Editors
Sharon Rödner Sznitman, Börje Olsson, Robin Room

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Acknowledgements

Contents

Introduction

Smoked, eaten, imbibed — or just talked about — it seems the world has a strong appetite for cannabis. An estimated one in five European adults have tried it. Thirteen million Europeans have consumed it in the past month. Nearly 50 000 tonnes of cannabis herb or resin is produced for consumption each year. Little wonder, then, that cannabis has become a controversial cultural and commercial phenomenon. Today, cannabis has a unique ability to divide opinion among policymakers, scientists, law enforcers, drugs professionals and consumers.

This EMCDDA cannabis monograph addresses one basic question. *How can I find quality information on cannabis, amid all the bias and opinion?* During the editing of this monograph it soon became clear that the EMCDDA was entering an area crowded with general guides, even competing cannabis monographs. This is where the idea of a cannabis 'reader' emerged. Our audience — researchers, parliamentarians, drugs professionals, students, European citizens — is currently faced with an overload of professional publications. Added to this is the daily flood of information on the Internet, often crusading in nature, and sometimes misleading. This threatens to obscure the genuine progress made in cannabis research during the past two decades.

The EMCDDA cannabis reader underlines the point that cannabis is not just a static, unchanging plant, but a dynamic product that is subject to gradual evolution in potency, prevalence, cultivation, legislative and public health concerns. In this monograph, leading experts provide short, sharp insights on a range of cannabis topics while offering advice on further reading for each topic. Brief editorial notes provide concise introductions to each topic, occasionally drawing attention to political sensitivities and the need for a 'critical eye'. So this cannabis reader has a value both as a shortcut to researchers entering the area and a synthesis for experts.

You will find a wide range of views expressed in the chapters in this monograph, not all of them in agreement. The arguments, tone and conclusion of each chapter is the responsibility of the author alone, and is not necessarily endorsed or supported by the EMCDDA. This reflects the wider discourse on cannabis where different positions and perspectives often lead to different conclusions being drawn from the same evidence. We believe each chapter represents a useful contribution to the overall debate, even if their individual perspectives differ.

Two volumes, multiple audiences: policymakers, enforcers, researchers, professionals

The monograph is divided into two volumes, each comprising three sections. There are a number of reasons for the two-volume approach. While complementary, each has a slightly different audience. The first volume centres on political, legislative, commercial and social developments relating to cannabis. Its core audience thus comprises policymakers, sociologists, historians, journalists and those involved in enforcement. The second volume is very much centred on drugs professionals working in the fields of treatment, prevention and healthcare.

Volume 1

- Cannabis in the past
- Policies, legislation and control strategies
- Supply and production issues

Volume 2

- Epidemiology
- Health effects of cannabis use
- Prevention and treatment

Changing perspectives: from global issues to local experiences

What unites both volumes is an attempt to fuse general chapters with specific case studies. Within each section, you will encounter a progression from a 'top level' to a 'close-up' view of the subject. So each section begins with chapters providing a general introduction to a single cannabis issue, often of an encyclopaedic nature, together with a summary of the current state of scientific research. The monograph then 'zooms in' with a case study about a specific aspect of cannabis.

In Volume 2 ...

In Volume 2 we can read general overviews of impact of cannabis use on health, from an individual perspective (the Witton chapter) and public health perspective (the Hall and Room chapters); descriptions of current European patterns of cannabis use, from a general population perspective (EMCDDA analysis) and in terms of adolescent use (results from the ESPAD surveys and from Dutch schools); and descriptions of treatment demand for cannabis use disorders in Europe. Case study articles look at the way cannabis users perceive their use in Finland, the specific effects of cannabis use on driving and the rise in cannabis treatment demand in Germany.

Foreword

The first volume of the EMCDDA's cannabis reader reviewed the history of the drug and its social impact, and also explored legislative issues. In this second volume, the focus moves to describing contemporary patterns of use, reviewing what is known about the potential health effects of the drug and highlighting how Europe is responding to cannabis use in terms of prevention and treatment.

The cannabis reader would not have been possible without the input of many European and international experts and the EMCDDA is indebted to all the scientists and researchers who have contributed original papers to this publication. We would also especially acknowledge the excellent work carried out by the Centre for Social Research on Alcohol and Drugs (SoRAD) in Sweden, which was the main contractor on this project. We also thank the reviewers from the EMCDDA's Scientific Committee, and John Witton and Wendy Swift, independent scientific editors.

Epidemiology, and the need to focus on 'at-risk' populations

The epidemiology of illicit drug use has seen marked improvements in the last two decades, with standard indicators having been set up and more reliable surveying methods introduced in many European countries. However, while surveys now allow us to chart the changing prevalence of cannabis use, they currently remain a weak vehicle for identifying those who may be using the drug intensively or experiencing problems. Measuring problematic cannabis use at the population level is methodologically challenging, but progress is being made.

This volume includes a chapter on screening instruments for identifying cannabis use problems, together with a Dutch schools study, which explores how cannabis use can be part of a broader pattern of polydrug consumption.

Cannabis consumption in the European population, particularly among adolescents and young adults, has been increasing since the 1960s. The most recent EMCDDA figures estimate that 13 million of the nearly 500 million Europeans in the EU Member States have consumed cannabis in the past month. Yet despite its being the most commonly consumed drug, cannabis use is far from 'standard behaviour'. The number of people who have not smoked cannabis in Europe in the last month is clearly far higher than the number of those who have, by a factor of around 40 to 1. Cannabis is a drug associated with the young. Yet even in high-prevalence countries, among those aged between 15 and 34 years, at most only one in five are estimated to have used cannabis

in the past month. And a more typical representative estimate across Europe is that only one in eight young people have smoked cannabis in the last month, whilst in the lower prevalence countries such as Greece, Bulgaria and Sweden, as few as 1 in 20 young people report last-month use of the drug.

Moreover, much cannabis use can be described as experimental behaviour which does not result in regular consumption patterns becoming established. Some surveys have sought to identify intensive use, defined as 'daily' or 'near-daily' use. Among the EU Member States for which data are available, the proportion of last-month cannabis users reporting daily or near-daily use ranges from 1 in 20 (Latvia) to 1 in 3 (Spain). Other reporting countries state that around one-quarter to one-fifth of last-month cannabis users report 'daily or near-daily use'. While data are insufficient to indicate an accurate estimate of intensive cannabis users across Europe, a rough figure would place the number of daily or near-daily cannabis users in Europe at around 3 million.

Most last-month cannabis users are young, with males generally more likely to have used cannabis in the last month. Data from the ESPAD series of school surveys provides us with an interesting window on consumption patterns among 15–16 year olds. Among this group, young males are generally more likely to have used cannabis on a frequent basis (defined as having used cannabis on 40 or more occasions). Reported frequent use by male students is twice, three times or even, in one country, four times higher than among female students.

Even among those who establish regular cannabis use patterns in their youth, many will stop using the drug as they grow older. Cannabis prevalence rates tend to peak among younger adults (aged 15–24 years), suggesting that the majority of cannabis users quit as they get older and assume more responsibilities. However, whilst most cannabis users will have stopped consuming the substance by their mid- to late 30s, there is some evidence to suggest that more people are now continuing to smoke the drug into middle age. If this is true, it could have important implications for assessing the likely longer-term public health impact of cannabis consumption.

More positively, recent studies suggest that in many high-prevalence countries, cannabis use is now showing signs of a stabilisation, or even a moderate decrease. Interestingly, this finding may be particularly evident in younger age cohorts. Nonetheless, cannabis use in Europe remains at a historically high level, and it remains unclear if we are seeing any stabilisation or fall in the numbers of those using the drug intensively and chronically — a group who are likely to be at particular risk of experiencing adverse consequences.

Cannabis and health

Historically, the cannabis health debate has often appeared poorly grounded in science with the possible adverse health effects of use being either trivialised or exaggerated. In this volume, a number of commentaries address cannabis and health issues. This is an area of emerging science where the evidence base is developing rapidly. A clear message emerges from this discourse: when discussing the health impact of cannabis use, it is vital to understand that different consumption patterns are likely to be associated with different risk profiles, and that risks may vary according to individual susceptibilities.

Cannabis has been associated with a number of adverse physical and psychological health effects, especially if used regularly. Recently, considerable concern has been expressed regarding cannabis's relationship with mental health problems, including a possible association with schizophrenia. Studies on the physical effects of cannabis use have also appeared regularly in the research literature. Amongst others, they have examined cannabis and respiratory problems, potential genetic vulnerabilities linked to cannabis-related problems, the effects of cannabinoids on the body's endocannabinoid system and cannabis's potential to impair driving skills.

A chapter in this volume by John Witton summarises the predominant recent studies of cannabis's adverse health effects. An appendix also offers a guide to help students to navigate the research base, with advice on how to approach the many claims made for and against cannabis use with a critical eye. Witton's chapter argues that, although cannabis use has been linked to psychological problems, and an association clearly exists between cannabis use and some forms of mental illness, determining with certainty a direct causal relationship still remains a more difficult question.

Although few people today regard cannabis as a harm-free substance, there is debate as to the relative public health impact of the substance, particularly in comparison with tobacco, alcohol and other illicit drugs. This volume of the monograph includes analysis by Wayne Hall and Robin Room of the global burden of cannabis use disorders in comparison with other drugs. While cannabis appears to have lower intrinsic risks than drugs such as heroin and other opiates — for example in terms of overdose risk, degree of intoxication and risk of dependence — cannabis use is far more widespread than the use of other illicit drugs, and so relatively low risks at the individual level can still result in a significant problem for public health at the population level.

Beyond the direct risk that cannabis use may pose to health, a number of broader public health issues exist. Among these are the secondary health risks posed by the drug, for

example the extent to which the drug is associated with road traffic accidents. Some work has been done in this area, particularly with respect to cannabis use and driving. This topic is reviewed here in a chapter that suggests that a minority of cannabis users drive under the influence of cannabis, with an adverse effect on road safety.

Although reports of drug treatment attendance by cannabis users have been growing, it is difficult to interpret what this means regarding the extent to which users experience difficulties. There are a number of reasons for this, including the fact that this data reflects both direct referrals from criminal justice and other agencies, as well as individuals spontaneously seeking help. Additionally, treatment services specifically targeted to cannabis users are still relatively rare in Europe. This may be beginning to change, but it is still worth noting that few evaluation studies of the efficacy of different cannabis treatment approaches have been carried out. More research is necessary to identify the best practices in this area. At the current time, no 'gold standard' exists for treating cannabis-related disorders, although structured psychosocial interventions appear to offer some promise in this area.

Prevention: a shift towards standard programmes and measuring effectiveness

In the field of prevention, considerable progress has been made in identifying factors which may influence cannabis use (age of initiation, peer influence, risk perception) and organisation of prevention intervention (universal, selective, indicated prevention). A number of countries have standardised prevention practice in schools by introducing manuals, although there is considerable variation in prevention programmes across Europe. Some evaluation of outcomes of specific prevention projects (e.g. EU-Dap) has showed that prevention, according to the predefined objectives, can contribute to a decrease in cannabis use. However, little is still known about the cost-effectiveness of interventions in this area. Moreover, the evidence base for some specific types of intervention, in particular mass media campaigns, remains weak.

The cannabis reader ... one more addition to a growing evidence base

Drawing the various strands of cannabis in Europe together, this monograph demonstrates that cannabis is a complex subject, in which we see considerable changes over time. The dynamic nature of this topic is evident not just in developments in the way the drug is used but also in attitudes, legislation and societal responses. Our understanding of this complex phenomenon is, however, growing and new material of all types is becoming ever more available.

There may be cause for muted optimism. Prevention practice is increasingly responding to the evidence base for what works. In terms of science, the workings of the endocannabinoid system are gradually being unravelled, with developments in the medicinal use of cannabis encouraging research scientists to identify the neurological and biological mechanisms that have a bearing on behaviour. In terms of mental health, there is increased understanding of the risk factors that accompany cannabis-associated psychological problems. Perhaps the most positive development is that, increasingly, drug policy in Europe reflects the evidence base drawn from the fields of epidemiology and drug treatment. This evidence base is growing ever stronger, with surveys, medical studies and statistical data all contributing to a sharper, more multidirectional focus on the subject.

The growing volume of new data in this area will naturally need regular review and synthesis. If anything is certain in this field, it is that this will not be the last monograph to published on cannabis in Europe, nor should it be considered as 'the final word' on this topic. However, it is clear that, in 2008, our understanding of cannabis use in Europe and its probable implications has improved substantially. Cannabis, a substance used in Europe for millennia, still remains worthy of our attention, concern and vigilance.

Paul Griffiths
Head of Epidemiology, crime and markets unit, EMCDDA

Overview of Volume 2

Part I: Epidemiology

Historically, the focus for much work in the area of drug epidemiology has been treatment demand data. However, in recent years we have increasingly seen the parallel development of survey data sets, relating both to the general population and selected population groups. This shift in focus has important implications for our understanding of patterns of cannabis use, particularly as in the past the drug has been less associated with problematic patterns of use, while most cannabis users will never come into contact with drug treatment services. In Europe, the EMCDDA has helped coordinate, standardise and collate national drug surveys since it was set up in 1993. Important supranational surveys such as the European School Survey Project on Alcohol and Other Drugs (ESPAD) also offer insight into drug use among adolescents. Monitoring cannabis use trends across countries and over time is now possible in Europe, although methodological differences still exist between countries which mean that data in this area require appropriate technical scrutiny.

The EMCDDA's key indicator on drug use in the general population is represented in this volume in Chapter 1, by Vicente, Olszewski and Matias. The chapter describes cannabis use in the adult population, and the state of play in data collection on cannabis use today. Picking up on one of the conclusions of the EMCDDA chapter — the need for increased knowledge of frequent and intensive patterns of use — the next chapter, by Beck and Legleye, from the French focal point OFDT, provides an overview

of instruments that have been developed to screen populations for intensive cannabis use. These screening instruments vary in length, nature and content, yet some consensus is forming about common ways to measure the incidence of cannabis use disorders, and to identify at-risk populations.

The section proceeds to look at cannabis use among adolescents. Björn Hibell of the ESPAD survey describes cannabis use trends in the school student population, focusing on ESPAD's methodology and its measures of a common age group (15–16 year olds) across Europe. Cannabis use among adolescents is also examined in the following chapter by Monshouwer, who uses data from Dutch school surveys. In particular, this chapter looks at the issue of polydrug use and how cannabis fits alongside alcohol, tobacco and other drug use.

While statistics can tell us much about drug use, there are stories behind numbers and percentages that can provide an additional perspective on this issue. This section ends with a chapter from Finland that uses a qualitative, interview-based approach. Kekoni describes how cannabis users view the substances in terms of their lives, lifestyles and political outlooks. While the chapter makes no claim to be representative of Finnish cannabis users as a whole, it does serve to underline the fact that cannabis use has a social dimension and that the meanings, rationales and experience of cannabis users in different Member States are likely to be important for informing our understating of why consumption patterns differ.

Part II: Health effects of cannabis use

Considerable research effort has been, and continues to be, devoted to the investigation of adverse health effects of cannabis use. Although the current state of research does not provide a clearcut understanding of the issues, some conclusions are beginning to emerge from the current evidence base. This section begins with a chapter by John Witton, summarising what we know about the health effects of cannabis today. He highlights that the issue of the extent of comorbidity of substance-specific and non-substance-specific disorders is crucial when discussing cannabis use, and especially frequent and harmful use.

The topic of health effects to the individual naturally has a bearing on the health of entire populations. The chapter by Room looks at the issue of the public health 'footprint' of cannabis. It provides some insight into the significance of cannabis-related health issues in comparison with tobacco, alcohol and other illicit drugs such as heroin. Room takes on the controversial task of comparing cannabis with other substances, legal as well as illegal. In so doing he provides the reader with a sense of perspective, from which the relative adverse health and social effects of cannabis may be better understood.

In the following chapter, Hall notes that one problem in the debate concerning health effects of cannabis use has been an 'inflationary–deflationary dialectic', in which a demand for unreasonably high standards of proof is often made by both sides of the debate. There are those who argue that there are few or no adverse health effects of cannabis use, and there are those who argue that effects are serious and grave. Hall discusses the problems that arise from conducting research on cannabis use and potential social and health outcomes, and proposes some guidelines for improved research in the future.

Beyond somatic and psychological effects of cannabis, there are other health consequences of cannabis use as it relates to behaviour. One of the areas of cannabis's effect on behaviour that has received strong attention is driving under the influence of cannabis (DUIC). Mann et al. discuss the specific issue of cannabis and driving. The authors have reviewed the scientific literature concerning the effects of cannabis on psychomotor skills, as well as the evidence of the combined effect of alcohol and cannabis on driving skills. They also address the issue of how society might be able to detect and protect itself from cannabis-impaired drivers. As drug-driving tests are being introduced in many European countries, the chapter looks at how countries have sought to quantify the impact of cannabis on road safety.

Part III: Prevention and treatment

Cannabis prevention and treatment are areas filled with complexity and contradictions. The issue of what constitutes effective treatment remains relatively open in comparison to many other types of drug, and considerable debate exists on whether prevention efforts are effective in this area. Nonetheless, in recent decades a large number of interventions have been developed in Western countries in order to prevent and treat the use of cannabis and other drugs, and the knowledge base in this area is steadily growing.

This section begins with an introduction to cannabis treatment. As the first chapter by Bergmark shows, there is considerable research regarding evidence-based cannabis treatment, yet this does not necessarily mean that the data provide adequate information as to which approach is the most appropriate and effective. For instance, studies do not allow us to determine guidelines for type, duration or intensity of treatment. We also do not know if it is the treatment as such which provides the effect, as it might be the decision to come to treatment in itself that determines the outcome. From this perspective, as Bergmark points out, it is clear that, despite an expanded pool of treatment effect research, the literature does not necessarily provide clearcut answers and guidelines on the issue of best practice in cannabis treatment.

Chapter 11, by Burkhart, provides an overview of prevention relating to cannabis in Europe, categorised according to the typology of universal, selective and indicated prevention. A number of EU Member States have begun to standardise universal school prevention programmes, yet have also placed emphasis on selective prevention linked to risk factor research. Nonetheless, the knowledge base on prevention is based strongly around research in the USA. The third chapter in this section, by Zili Sloboda, an American prevention expert and former Director of the Division of Epidemiology and Prevention Research of the National Institute on Drug Abuse (NIDA), provides an overview of school prevention programmes in the USA, together with some explanation of their rationale.

The section then looks at the issue of the treatment of cannabis use disorders. In recent years, there has been an apparent increase in demand for treatment related to cannabis use. Montanari et al. of the EMCDDA provide an analysis of cannabis treatment demand in Europe, based on data from the EMCDDA treatment demand indicator. The data used are gathered for the purpose of cross-national comparisons, and thereby provide a fruitful starting point for analysing the current situation in Europe. A chapter by Rödner Sznitman then provides an analysis of fresh data gathered in order to reach a better understanding of the current treatment system available to cannabis cases in Europe today. This overview provides relatively up-to-date information about the treatment facilities that see cannabis cases in Europe and what kind of treatment is offered, as well as information about client characteristics. A more in-depth analysis of treatment demand follows in the chapter by Simon and Kraus. This chapter focuses solely on Germany, and analyses what may lie behind the increase in treatment demand related to cannabis use in Germany.

The final chapter looks at risk factors relating to cannabis use. Coggans summarises the literature on the subject of risk factors for cannabis use, and discusses how these might be used to help us target populations at risk. Risk factors are, naturally, important aspects of both prevention and treatment. The chapter thus provides a useful resource for practitioners to understand the needs of their clients, and to target interventions accordingly.

Peter Thomas
EMCDDA

Sharon Rödner Sznitman
Sorad

Epidemiology

PART I
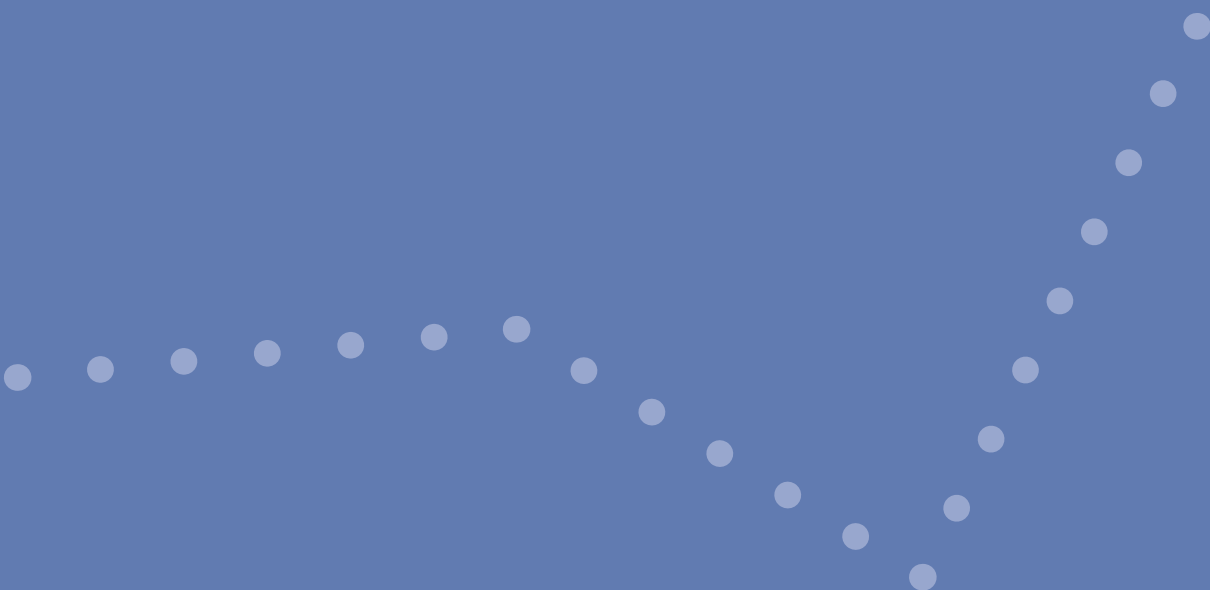
Chapter 1
Prevalence, patterns and trends of cannabis use among adults in Europe

Keywords: adolescent prevalence – adult prevalence – cannabis – epidemiology – EMCDDA – EU – longitudinal patterns – survey

Setting the context

A total of 71 million European adults (22 %) have tried cannabis: 23 million European adults (7 %) have used it in the last year while 13–14 million European adults (4 %) have used the drug in the last 30 days. A crude estimate suggests that 3 million European adults (around 1 %) are 'daily' or 'almost daily' cannabis users.

Such headline figures provide neat, newspaper-friendly estimates of the number of cannabis users in Europe. Yet it is important to differentiate between the numbers. There is a vast difference between those who admit having tried cannabis and those whose use appears to be intensive. Beyond this basic distinction there are myriad other variations: growth and decay in perceived risk of use; intensity and setting of use; generational or demographic acceptance and disapproval; country-by-country and region-by-region variation; and ethnicity and gender differences. In short, while cannabis use may be perceived as common in one subgroup, it might be considered outright deviance in another.

Reliable statistics are crucial for defining evidence-based drugs policy. For example, knowing that there is a large difference in lifetime use between 15- to 16-year-olds and 17- to 18-year-olds [1] demonstrates that much experimentation with the drug clusters in the late teens. Targeted prevention should, thus, take into account the fact that late-teen initiation is commonplace. Moreover, early indications that use is growing among forty-somethings should be monitored. Middle-age concerns, such as careers, parenthood, rent and mortgages, have traditionally counteracted regular drug use — is something changing today?

[1] http://stats06.emcdda.europa.eu/en/elements/eyefig01a-en.html

Information on cannabis use in Europe has improved substantially in recent years, and is subject to a standard reporting cycle. Each year, for over a decade, the EMCDDA has published analysis and information on the prevalence of cannabis and other illicit drugs in its *Annual report* [2] (currently covering 29 countries). Since 2004, the *Annual report* has also included a companion publication, the *Statistical bulletin* [3], that provides further information on the underlying data, information sources and methodology. On a less strict yet still frequent cycle — dependent upon implementation of the questionnaire — the ESPAD [4] school survey (37 countries) provides a key transnational source for cannabis use patterns among adolescents. Beyond Europe, the standard transnational source for epidemiological data on cannabis is the United Nations Office on Drugs and Crime (UNODC)'s annual *World drugs report*. In addition to this, at a domestic level, many countries publish prevalence surveys in the context of focused national surveys on drugs (e.g. Australia's *National drug strategy household survey* and the SAMHSA *National survey on drug use and health* in the USA).

In addition to these statistical publications, the EMCDDA's National reports [5] include discursive analysis of cannabis trends in different European countries. Grey literature (governmental, NGO, think tank) publications on cannabis typically appear several times per year (see the Appendix to Volume 1 of this monograph). Such publications play an important qualitative role, providing explanations for trends and nuanced information at regional level [6].

There remains work to be done. With the EU growing — the recent entry of Bulgaria and Romania having brought the total number of EU citizens close to 500 million — the scope for generalisation is getting smaller. One of the challenges of adding complexity to any sample is that the lists of exceptions grows. There are also possibilities for mining the rich seams of data in the grey literature and ad hoc surveys. As the reporting cycle matures to cover not simply years but decades of data, longitudinal analysis will become possible. For example, it is perhaps premature to speak about generational shifts in cannabis use in 2007.

[2] http://annualreport.emcdda.europa.eu
[3] http://stats07.emcdda.europa.eu
[4] www.espad.org/
[5] www.emcdda.europa.eu/index.cfm?nNodeID=435
[6] See also EMCDDA (2000), *Understanding and responding to drug use: the role of qualitative research, EMCDDA Monograph Series 4*, European Monitoring Centre for Drugs and Drug Addiction, Lisbon.

Cannabis epidemiology: key websites

Bibliography of European nationwide drug surveys: Table GPS-0
   www.emcdda.europa.eu/stats07/gpstab00/

EMCDDA *Annual report*
   http://annualreport.emcdda.europa.eu

EMCDDA *Handbook for surveys about drug use among the general population*
   http://www.emcdda.europa.eu/?nnodeid=1380

UNODC *World drug report*
   www.unodc.org/unodc/world_drug_report.html

Prevalence, patterns and trends of cannabis use among adults in Europe

Julian Vicente, Deborah Olszewski and João Matias

This chapter presents an overview of prevalence and trends in cannabis use in Europe, based on survey data reported annually to the EMCDDA. This source of information on cannabis use in Europe has improved substantially in recent years. Not only have most countries now conducted national surveys on drug use, but most have also adopted a common set of core items for measuring this behaviour. Methodological differences still exist in the way some surveys are conducted. Nonetheless, overall this information source can now be considered a relatively robust one for commenting on trends and levels of cannabis consumption in Europe.

Cannabis is by far the illegal substance most frequently used in Europe. It is estimated that roughly 71 million people have tried the substance in Europe (about 22 % of adult population of 15–64 years), although recent use (last 12 months) or current use (last 30 days) is clearly lower. A rough estimation for Europe indicates 23 million recent users (about 7 % of adults) and 13–14 million current users (about 4 % of adults), although with marked differences between countries.

Levels of cannabis use are highest among young adults, and this is particularly true when more recent or current use is considered. For example, at the European level, on average among those aged 15–34, last year and last month prevalence is estimated to be 13 % and 7 % respectively. Use is generally discontinued in later adult life, although it is possible that in future years we will see an increased use of the drug among older people as there is some evidence to suggest that regular use of the drug is becoming more common. Despite increasing concerns about intensive cannabis use, very limited information is available in Europe on the extent of this problem. A rough estimate made by EMCDDA in 2004 suggested that probably around 1 % of European adults may be daily cannabis users, and among young adults (15–34 years) estimates range roughly between 1 and 3.5 %.

Use of cannabis, as with other illegal drugs, is more common among males, and this is particularly true for measures of more recent or current use. There are marked differences between countries in gender differences, although among young people and school children these differences tend to be smaller. Of the Europeans that have ever tried cannabis, it is estimated that only 18 % have used it also in the last 30 days

(current use), although a higher 32 % have used it during the last 12 months (recent use).

Cannabis use has increased substantially in most EU countries during the 1990s, in particular among young people. In the new Member States that have more recently joined the European Union, increases have also been generally notable since the mid-1990s. The picture may be beginning to change, however. Although increases are still continuing to some extent, in recent data they are generally less marked and some countries now report a stabilisation or even a decrease in levels of use in the most recent data available.

Introduction

The increasing levels of cannabis use observed during the last 10 years in most of Europe clearly requires close monitoring as this drug continues to generate considerable public and policy interest. While there is recent evidence that cannabis use may be decreasing in some high-prevalence countries, such as the United Kingdom and Spain, it remains an important topic. Monitoring patterns of cannabis use, especially the intensive and sustained use of the drug, has also become more important as concerns have grown about the possible longer-term health and social consequences of use. Overall, in Europe the information available on the use of this drug varies considerably and there is generally an absence of data on more intensive patterns of use — which may be most important for considering the implications of cannabis use for public health (see Beck and Legleye, this monograph). A comprehensive review of the European data can therefore provide a more robust platform for facilitating a debate on cannabis and identifying information needs. This chapter offers a basic descriptive overview of cannabis prevalence in the different EU countries. In addition, crude European averages have been computed for basic patterns of cannabis use: lifetime experience, last year prevalence, last month prevalence and, with more difficulties, more intensive forms of use such as daily use. The method to estimate these European figures has been relatively simple (weighted averages) and results should be taken as a first but informative approximation, which will require improvement in the future as further data become available.

Measuring cannabis use in the population

Cannabis use in the general population can be measured through representative surveys among adults and school children, which provide estimations of the proportion of the population having used drugs during standard timeframes: any use in the lifetime (also sometimes referred to as 'experimentation'), any use in the previous 12 months (also sometimes referred to as 'recent use') and any use in the previous 30 days (also referred

to as 'current use'). Although response and non-reporting biases can have an impact on any survey exercise, population surveys — if well conducted — are generally considered to produce reasonable estimations of cannabis use. This is particularly true of cannabis use: compared with other drugs, cannabis smoking is a relatively less stigmatised behaviour, and it is also more common than use of other drugs.

'Lifetime use' as a measure has limited value in describing current levels of drug use, although it may be useful for exploring broader questions, for example, the difference between users and non-users in attitudes and perceptions, or charting cannabis over time to analyse 'use careers'. Use in the previous 12 months and the previous 30 days give better indicators of actual drug use. The latter can be used to indicate regularity of use, although clearly this is an imperfect measure in this respect.

Information presented here is based on national surveys among adults [7], but the reader should note that school surveys are addressed in detail elsewhere in this monograph. Analysis is presented here that is predominantly based on surveys conducted by EU Member States, between 2003 and 2006 [8]. The results of these surveys are reported annually by Member States to the EMCDDA through a standardised form. Detailed information on those datasets included here can be found in the EMCDDA annual reports and the accompanying *Statistical Bulletin*.

The EMCDDA has developed guidelines for surveys that include a set of common core items ('European Model Questionnaire' (EMQ)) [9]. These questions are now used in most adult surveys conducted in the EU Member States. Although, overall, the quality, reliability and comparability of European survey data have improved considerably, some methodological differences still exist between countries in they way surveys are conducted. This means that caution is still required in interpreting differences, especially where they are small.

In this chapter we will restrict our attention to the issue of prevalence. However, it is worth noting that survey work in Europe is increasingly addressing a wider set of questions in this area. Among these are: the identification of risk and protective factors for initiation of cannabis use or for progression to more intensive forms of use (see Coggans, this monograph); and the assessment of levels of problems and dependence found with different patterns of use. Readers interested in these issues are directed to recent reviews by Hall et al. (2001), INSERM (2001), Rodin Foundation (2002) and Simon (2004).

[7] The term 'adults' is used in this paper to refer to the group of 16–64 years of age. Most surveys target this population, although the reporting may address other specific subgroups selected by age.

[8] Malta 2001, Portugal 2001 — new survey conducted in 2007 — and Poland 2002.

[9] See EMCDDA (2002), *Handbook for surveys about drug use among the general population*: www.emcdda.eu.int/?nnodeid=1380

Prevalence of cannabis use in Europe

Lifetime prevalence (ever use)

Cannabis is by far the most commonly used illegal substance in Europe [10]. Recent surveys indicate that between 2 and 37 % of adults (15–64 years) have tried the substance at least once. The lowest lifetime prevalence estimates were found in Romania (1.7 %), Malta (3.5 %) and Bulgaria (4.4 %) and the highest in the United Kingdom (29.8 %), France (30.6 %) and Denmark (36.5 %). In most countries (12 of the 26 countries from which information was available) lifetime prevalence was estimated to be between 10 and 25 % of the adult population.

A crude estimation, computed as an average from national prevalence data and weighted to reflect population size, suggests that over 70 million adults (15–64 years) have tried cannabis in Europe as a whole, representing about 22 % of the adult population. Perhaps unsurprisingly, cannabis use is concentrated among young adults (15–34 years), who consistently report higher rates of lifetime use than the population average. Between 3 and 49.5 % of young Europeans report having tried the drug, with the lowest prevalence estimates found in Romania, Malta and Bulgaria and the highest in Denmark (49.5 %), France (43.6 %) and the United Kingdom (41.5 %). In general, the prevalence levels are found to be greatest among young people aged 15–24 years, with most countries reporting that somewhere in the range of 20–40 % of this age group have tried the drug at least once.

Last 12 months prevalence ('last year', recent use)

Overall in the EU, an estimated one-third (32 %) of people who have ever tried cannabis have also used it in the last 12 months. Put another way, around two-thirds of those who have ever used cannabis have not done so in the last year. Interestingly, among those who have used cannabis in the last year, about 60 % have also done so in the last month, suggesting some regularity of use.

Depending on the country surveyed, between 1 and 11.2 % of adults report having used cannabis in the last 12 months, with Malta, Bulgaria and Greece presenting the lowest prevalence estimates and Italy (11.2 %), Spain (11.2 %), the Czech Republic (9.3 %) and the United Kingdom (8.7 %) the highest. Most countries (13 out of 25) reported figures in the range of 4–9 %.

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[10] Estimates for the EU presented in this paper relate to the European Member States and Norway, which participates in EMCDDA activities by special agreement.

A crude estimate would suggest that over 23 million adults, around 7 %, have used cannabis in the last 12 months in the European Union as a whole. Most of those who had used the drug in the previous 12 months were young, with 18 of the 23 million estimated users falling into the age range of 15–34 years. In other words, about 13 % of all those aged 15–34 had used the drug, a rate nearly five times higher than that found among those aged 35–64 years, among whom, at the European level, last year prevalence is estimated to be about 2.5 %.

European averages are naturally most influenced by patterns of use in the countries with larger populations. They can therefore obscure heterogeneity at the Member State level. Depending on the country surveyed, between 2 and 20 % of young adults (15–34 years) report having used cannabis, with the lowest figures found in Malta, Greece, Cyprus and Bulgaria, and the highest in Spain (20.3 %), the Czech Republic (19.3 %), France (16.7 %) and Italy (16.5 %). Overall, 11 countries reported prevalence estimates for this age group in the range of 7–15 %.

If attention is restricted to young adults, last year prevalence rates rise considerably. Among Europeans aged 15–24 years, estimates of use in the last year range from 4 to 28 %, with most countries falling between 10 and 25 %. This means that, depending on the country, somewhere between 1 in 10 and 1 in 4 young Europeans have used cannabis in the previous year, with the figure rising to nearly one out of every two males between 15 and 24 in some countries (Figure 1).

Figure 1: Recent use (last 12 months) of cannabis among young adults (15–34 years old) and very young adults (15–24 years old) in EU Member States
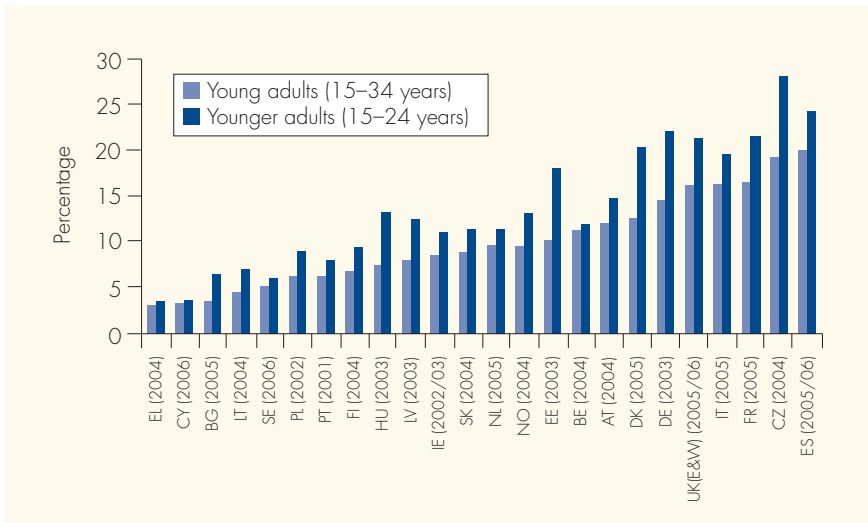
Last 30 days prevalence (current use)

In recent European surveys, current use (last month prevalence) was reported somewhere between 0.5 and 8.7% of all adults. The highest figures were found in Spain (8.7%), Italy (5.8%) and the United Kingdom (5.2%) and the lowest in Malta, Sweden and Lithuania. Thirteen out of 26 countries for which information was available reported figures in the range 2–6%. These data can be used to produce an EU population estimate that around 13.5 million adults (aged 15–64 years) have used cannabis in the last 30 days, representing nearly 4% of all adults. This figure should be considered as a minimum estimate. The majority of those who had used in the last month were young, with about 10 million out of the total 13.5 million falling in the 16–34 years age group, suggesting that around 7% of young adult Europeans can be considered current cannabis users. These figures vary considerably depending on the country, from less than 2% (1.5%) to over 15%, with the highest figures in Spain (15.5%) and France (9.8%). Sixteen out of 25 countries for which information was available reported figures in the range of 3–10%. By restricting the analysis to an even younger age group (15–24 years), even higher levels of last month use were generally reported. For this age cohort, last month prevalence varied between 1.2 and 18.6%, with most countries typically falling in a range of between 5 and 10%.

'Use in the last 30 days' can be taken as an indicator of 'current use' and will include people who use cannabis regularly, although clearly not all will fall into this category.

Figure 2: Current use (last 30 days) of cannabis among all adults (15–64 years old), among young adults (15–34 years old) and among 15- to 24-year-olds, in the EU Member States
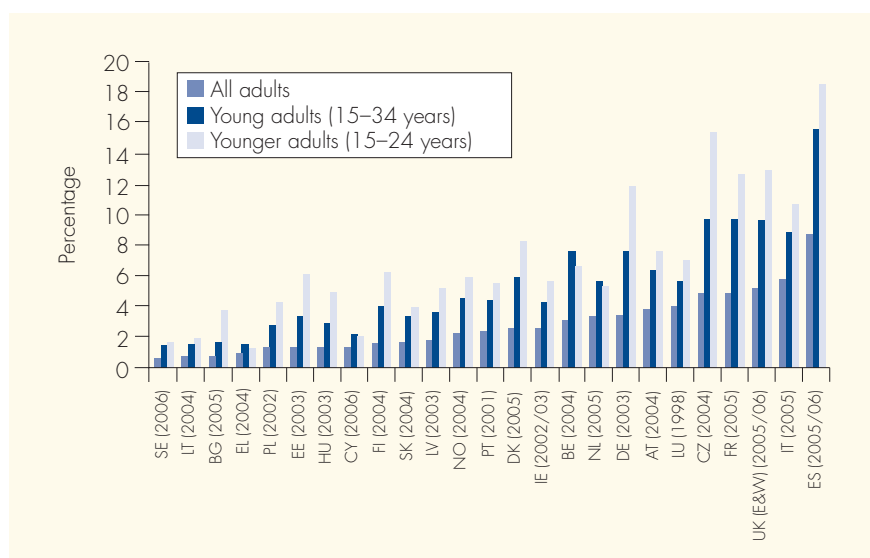
It is also unclear what proportion of those reporting use in the last month will be consuming the drug on a daily or near-daily basis. A clue is provided by a recent estimate conducted by the EMCDDA, based on more detailed analysis of data available from seven countries. In this exercise, it was found that between 19 and 33 % of those reporting use in the last 30 days were daily or near-daily users (EMCDDA, 2004a) (Figure 2). As those using cannabis on a regular and intensive basis are an important group for developing a better understanding of the public health impact of cannabis consumption, improving the information available on this kind of consumption pattern is, therefore, an important task for the future (see Beck and Legleye, this monograph).

Comparing figures from Europe and other parts of the world

When considering cannabis consumption in Europe, one question that often arises is how it compares with patterns of use elsewhere. Cannabis consumption is estimated to be common in both parts of Africa and Asia, but data to allow meaningful comparisons with European patterns are not available. A contrasting point of reference can be found in data from the USA, Canada and Australia, all of which have undertaken surveys of cannabis use that are broadly similar to European studies. In 2005, the US national household survey on drugs [11] reported that 40.1 % of adults (12 years and older) reported lifetime use of cannabis. This can be compared with an EU average of about 22 %. Even taking into account the slightly different age range covered, the US figure is clearly higher than the European average, although some European countries come close. For example, both Denmark and the United Kingdom report lifetime prevalence estimates slightly in excess of 30 %.

To some extent, differences in lifetime prevalence between America and Europe can be seen to reflect a historically earlier — that is, generational — experience with widespread drug use. This is illustrated by looking at last year prevalence estimates, which are more similar, at 10.4 % and 7 % respectively, with a number of European countries (Italy, Spain and the Czech Republic) reporting similar figures that approach the higher US estimate. Further points of comparison are provided by Canadian data (2004) [12], with lifetime adult prevalence (defined as 15 years and above) being estimated at 44.5 % and last year prevalence at 14.1 %, higher than the figures for

[11] Source: SAMHSA, Office of Applied Studies, National Survey on Drug use and Health, 2005 — see www.samhsa.gov and http://oas.samhsa.gov/nhsda.htm#NHSDAinfo. Note that the age range for 'all adults' in the US survey ('12 years and over') is wider than the age standard range for European surveys (15–64), implying that these will present relatively higher figures.

[12] Source: Adlaf, E.M., Begin, P. and Sawka, E. (eds) (2005), *Canadian Addiction Survey (CAS): A national survey of Canadians' use of alcohol and other drugs — prevalence of use and related harms, detailed report*. Canadian Centre on Substance Abuse, Ottawa. Note that the age range for 'all adults' in the Canadian survey ('15 years and over') is wider than the age standard range for European surveys. See Note 4.

both Europe and the USA. Similarly, Australian data (2004) [13] suggest that one-third (33.6 %, or 5.5 million people) of adults (defined as 14 years and older) have ever used cannabis; 11.3 % have used cannabis in the last year; and 6.7 % are estimated to have used the drug in the last 30 days.

A similar picture is found when prevalence rates among younger adults are compared (Figure 3). In Europe, lifetime prevalence is overall around 30 % for the 15–34 years age group. This can be compared with estimates of nearly half (49.1 %) of 16- to 34-year-olds in the USA, and a similar figure of 48 % for Australians, although the available age breakdown is slightly wider in Australia (14–39 years). In Canada, the estimate for lifetime prevalence among young adults (aged 15–34) is higher still, at 58.6 %. For these same age groups, last year prevalence estimates report some divergence: Europe at 13 %, the USA at 21.6 %, Australia at 20 % and Canada at 28.1 %. Again, it should be noted that at national level some of the higher-prevalence European countries — the Czech Republic, France, Spain and the United Kingdom — reported estimates that were broadly similar to those found in the USA, Australia and Canada.

Figure 3: Lifetime prevalence and previous 12-month prevalence of cannabis use among young adults, in the EU Member States, in the EU as an average and in third countries (USA, Canada, Australia)
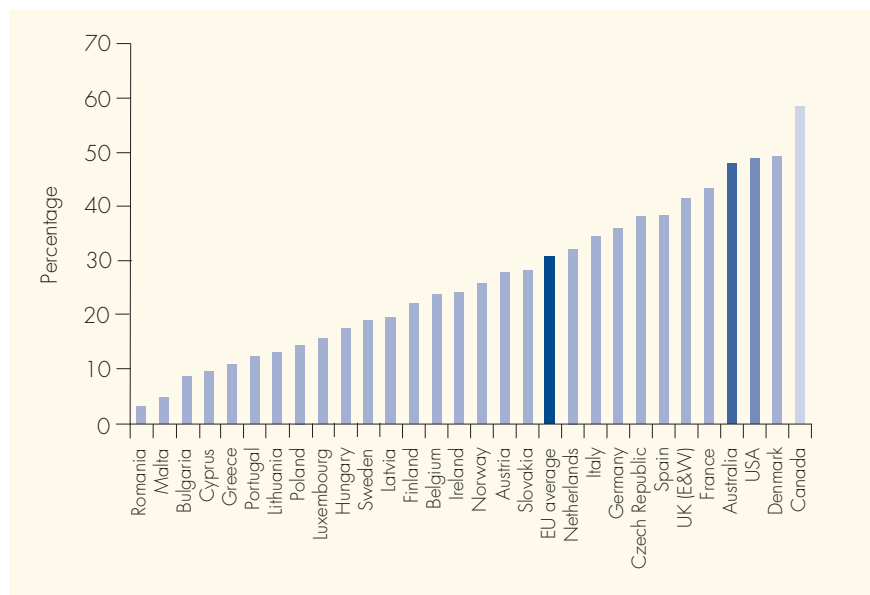
Note: In the USA the age range for all adults is 12 years and over.

Prevalence of more intensive forms of cannabis use

There is an increasing concern about prevalence of intensive cannabis use and its potential health consequences [14]. Unfortunately, very little information is available that might allow some assessment of either levels or trends in this pattern of cannabis use. Where information sources do exist, they are usually difficult to compare across studies. Even the concepts in this area lack standardisation, with different researchers using terms such as 'regular', 'repeated' or 'intensive' use with differing operational definitions. Some population surveys have started to include scales to assess 'problematic use' or 'dependence/abuse', although this work remains very much in its infancy, and harmonisation at the European level is needed (see Beck and Legleye, this monograph).

Last 30 days use

Given the lack of alternatives, last 30 days cannabis prevalence (current use) could be used as a very rough proxy indicator for estimating regularity of use. However, it should be stressed that this indicator does not imply problematic use or dependence. Information about prevalence of last 30 days use is presented in Figure 4. However, it should be noted that trends over time in this pattern of use are difficult to assess at the European level. Very few countries have data series with more than two measured points, and no clear picture emerges from the data that are available: in many countries no marked changes are observed. In the United Kingdom, a decreasing trend has been observed since 2004, whereas increases of different magnitude are reported in Spain, Belgium, Italy and Finland.

Daily use of cannabis

'Daily use' or 'almost daily use' (use on 20 days or more during the previous 30 days) may be considered a better indicator of 'intensive use' of cannabis and is included as a topic in a number of different studies and the EMQ. Although it is in need of update, the EMCDDA included an analysis on the available data in this area for the 2004 EMCDDA *Annual report* (EMCDDA, 2004a). Eight countries [15] provided data, and, with the exception of Latvia, where the figure was lower (4 %), approximately one-quarter (19–33 %) of those who had used cannabis in the last 30 days were reported to be daily or near-daily users (Figure 5). In terms of overall prevalence rates, daily use estimates

[14]   For further discussion of the public health effects of cannabis, see chapters by Hall and Room, this monograph, and also dedicated publications by Hall et al. (2001), INSERM (2001), the Rodin Foundation (2002) and Simon (2004).

[15]   France, Greece, Ireland, Italy, Latvia, the Netherlands, Portugal and Spain. Finland decided not to report due to the small number of last month users in their survey. See more details in 2004 *Annual report* (http://ar2004.emcdda.europa.eu).

Figure 4: Evolution of current use (last 30 days prevalence) among young adults (15–34 years old) in EU Member States that reported information from consecutive surveys
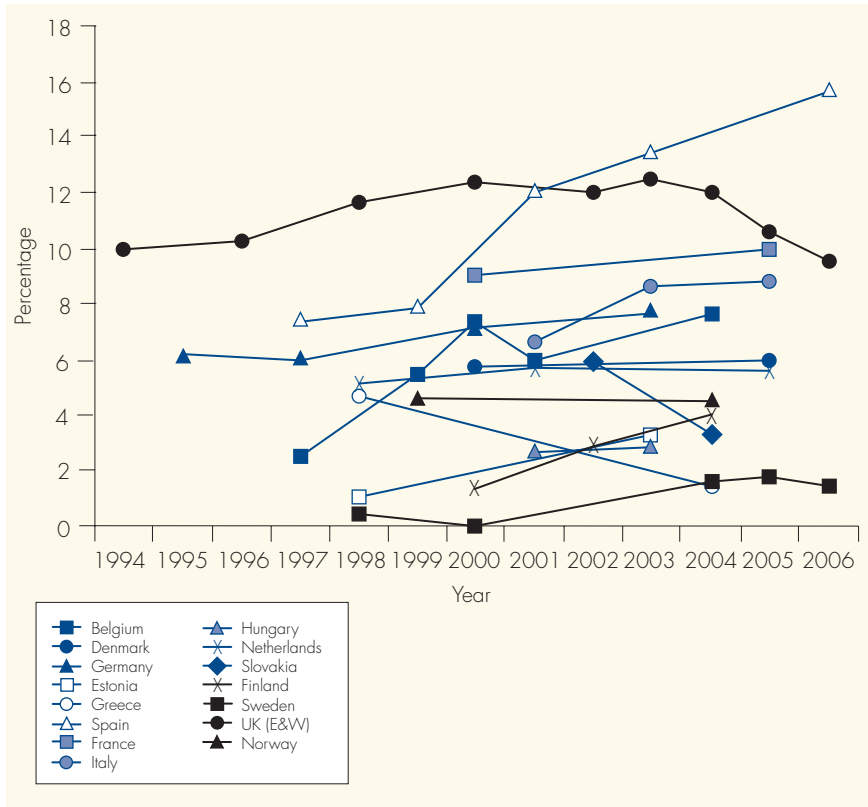
Figure 5: Prevalence of 'daily or almost daily' use of cannabis (≥ 20 days in the last 30 days) in different EU Member States
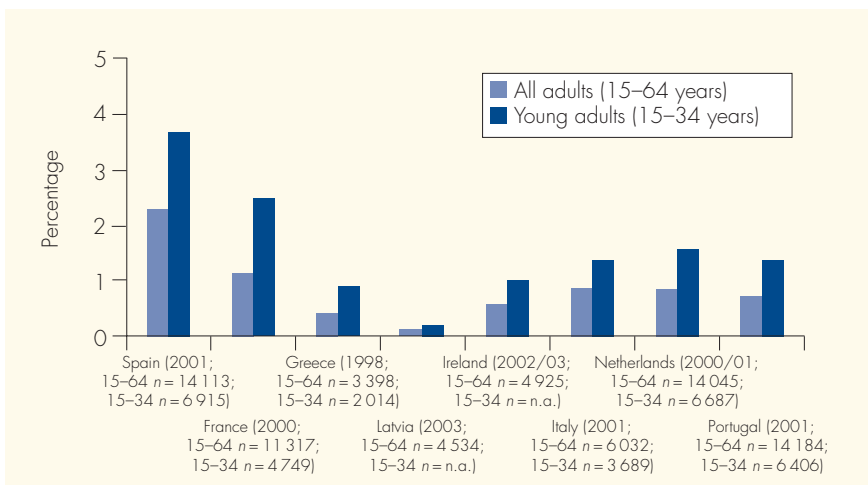
ranged between 0.5 % and 2.3 % of all adults (15–64 years) and between 0.9 % and 3.7 % of young adults (15–34 years). Extrapolation of these data would give a rough estimation that there may be around 3 million daily cannabis users in the EU, or about 1 % of the adult population.

Almost all daily users concentrate in the age range 15–34 years, and the vast majority are male. At present, it is difficult to assess trends in daily use, as information reported here was based on an ad hoc data collection exercise. However, this exercise is currently being repeated. Moreover, the data currently available are simply a behavioural measure of drug use. No supplementary information is available that allows informed comment on the extent to which daily users are likely to be experiencing problems or dependence. It would, nonetheless, be reasonable to assume that daily use would be associated with both. A study conducted in 1992 in the USA (Kandel and Davis, 1992) reported that one in three daily users met DSM-III criteria for dependence. The extent to which this estimate is likely to be valid for patterns of cannabis use in Europe today is unclear.

Estimations of cannabis dependence or problematic use

Frequency of use is relatively easy to measure in questionnaires, although additional information on dependence or problems would add insight into the implications and correlates of substance use. Despite the difficulties, it can be argued that surveys have the potential to better estimate cannabis use disorders. At present, there is limited information on prevalence of cannabis dependence or problematic use in Europe. A recent review of surveys carried out in European countries from 1990 until 2002 found that 0.3–2.9 % of adults met the criteria for 'drug dependence' (including all illicit drugs) in the previous 12 months, and in addition similar or higher numbers were classified as using the drug in a manner that could be defined as 'abuse/harmful use'. The highest estimates were found among young people aged 18–25 years (Rehm et al., 2005).

Figures from the US survey may provide a useful point of reference, although they cannot be assumed to translate directly to the European situation. In the 2003 National Survey on Drug Use and Health (SAMHSA, 2004a) 1.8 % of people aged 12 or over fulfilled DSM-IV criteria for cannabis dependence or abuse during the previous year, or around 4.2 million Americans. The proportion among 18- to 25-year-olds was higher, at 5.9 %. Data from this survey suggested that 16.6 % of those who had used cannabis in the last year met the criteria for either dependence or abuse of the substance.

Patterns of use: continuation rates of cannabis use

In general, cannabis use tends to be occasional or discontinued some time after its initiation in adolescence or during a user's early 20s. Thus, prevalence rates become

lower with increasing age, in particular for measures of last year or last month use. 'Continuation rates' can be considered as the proportion of people that, having used a drug for a longer period of time (e.g. during their lifetime), have also used it in a more recent period (e.g. during the last 12 months or last 30 days). As a European average, only 18% of those that have ever tried cannabis have used it also in the last 30 days (Figure 6). National figures range from 10% or less in Denmark, Lithuania, Romania and Sweden to over 20% in Belgium, the Czech Republic, Spain, Italy, Cyprus and Portugal. In addition, on average in Europe, about one-third of those who have ever used the substance have used it in the last 12 months. It is worth noting that, in most countries a relatively high proportion, averaging almost 60%, of those who have used cannabis in the last 12 months have also done so in the last 30 days, suggesting a certain regularity of use, although not necessarily frequent or intensive use. However, there is a wide variation between countries (30–78%).

Continuation rates are relatively stable in those few EU countries where this rate can be computed over a number of years. A similar finding is observed in the USA. This may suggest that there is not an intensification of use patterns among most users, although this may not apply to the more intensive or problematic forms of use. Furthermore, this statement must be made with the caveat that the overall European dataset in which this question can be explored is limited.

Figure 6: Continuation rates of cannabis use — European Union average, Germany, Spain and the United Kingdom, and the USA
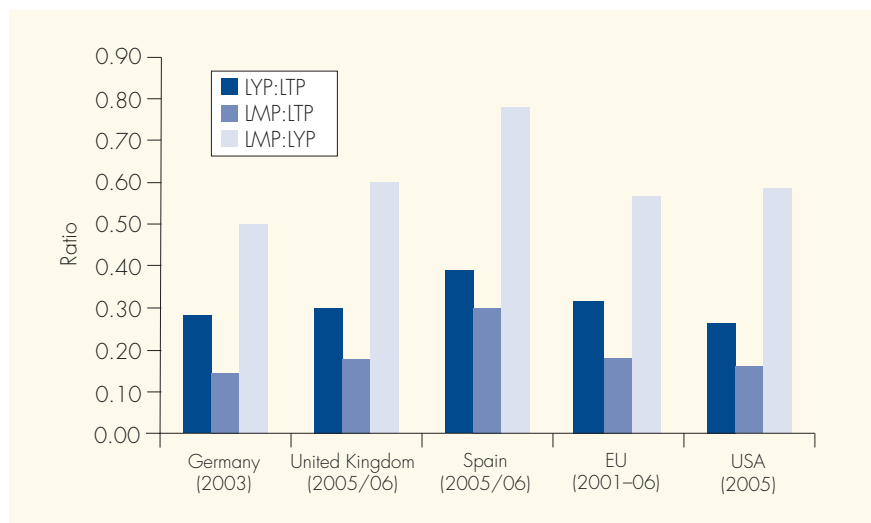
Note: LMP, last month prevalence; LTP, lifetime prevalence; LYP, last year prevalence.

Gender differences in cannabis use

In Europe, most young people who have tried an illicit drug have used cannabis, and males are generally more likely to have done so than females. Adult and school survey data suggest that there has been only limited convergence in cannabis use between males and females, and increases in cannabis use have tended to occur largely in parallel. Some patterns are, nonetheless, detectable. For example, female and male use tends to become more equal as prevalence of cannabis use increases, and this gender gap is generally wider for use of other illegal drugs and for recent or frequent patterns of drug use.

Male to female ratios [16] tend to be consistently higher among surveys of adults than among school students. Among students aged 15–16 years, lifetime experience of cannabis is slightly higher among males in all but three countries (Ireland, Finland and Norway). School student male/female differences are fairly consistent and small across most countries in the European Union, ranging from equal ratios in Ireland, Finland and Norway to 1.8 in Portugal. However, among adults (aged 15–64 years) gender differences for lifetime experience of cannabis use reveal a greater gender gap and more variation across countries than among school students: male to female ratios range from 1.25 in Finland to 4.0 in Estonia.

The gender gap also becomes wider if one progresses from lifetime use through recent (last 12 months) to current use (last 30 days) (Figure 7). Recent use (last year prevalence) male–female ratios range from 1.5 in Finland to 4.3 in Hungary. In the case of current use, male–female ratios are even larger, ranging from 1.8 in Norway to 5.9 in Portugal. Among school students, gender ratio differences are considerably greater for 'frequent use' of cannabis (defined as 'used 40+ times during a lifetime') than for lifetime prevalence or last year prevalence. Nonetheless, some caution is needed in interpreting results for current or frequent use because of the relatively small numbers involved. In European Union countries with relatively high prevalence rates, the difference between male and female adults tends to be less marked than in countries with low prevalence rates. Sweden, Norway and Finland are exceptions, as prevalence is relatively low and male/female differences are minimal.

From 1995 to 2003, although increases generally occurred in parallel among both male and female school students, the trend in countries with relative high prevalence has generally been towards equality between males and females. Among adults, there is

[16] Differences between males and females are presented here as ratios of prevalence of use among males over prevalence of use among females. Ratios higher than 1 indicate more males than females; for example, a ratio of 2 indicates twice as many males as females (diagrams are drawn with logarithmic scaling).

Figure 7: Male:female (M:F) ratios for adults, lifetime prevalence and last month prevalence in Europe
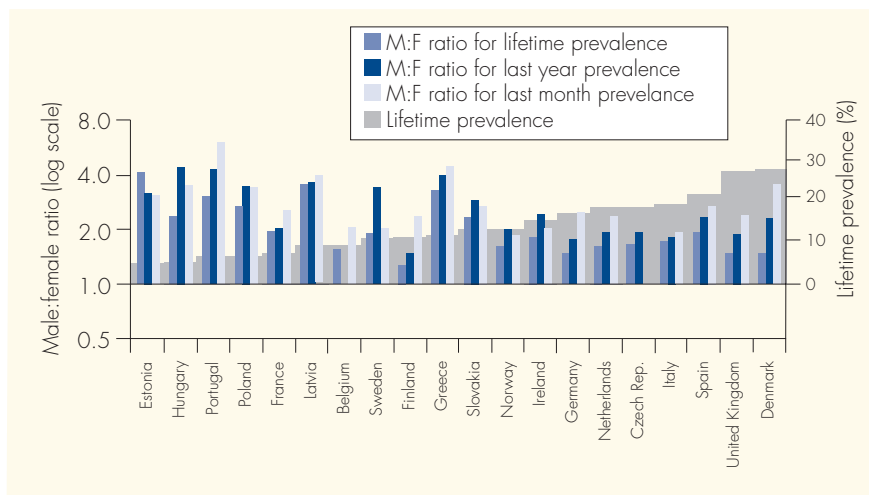
little evidence of gender convergence in countries with trend data. It is not clear to what extent male predominance at low prevalence levels is determined by persistent cultural factors that make males disproportionately prone to illicit drug experimentation and to what extent it arises from the fact that in many of these countries drug use is a relatively recent historical phenomenon, developing first within the male population. The gender ratios for school students aged 15–16 years reporting that they had drunk five or more drinks in one session during the past 30 days and for lifetime prevalence of cannabis use are broadly similar among different countries (a log scale correlation of 0.46). This may suggest a common association of drug use with an outgoing lifestyle related to gender or age.

Evolution of cannabis use in Europe — long-term and recent trends

Only a few European countries have a series of drug surveys that allow long-term trends to be identified with any precision. Most countries do not have a set of historical data that can reasonably be considered to represent a time series in any strict sense, although sporadic surveys are sometimes available that give some indication of the historical situation. Moreover, even in those countries where data are the strongest, it is only possible to extend the observational window with any confidence to the early or mid-1990s.

Initial expansion of cannabis use in European countries

In the USA the widespread expansion of cannabis use began in the first half of the 1960s (Kandel et al., 2001). It is generally considered that this cannabis use began to spread to parts of Europe at this time as part of a growing counterculture (see Olsson and Abrams chapters, this monograph). Where it had become established, the popularity of the drug continued to grow through the 1970s and 1980s. However, both within and between countries there was considerable heterogeneity in levels of use, and the drug was probably more clearly linked with particular subgroups than it is today.

Some indication of patterns of use over time can be gained by looking at the dates given for when a cross-section of cannabis users report their first use of the drug. An analysis on initiation of cannabis use (age of first use) found, for example, that cannabis use expanded markedly in Spain during the 1970s, in the former West Germany during the 1980s and in Greece during the 1990s. In addition, it was observed that the more recent young generations had reported higher levels of cannabis experience than any previous generation in these countries (Kraus and Agustin, 2002). Surveys conducted between 2000 and 2003 indicate significant levels of lifetime experience (12–24 %) among the 45- to 54-year-olds in Denmark, France, Germany, the Netherlands, Spain

Figure 8: Initiation of cannabis use in Spain according to year and by birth cohort
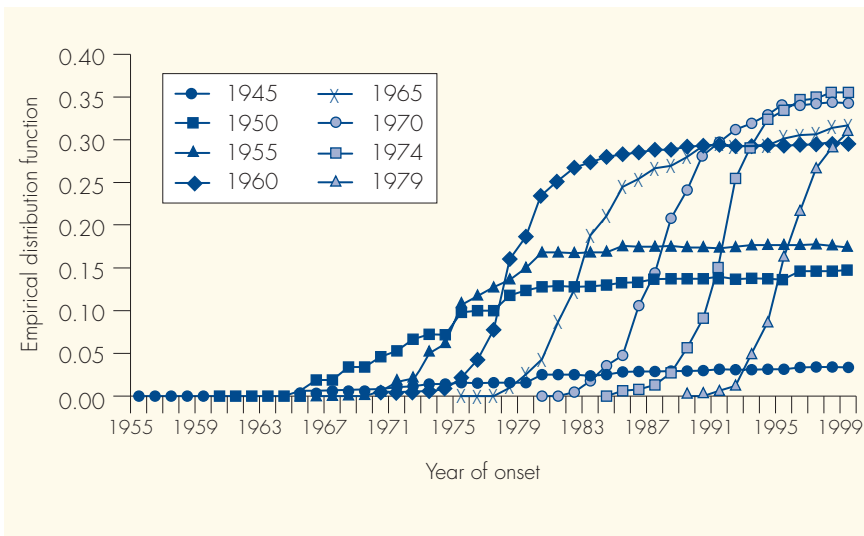
Note: Empirical distribution function for year of onset of cannabis use — Spain, one-year-cohorts. Results from combined surveys of the years 1997 and 1999.

(Figure 8), Sweden and the United Kingdom, suggesting that the number of cannabis users was probably not trivial in these countries 25–30 years ago.

Recent trends in European countries (1990s to present)

Different types of surveys (national or local household surveys, conscript and school surveys) have shown that cannabis use increased markedly during the 1990s in almost all EU countries, particularly among young people (Hibell et al., 2004; EMCDDA, 2005a) (Figure 9). In most European countries, cannabis use has continued to increase until recent years, although different paces of growth have been observed between countries. Nonetheless, it is worth noting that several countries are reporting a recent stabilisation in levels of use in different settings (EMCDDA, 2005a).

Figure 9: Trends in recent use of cannabis (last 12 months) among young adults (15–34 years old)
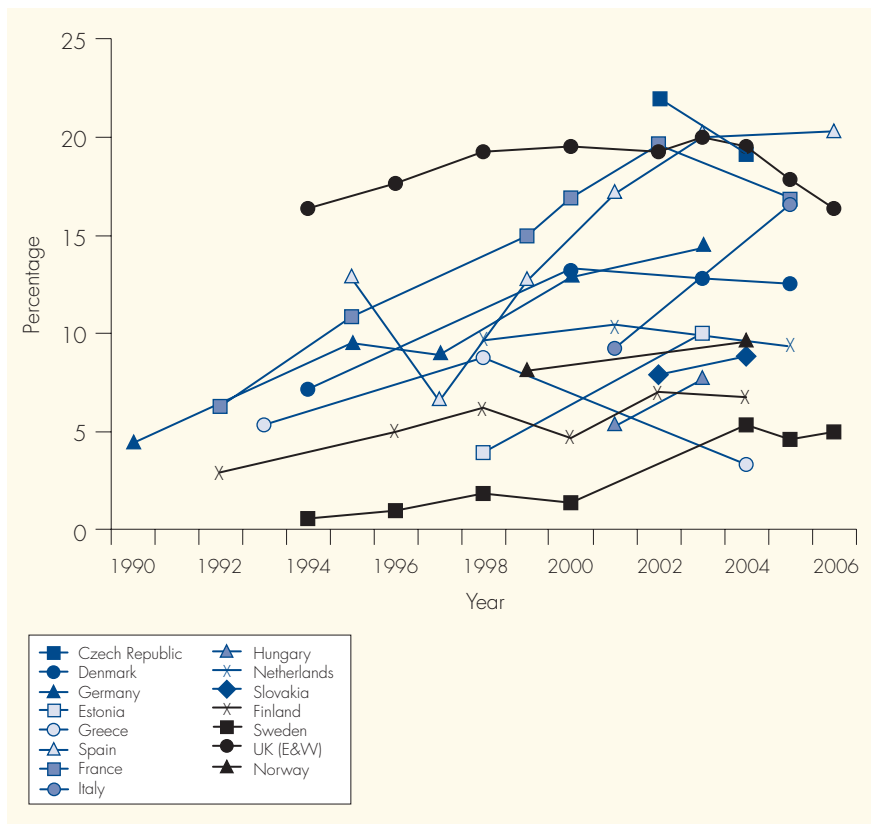
Differences by countries

In the United Kingdom (England and Wales) ([17]), which since the early 1990s has reported among the highest figures in Europe, cannabis use among young adults (16–34 years) remained stable from the mid-1990s until 2003 (19–20 %) and then fell between 2003 and 2006 (20–16.3 %). It is worth noting that levels of reported use fell more in a time comparison of the age group 16–24 years, while continuing to increase among 25- to 34-year-old males (from 9.4 % in 1994 to 14.8 % in 2003–2004), although a slight decrease is seen here in the most recent data (12 % in 2005–2006). These UK data suggest a 'generational effect' in which those who started using the drug 10 or 15 years ago may be more likely to be continuing to use the drug into adulthood, and that the popularity of cannabis may be waning slightly among younger age cohorts (Figure 10).

Figure 10: Trends in recent use of cannabis (last 12 months) by age group in the United Kingdom, illustrating a possible 'generational effect'
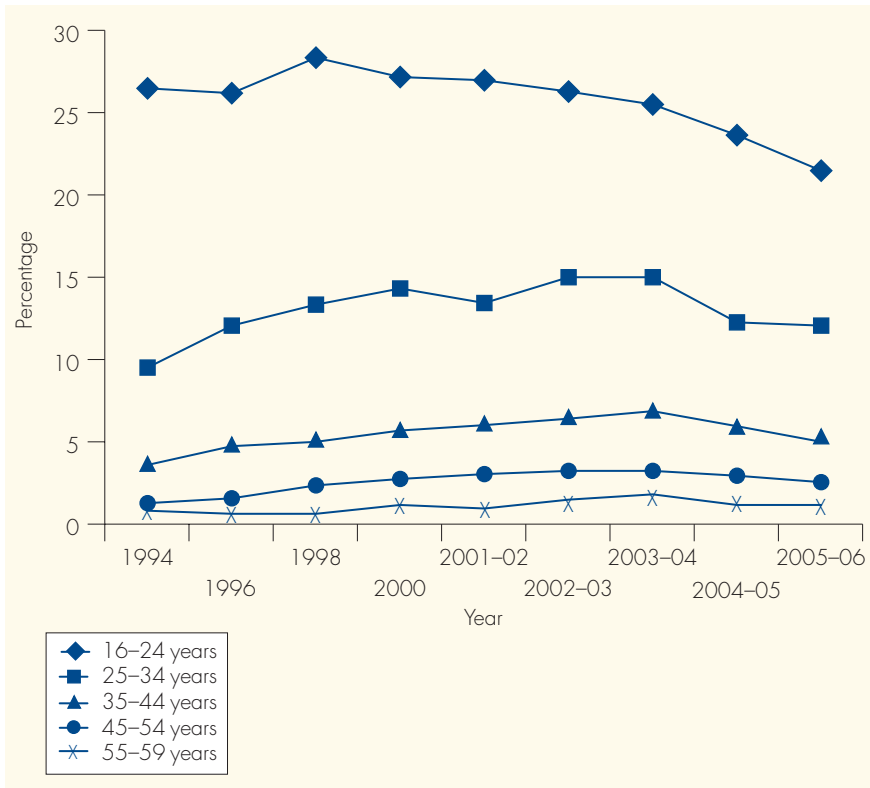
([17]) In this section the information for the United Kingdom is based on British Crime Survey data (for England and Wales). The first BCS (E&W) for which information on drugs is available at the EMCDDA is from 1994.

Prevalence figures among young adults in France, Spain and Italy have reached the levels of the United Kingdom in recent years (2002 or 2003), after a markedly increasing trend for several years. However, some stabilisation is also becoming apparent in these countries. France reported a decrease in 2005, and Spain a clear moderation in the increasing rate in the more recent data (2006). Figures from the Czech Republic (2002) were similar to those from these high-prevalence countries, although more recent information (2004) suggests stabilisation or a slight decrease in prevalence levels.

It is worth noting that, in contrast to the United Kingdom, increases in France and Spain among 15- to 24-year-olds have continued until very recently, with a decrease in France only in its most recent survey. Among 25- to 34-year-olds, a marked increase has been observed in Spain since 1999, with only a slight decrease in 2006. It is, thus, likely that trends among younger people anticipate trends in the broader population, and should therefore be monitored with particular attention.

Denmark and Germany also reported increases in cannabis use until recent years (reaching 12–15 % of last 12 months use among young adults), although not reaching the levels of the high-prevalence countries above. The most recent information for these countries indicates stabilisation or small decreases. In the Netherlands, prevalence figures have remained stable, at around 10 %, in the period 1998–2005.

Finland and Sweden have presented comparatively low prevalence estimates of cannabis use since the early 1990s. Although some increases have been observed, their figures remain low compared with other countries, without apparent signs of likely convergence with high-prevalence countries. The increase observed in Sweden between 2000 (1.3 %) and 2004 (5.3 %) may be related to methodological changes. Prevalence estimates for Sweden in the 2004, 2005 and 2006 surveys suggest a stable situation.

Among new Member States, the available information, mainly from school surveys within the ESPAD project (Hibell et al., 2004; EMCDDA, 2004a), suggests that there has been a substantial increase in cannabis use in recent years, in particular since the mid-1990s. Consecutive surveys among adults in Estonia (1998, 4 %; 2003, 10 %) and Hungary (2001, 5.4 %; 2003, 7.7 %) have also revealed increases of cannabis use among young adults.

It can be noticed in several new Member States that last 12 months prevalence among 15- to 24-year-olds is in the same range as other EU countries. By contrast, prevalence estimates drop considerably among the immediately older age groups (25–34 or 35–44 years), suggesting a generational effect that could be related to lifestyle changes occurring during political and social changes that took place in these countries during the 1990s, and that were possibly adopted initially by the younger generations (see Moskalewicz et al., this monograph).

Finally, from different sources (adult surveys, youth or conscripts surveys and school surveys, etc.) it can be noted that a number of countries are now reporting recent stabilisation or even a decrease in levels of cannabis use. In some cases, different surveys may signal opposite trends in a country, possibly due to the different age ranges or social milieu covered. Among countries reporting stabilisations are the Czech Republic, Denmark, Germany, France, the Netherlands, Finland, the United Kingdom and Norway. These findings may indicate that the overall increase in cannabis use observed during the 1990s and early 2000s may be starting to stabilise, at least in some countries, and in particular among younger people.

The present situation and future information needs

Information on prevalence of cannabis use and patterns has increased substantially in recent years in the European Union. Most European Union countries are now conducting harmonised school surveys at regular intervals within the ESPAD project, although sample sizes are sometimes relatively small. Almost all EU countries have conducted general population surveys on drugs, with overall strong compatibility with the EMQ. However, clear limitations still do exist on information at EU level. There are still differences in methodology (e.g. data collection, sampling). Only very few countries have a series of repeated surveys with consistent methodology. Harmonisation beyond the basic items of the EMQ is often limited, including questions that would allow better assessment of more intensive forms of use.

Added value is accrued from surveys if they are repeated over time using comparable methods. It is, therefore, important to consolidate national series of household surveys to generate robust time series. This would greatly increase the analytical value of the data and permit more complex and detailed analyses. There is a need to educate policymakers and those commissioning surveys that this is, by necessity, a long-term investment, with the value of information progressively increasing as survey series become longer.

Data from population surveys form one of the EMCDDA key indicators and there is a political commitment to implementing the indicators in the current EU action plan on drugs. However, although almost all European countries have made progress in this area, there is a clear need to stimulate more regular data collection exercises and a greater adoption of common standards of good practice.

As concern increases about the possible public health implications of cannabis use, it is imperative to improve existing methods and capacity to assess intensive patterns of use, and to analyse their correlates, and potential health and social consequences. This

approach may also need to be extended to embrace other substances (e.g. stimulants, psychoactive medicines, problematic and combined use of alcohol with drugs).

Finally, survey data need to be complemented with longitudinal and more focused studies to describe the specific behaviour of vulnerable subgroups, or to explore important temporal issues, such as drug use initiation and cessation rates. In particular, qualitative studies of users can contribute valuable information that can illuminate the drier statistics. These help to understand the associations found within the statistics, by placing them in the context of an understanding of the individual user's experiences, rationale and motivation.

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Chapter 2
Measuring cannabis-related problems and dependence at the population level

Keywords: cannabis – cannabis use – disorders – intensive use – mental health – questionnaires – screening – survey design

Setting the context

While there is evidence of stabilisation or slight decline in use in some high-prevalence countries, cannabis use has, on the whole, increased in most European countries over the last 15 years, especially among adolescents and young adults.

Despite strong public health interest, the commonly used indicators of cannabis use — lifetime and last year prevalence — aim to assess not problematic use but broader use patterns. Indicators of current use — last month prevalence and frequency of use in the past month — provide indirect indications of the extent of more intensive forms of use and problematic use of drugs. Yet frequent use of cannabis does not necessarily imply that users will experience problems, so a more detailed picture is required. As Europe becomes increasingly sensitive to the health risks of cannabis use, particularly among high-prevalence populations, distinguishing between various kinds of use is vital to ensure that interventions are targeted to those most at risk.

Nearly all EU countries now collect information on how many days cannabis has been used in the month prior to interview. However, standardisation remains far from complete: some collect number of days, others number of times smoked or less well-defined measures. The EMCDDA, in collaboration with several national experts, is currently developing the methodological and conceptual framework necessary for monitoring 'intensive forms of drug use' to better identify those experiencing problems. Several projects to test psychometric instruments are under way in Germany, France, the Netherlands, Poland, Portugal, the United Kingdom and, most recently, Spain (EMCDDA, 2007).

This chapter, written by experts based at the OFDT (the National focal point for France), presents the main concepts for diagnosing harmful cannabis use, abuse and dependence as well as tolerance and withdrawal symptoms from cannabis. It also touches on wider difficulties in abstaining and controlling use, together with other factors linked to problematic use (family disapproval, financial impacts, etc.). The authors have collected the existing screening tests for cannabis-related disorders. They review the screening processes and comment on their reliability. They then present and discuss the main available cannabis tests and how they may be used in general population surveys. While they suggest that even if the concepts and tools are somewhat arbitrary and vary according to cultural background, such screening instruments remain useful in increasing research into cannabis-related disorders.

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Measuring cannabis-related problems and dependence at the population level

François Beck and Stéphane Legleye

Introduction

Although common perceptions of the 'harmlessness' of cannabis have often been countered in recent years, the fact remains that a majority of cannabis users do not encounter any clinical or social problems. So epidemiologists have sought ways to distinguish — among the many people who report lifetime, last year or last month cannabis use — the profiles of cannabis users who suffer from a cannabis use disorder or who manifest patterns of cannabis use that may require a timely intervention.

The definition of an *acceptable* level of cannabis use, i.e. the establishment of a threshold beyond which the use becomes problematic, is beset with ethical issues. First, cannabis is an illegal drug and so establishing use guidelines may be perceived as condoning its use (see Bennett, this monograph). Second, as with legal drugs such as alcohol or tobacco, problematic use can emerge from what some groups — peers, specific generations and subcultures — might perceive as moderate or normative consumption. Indeed, in the light of increasing treatment demand for cannabis (Montanari, 2004; Simon and Kraus, this monograph), there is considerable demand to operationalise concepts of dependence into measurable criteria, and to inform people of cannabis-related health risks.

Problematic use can be defined as use leading to negative consequences on a social or health level, both for the individual user and for the larger community. From this definition of problematic use, various other concepts can be defined, such as misuse, abuse and dependence, together with difficulties faced in abstaining or controlling use. Harms are either directly linked to the substance itself, for example loss of concentration in the short term or lung damage in the long term (see Witton, this monograph, Vol. 2), or are secondarily harms linked to polydrug use (principally, alcohol and tobacco) or risky behaviour (drug driving, binge patterns). Such risk situations should ideally be detected early by practitioners. By identifying problems early, drugs workers have a window of opportunity to minimise cannabis-induced problems, for instance by referring users to treatment or by taking actions aimed at preventing intensive use and dependence.

Monitoring of cannabis use has been improved since the beginning of the 1990s, partly due to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), which has developed a European model questionnaire for general population surveys (Bless et al., 1997). Nonetheless, most studies dealing with abuse, problematic use, harmful use or dependence reflect a lack of standardised screening tools[1]. And more study is needed on the links between various types of use, socio-demographic characteristics and socio-medical factors.

The literature provides evidence that brief rating scales are well suited for screening purposes, and that instruments with direct questions appear to perform better than scales with more subtle questions (Rost et al., 1993; Svanum and McGrew, 1995). Yet, there remain many different screening instruments used to measure cannabis use disorders[2]. This heterogeneity reflects the diverse goals of researchers and practitioners (which types of uses are to be screened and in which contexts), and of the means they choose to reach them (which types of questions, how many items and what kind of questionnaires). Although there are a number of definitions of cannabis use disorders, those which operationalise specific types of drug use are relatively vague. Furthermore, the way such definitions are translated into questions in screening tools can be very different. This is partly because identifying potentially harmful drug uses is complex and partly because in most countries attempts to distinguish problematic cannabis use from other types of cannabis use are new.

In this chapter we first clarify the different concepts for defining general substance use disorders and how these are applied to cannabis. Second, we describe the various screening instruments which attempt to measure cannabis use disorders, their differences and similarities. Finally, we discuss the various problems with existing screening tools and propose a possible step forward in order to better screen cannabis-related disorders in the future.

Concepts and their adaptation

The basics of screening potential problematic drug use are (i) establishing criteria to define problem use and (ii) developing questions that can be used to diagnose whether a respondent meets these criteria. Screening typically takes the form of a clinical interview between a patient and practitioner. Nonetheless, difficulties can

[1] The majority of these tests are conceived for all the psychoactive substances then adapted to cannabis; the others were specifically conceived for this product.
[2] Recent European screening can be summarised as follows: Germany: Severity of Dependence Scale (SDS); France: Cannabis Abuse Screening Test (CAST); the Netherlands: CIDI modified plus additional ad hoc scale; Poland: Problematic Use of Marijuana (PUM); Portugal: Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV scale); Spain: *Estudes* study, combining CAST, SDS and the abuse subscale of the DSM-IV.

be encountered by the researchers, practitioners and respondents. This section does not focus on cannabis use or particular screening tests. Instead, it deals with three questions which should precede screening: 'what is problematic use of drugs?', 'how is problematic use best screened?' and 'will the screening process give us relevant and reliable information?'.

Concepts

The concepts of drug use disorders have a history. Until the middle of the 20th century the clinical study of drug addiction was characterised by many different theoretical approaches. Theory shifted to practical definition within a number of international standardised grids describing the disorders associated with drug use. Since this period, criteria have been modified alongside evolution in research and in interpretations of *dependence*. The term 'dependence' was borrowed from psychopharmacology, where it referred to tolerance and withdrawal, and was used more generally to replace the term *addiction* by a WHO Expert Committee in 1964. Edwards et al. (1981) introduced cognitive and behavioural signs and symptoms to the concept, and dependence became both behavioural and physical. Thanks to Goodman (1990), behavioural criteria gained more importance and the concept of dependence could be used to describe addictions without a drug, for example addiction to gambling. Dependence might also include a physical dependence characterised by pharmacological criteria (Kaminer, 1994; Bailly, 1997, 1998).

Today, the most widely accepted definitions of use disorders are *harmful use*, *abuse* and *dependence*. These are defined by a list of criteria. *Harmful use* and *dependence* are defined in the International Classification of Diseases (ICD-10), Section F10–F19 [3], of the World Health Organisation, a concept developed from a European perspective, whereas the American Psychiatric Association's Diagnosis and Statistical Manual of Mental Disorders (DSM-IV) [4] defines *abuse* and *dependence* — a concept developed from a US perspective.

Abuse under DSM-IV and *harmful use* under ICD-10 can be regarded as immediate damaging use for the individual, and are parts of a continuum that ranges from abstinence to dependence. Abuse may involve legal problems resulting from use, for example arrests for substance-related problems, and risky behaviours, such as use in physically hazardous situations, which are not included in the definition of *harmful use*. Yet, despite their differences, both take into account problems linked to the wider environment of the user, such as reproaches from the family circle or personal or social

[3] www.who.int/classifications/apps/icd/icd10online
[4] www.dsmivtr.org. DSM-IV is currently in the process of being updated to a new manual, DSM-V.

difficulties associated with use. Still, neither definition allows us to classify cases in terms of staggered stages of increasing gravity, and concepts of dependence *stricto sensu* require further definition.

Two other components make up the definition of dependence according to DSM-IV: *physiological* and *psychological dependence*. *Physiological dependence* comprises tolerance and withdrawal. Tolerance is defined by the need for increased amounts of the substance to achieve the original effects of the substance, or a markedly diminished effect with continued use of the same amount of the substance (criterion 1). The withdrawal symptom (used in criterion 2) is described as a maladaptive behavioural change that occurs when the substance concentration declines in an individual who has maintained prolonged heavy use of the substance (APA, 1994). Psychological dependence includes compulsive use (criteria 3, 4, 7), intensity of use (criterion 5) and consequences of use (criterion 6). These concepts may be found in most of the existing drug screening tests, whether specific to cannabis or not.

In Europe, some definitions of substance use problems are not based on ICD-10 or DSM-IV concepts, but are purely pragmatic. One is the EMCDDA's definition of problematic drug use as injection or regular use of opiates, cocaine, crack and/or amphetamines. The EMCDDA uses its definition of problematic use as one of its key indicators, and the definition is helpful in establishing a link with its key indicators on drug-related infectious diseases and drug-related deaths and mortality.

Work is still ongoing in Europe in defining problematic use of cannabis. One approach used in general population surveys is to assess problematic use by measuring 'intensive use', which can be defined through indicators of intensity or frequency of use (Simon, 2004). This notion is based on the idea that the use is problematic above a certain excess threshold. This makes sense, but its definition is arbitrary and not based on medical criteria. Furthermore, many studies have shown that a statistical link between problems and use appears even at very low levels of use (Ramström, 2003), although this link must be cautiously interpreted as it varies with other variables such as gender, age, socio-economic context and the illegal status of the drug. Nonetheless, intensive use is useful in identifying those who are more at risk of developing problems linked to cannabis use.

Such criteria of problematic drug use play a practical role in diagnosis, alerting practitioners to problem patterns and enabling immediate diagnosis of harms. Nonetheless, difficulties remain in shifting from abstraction to action, i.e. to develop practical screening instruments for cannabis use disorders:

• Definitions of substance use disorders do not easily translate into screening tool questions.

- Problems related to consumption are not purely somatic, but embrace other aspects of the user's environment — associated risks, medical, educational, social and legal problems.
- A survey given at a specific time may not be able to gauge the risk of a user, for example mid- or long-term problems that have not yet transpired.

From concepts to screening tests

Screening consists of comparing substance disorder criteria — that is, the concept defining harmful use — against the actual pattern of use. This process can provide a variety of insights on the side of both the practitioner and patient or respondent, which are open to diverse interpretation. Thus, it is crucial to design a questionnaire that adequately reflects the criteria defining problematic use, and which ensures that responses are accurate, valid and actionable. There are basic delivery issues too: the context of use and population sample (adults, children, at school, at clinics, etc.) determines how questions are worded, how many questions are asked, how questionnaires can 'fork' to provide further details, and so on.

Harmful use criteria can differ from one population to another. Harrison et al. (1998) showed, for example, that DSM-IV does not completely fit adolescents. Within DSM-IV, criteria applicable to adolescents are often absent for concepts such as withdrawal, tolerance or giving up other activities providing pleasure and interest. Thus, it has been argued that DSM-IV concepts, when applied without adaptation to adolescents, do not deliver the prognostic value they have for adults (Bukstein and Kaminer, 1994). According to many researchers, current tools made for the screening of adults only deliver a late screening of youth-specific problems. So, it has become common for research teams working on adolescents to try to develop their own tools (Inserm, 2001).

Validation and quality measures

Measuring the quality of a screening test is not easy. As stated, a test must be theory based and should correctly screen users according to a harmful use concept. This concept must be clarified through a reference test, i.e. a 'dry-run' test that may or may not offer the kind of responses one obtains during actual use of the test. Thus, validation of the screening test needs to be iterative, based on comparing actual responses with the reference test, and tweaking the screening test accordingly. This process can be split into two basic tasks: first, comparing the screening test with the reference test; and, second, assessing the quality of the screening test (and its reference test) in a clinical situation in which a practitioner's diagnosis can be compared with the result of the test. While it is not our aim to summarise best practices in survey validity here, validity can be tested

in a number of ways: completeness (Have all questions been answered? In the right sequence?); respondent base (Has the test been adequately prepared? Have sufficient respondents been used to test the practicality of the test? Have respondents answered sincerely and have interviewers correctly recorded responses?); and logic (Does the test reflect the harmful use concept? Can conclusions be generalised across the respondent base? And are other plausible explanations ruled out?). While preparation does not guarantee the ideal screening instrument, it is possible to avoid common pitfalls and to 'build in' validation into clinical interviews or in general population surveys.

Existing screening tests for cannabis use disorders

Standardised early screening instruments have been used for tobacco (Fagerström and Schneider, 1989) and alcohol (Daeppen, 2004) for a long time. These tools are used as an aid in informing a diagnosis in a clinical situation, and also as an epidemiological tool in general population surveys among adults or adolescents in order to measure the levels of the different patterns of use. For alcohol, the most common instruments are the Alcohol Use Disorders Identification Test (AUDIT) (Saunders et al., 1993) and the CAGE test (Cut down, Annoyed, Guilty, Eye-opener test) (Ewing, 1984).

For other drugs, a large number of tests exist. Most have been developed for use with all drugs but can be adapted to a specific drug. For example, the Severity of Dependence Scale (SDS), was conceived for heroin and opiates (Gossop et al., 1995), and then adapted for cocaine and amphetamines, and recently for cannabis (Swift et al., 1998; Kraus et al., 2005). A literature review on screening tests and on their validation, describing the great diversity of what is available, has been conducted in France (Beck and Legleye, 2007a).

For cannabis, available screening tests are relatively recent and rarely used in general population surveys. In the 1990s, assessment instruments such as the Composite International Diagnostic Interview (CIDI) and the Schedules for Clinical Assessment in Neuropsychiatry (SCAN) have been used in several general population surveys, but their ability to measure cannabis dependence and cannabis abuse remains a matter for discussion (Compton et al., 1996). One difficulty is that contexts and motivation for use vary greatly among heavy cannabis users. Heavy use can develop both through solitary use, for example to manage stress or enable sleep, and in social settings, for example at recreational events or among peers. The same respondent can report both recreational use and harmful effects due to use.

A good example of adaptation of the concept of dependence into a set of questions can be found in aggregated data from three waves (1991 to 1993) of the US National

Household Survey on Drug Abuse (NHSDA)[5], with 87 915 respondents aged 12 and over (Kandel et al., 1997). For this survey, a measure of cannabis dependence was developed, inspired by DSM IV (see Appendix A). The test asked questions about tolerance, withdrawal, loss of control, how much time spent on using cannabis, negative consequences for daily life, and continued use despite knowing that cannabis causes significant problems.

Among adolescents, problems associated with physical cannabis dependence appear to be rare (Beck et al., 2004), although they are reported in some studies (Dennis et al., 2002; Martin et al., 2005). Adolescents reporting problems seem to suffer more from psychological dependence, exacerbated by the fact that cannabis is almost always mixed with tobacco. Adolescents also appear more likely to experience risky situations, concentration and motivation difficulties or problems in their relationships with their family and friends (Obradovic, 2006). However, many of these factors might derive from the fact that cannabis is an illegal substance.

As dependence is considered to be the last and most harmful stage of use, screening in general population surveys rarely aims to detect dependence and its symptoms, although there are some exceptions (e.g. the OPCS Surveys of Psychiatric Morbidity in the 1980s and 1990s in the United Kingdom; the ESA survey in Germany; the Australian National Drug Strategy Household Survey). Some questions related to dependence criteria may be included in some tests, for example the screening carried out by the Alcohol Advisory Council of New Zealand (ALAC, see Appendix A). However, other tools could be used for this purpose, such as SDS or MINI Cannabis, or the instrument developed by Kandel et al. (1997), with questions from the NHSDA.

There have been several recent attempts to develop a scale measuring problematic cannabis use. These screening instruments intend to measure problems related to cannabis use in various areas:

 (i)   consumption per se;
 (ii) physical dependence (withdrawal and tolerance);
 (iii) psychological dependence;
 (iv) social harm from use (legal difficulties, harm to relationships, work role harm, etc.); and
 (v)   health harm due to use (memory loss, physical ailments, casualties, etc.).

Many of these are familiar. DSM-IV and ICD-10 include the second and third of these dimensions in their definition of *dependence*. ICD-10 includes item (v) as *harmful use*. DSM-IV includes criteria from items (iv) and (v) as *abuse*. Some diagnostic

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[5] NHSDA is a household survey conducted by the federal government's Substance Abuse and Mental Health Services Administration (SAMHSA).

instruments also include these criteria, although they sometimes also include other harms, for example guilt or deviance from a standard context of use. Some items, like the reproaches of relatives, may enter many categories, such as social harm, health problems or dependence. Solitary smoking may indicate either dependence or social harm.

Screening scales used among adults

Although they seem to underestimate heroin, cocaine or amphetamine use disorders, general population surveys can be used to give a relevant estimate of cannabis use disorders (Rhem et al., 2005). The 2003 Epidemiological Survey on Substance Abuse (ESA) in Germany employed the Severity of Dependence Scale (SDS), as proposed by Gossop et al. (1995), to measure cannabis dependence (see Appendix A). This general population survey (self-administered questionnaires) was carried out with a sample of 8 061 adults aged 18–59 years. The SDS was used to identify subjects who showed signs of cannabis dependence. A score of three or more points was taken as a cut-off point for cannabis-related problems. Overall, 1.1 % of the sample exceeded the threshold of three or more points on the SDS and were characterised as cannabis dependent (Kraus et al., 2005). The scale consisted of five items, with each scored on a four-point scale (0–3). The greater the score, the higher the degree of psychological dependence. The total score is obtained through the addition of the five-item ratings. The scale explores strictly psychological dependence and no other areas of harm.

A team from New Zealand used the Cannabis Use Disorders Identification Test (CUDIT, see Appendix) screening instrument (Adamson and Sellman, 2003), derived by modifying the AUDIT test for alcohol (Saunders et al., 1993). This 11-question scale aims to screen for cannabis abuse or dependence. It was used in a clinical sample of alcohol-dependent adults who reported some cannabis use over the preceding six months ($n = 53$). The scale was compared with the self-reported frequency of cannabis use in the preceding six months. The scale explores the nature of consumption per se, including intensity of use and compulsive use, physical dependence, psychological dependence, social harm from use, health harm due to use, and also guilt and reproaches or blame from relatives. Several queried items could be classified as linked to more than one harm, for example cannabis consumption in the morning.

According to the authors, on the basis of the Diagnostic Interview for Genetic Studies (DIGS) providing a DSM-IV diagnosis (Nurnberger et al., 1994), the CUDIT test was better than a frequency measure (at least 80 days using cannabis), achieved positive predictive power of 84.6 % and sensitivity of 73.3 % at a cut-off of 8, compared with positive predictive power of 81.8 % and sensitivity of 60.0 % for the frequency measure. Such results indicate the viability of the CUDIT measure for identifying cannabis use

disorder in risk populations, and its use for the general population should be assessed. However, one general problem of this scale is that the reference period (6 months) would need to be adapted to European standards (last month, or last year use), defined by EMCDDA.

On several French prevention websites, a cannabis-specific adaptation of the CAGE (Cut down, Annoyed, Guilty, Eye-opener) alcohol screening test has been tried to enable self-evaluation of problematic cannabis use. CAGE explores four areas of harms: psychological dependence, social harm, guilt and physical dependence. Two positive answers out of a possible four is interpreted as indicating problematic cannabis use (Midanik et al., 1998). The test has never been validated in its cannabis version. It should, however, be noted that the alcohol version has been criticised by Bisson et al. (1999). Moreover, CAGE is not recommended as a brief alcohol screening test among adolescents, as it appears to perform less well than AUDIT or CRAFFT (Knight et al., 2003).

Some surveys focus only on one or two areas of harm; for example, a survey carried out in Ontario (Ferris et al., 1994) explored only health and social harm (see Appendix A). Alternative scales are sometimes created for self-assessment of cannabis use and its impact, such as the one developed by the Jellinek clinic in Amsterdam (Kerssemakers, 2000)[6]. The Know cannabis test has 16 questions, and can be filled out on a website. The result is accompanied by recommendations for the cannabis user. The scale explores multiple consequences of cannabis consumption per se, including spending money and compulsive use, polydrug use, motivations for use, dependence, social harm, guilt, health consequences and reproaches and blame from relatives. Again, some items may explore more than one area of harm.

Screening scales used in the youth population

Several recent studies have explored the feasibility of measuring adolescent cannabis use disorders in the general population. In Poland, a study in progress aims to assess the accuracy of a test focused on problematic herbal cannabis use in an adolescent population (Okulicz-Kozaryn and Sieroslawski, 2005). In France, Chabrol et al. (2000) conducted a study on abuse and dependence, according to the DSM-IV criteria, in a school survey. They used the MINI cannabis screening test, derived from the Mini Neuropsychiatry International Interview (Lecrubier et al., 1997; Sheehan et al., 1997; see Appendix A). The MINI tests for cannabis dependence as well as for cannabis abuse.

[6] The Jellinek test can be taken at www.knowcannabis.org.uk and www.jellinek.nl/zelfhulp/cannabis

In France, the Cannabis Abuse Screening Test (CAST) (see Appendix) was constructed to be used in general population surveys. It was used in a sample of 20 000 adolescents in the ESCAPAD survey (Beck and Legleye, 2003). CAST explores consumption per se, deviance from a common standard of use, health and social harm, and reproaches from relatives and dependence. It aims to determine two kinds of populations: adolescents with no problem and adolescents who need a diagnosis on their cannabis use (Karila et al., 2004). Clinical validation of CAST is in progress in a partnership between the French monitoring centre for drug and drug addiction (OFDT) and two specialised centres for cannabis use prevention and treatment.

CAST is used both in general population surveys and in cannabis consultation to screen problematic cannabis users and to refer them to the appropriate service. Thresholds enable practitioners to normalise the interview with the person in consultation and to gauge whether the cannabis use pattern is potentially problematic. Two positive answers highlight the need for the person to be careful about use. Three or more positive answers indicates that the use may be problematic and the person should be offered a specialised consultation to obtain help to diminish or stop use, thereby alerting clinicians that a deeper assessment is warranted. Other tests are also in the process of clinical validation in this study, such as the French versions of the CRAFFT and of the ALAC tests used as self-administered evaluation instruments. The ALAC questionnaire (see Appendix A) for the self-evaluation of cannabis use is recommended by the Alcohol Advisory Council of New Zealand (1996). Two positive answers indicate a moderate risk of abuse, and three positive answers indicate a strong risk of abuse. The ALAC questionnaire has not yet been validated, but it aims to assess the harms of reproaches, health problems, dependence and social problems. It appears to be problematic compared with the other tests, as several of the questions do not mention drugs at all.

Longer screening tests

Other scales, which query a greater number of harms, have been used among specific populations. For example, the Cannabis Problems Questionnaire (CPQ) was very recently modelled (Copeland et al., 2005; Martin et al., 2006) on the 46 items of the Alcohol Problems Questionnaire (APQ; Williams and Drummond, 1994). The study was conducted among 72 adolescents smoking at least 15 days per month. It left the final CPQ as a 22-binary-item scale, which seems to be an efficient and reliable measure of cannabis-related problems for use with populations of current cannabis users, offering more than 80 % sensitivity and specificity, according to DSM IV criteria.

Heishman et al. (2001) have developed and validated the Marijuana Craving Questionnaire (MCQ), a 47-item multidimensional questionnaire on marijuana craving, based on the model of the Questionnaire on Smoking Urges (Tiffany and Drobes,

1991) and the Cocaine Craving Questionnaire (Tiffany et al., 1993). In their study, current marijuana smokers ($n = 217$) not seeking treatment completed forms assessing demographics, drug use history, marijuana quit attempts and current mood. The findings suggested that four specific constructs characterise craving for marijuana: compulsivity — an inability to control marijuana use; emotionality — use of marijuana in anticipation of relief from withdrawal or negative mood; expectancy — anticipation of positive outcomes from smoking marijuana; and purposefulness — intention and planning to use marijuana for positive outcomes. Heishman et al. (2001) found that the MCQ is a valid and reliable instrument for assessing marijuana craving in individuals not seeking drug abuse treatment, and that marijuana craving can be measured in the absence of withdrawal symptoms.

The Marijuana Effect Expectancy Questionnaire (MEEQ) assesses motivation to use marijuana (Schafer and Brown, 1991). It has 70 yes/no format items with agree/disagree instructions similar to those of the Alcohol Expectancy Questionnaire (AEQ). Subjects are asked to respond according to their own beliefs and whether they have actually used marijuana. Although MEEQ is not designed for general clinical screening, it contains items with potential for screening. It has been tested in a psychometric evaluation on 279 adolescents from a clinical and community sample (Aarons et al., 2001) and on 149 males from a clinical sample (Galen and Henderson, 1999).

The Marijuana Screening Inventory (MSI-X) is a 39-binary-item scale. Thirty-one of the items are used to calculate a simple score to classify into one of the four following categories: no problem; normal or experimental marijuana use; potentially problematic marijuana use; and problematic marijuana use. The study was conducted on a sample of 420 military reservists (a convenience sample). The MSI-X was found to be promising, especially for rapid diagnosis assessment, but a clinical validation is yet to be conducted (Dale, 2003).

These instruments seem, at a first glance, to be too long to apply as part of a general population survey. The application of such instruments requires more time than available in most cases in population surveys, and sometimes skilled interviewers, too. They have only been tested in clinical populations, which might not be sufficient to assess their applicability in the general population.

Discussion

This chapter presents the main tools aiming to screen different kinds of cannabis use and problems resulting from it. It is not an exhaustive presentation of the published literature, yet it provides concise discussion of the concepts and tests developed so far.

There is evidence that cannabis use sometimes leads to problems, and these problems are now a major concern in the field of public health. As a consequence, many surveys try to evaluate the proportion of cannabis users who suffer problems resulting from cannabis use or the proportion of dependent users. The largest recent surveys were conducted in the USA and Australia. Estimations vary and depend on the instruments used. In Australia, the National Survey of Mental Health and Well-being conducted a study in 1997 among a representative sample of 10 600 people of the Australian population aged 18 and over, and used DSM-IV and ICD-10 diagnoses. Swift et al. (2001) found that 1.5 % (DSM-IV) or 1.7 % (ICD-10) of this population was cannabis dependent, with marked differences in symptom prevalence. The proportions among cannabis users during the last 12 months were 21 % (DSM-IV) and 22 % for ICD-10. In the USA, according to a recent NHSDA survey (SAMHSA, 2002), 2 % of people aged 12 and over fulfilled DSM-IV criteria for cannabis dependence or abuse during the last 12 months. The proportion among those aged 18–25 years was 6 %. According to this survey, 17 % of last year cannabis users fulfilled criteria for cannabis dependence or abuse.

The concepts and definitions used in the DSM and in the ICD are controversial, and not all studies support the idea that cannabis smokers develop *dependence* as well as *abuse* (see also Witton, this monograph, Vol. 2). In a study by Hollister (1986), for instance, cannabis was given to subjects for a certain period of time in order to study the effects of interruption of the supply. The first attempts failed, but this may be due to amounts of cannabis, which were too small, and a period of supply, which was too short, for ethical reasons. Many authors do, however, confirm that dependence can occur with long-term use: patients who receive significant doses over a long period of time develop symptoms such as occasional perspiration, slight nausea, anxiety and sleeplessness (Compton et al., 1990; Jones, 1996; Crowley et al., 1998; Haney et al., 1999a,b; Vandrey et al., 2005). Despite this general agreement, Jones (1996) emphasises that frequency of dosing and dose interval are more important than daily dose for producing a cannabis withdrawal syndrome. Typical patterns of cannabis use appear to be non-optimal conditions to get an obvious withdrawal syndrome, though less obvious symptoms may be relevant when treating cannabis-dependent patients. Smith (2002) points out that these symptoms are not specific for cannabis (they can be observed with tobacco) and vary with the psychological profile of the individual. Coffey et al. (2002), argue that tolerance might be useless in clinical assessment of cannabis dependence.

The list of criteria used for psychological dependence for all drugs in the DSM-IV definition of dependence appears non-exhaustive. In addition, some of these criteria have been criticised for not seeming relevant for certain researchers (Soellner, 2002). For example, criterion 7, dealing with the continuation of use despite the recognition of its contributing role to some psychic or physical problems, ignores the eventuality that the user might have no intention of stopping use and, on the contrary, might rationally

choose to continue to use it because it provides greater benefits. This possibility has not been investigated. Indeed, the challenge of adapting a generic mental health standard, such as DSM-IV, to use of a specific drug is illustrated in the discrepancy between DSM-IV's definition of dependence for all drugs and the criteria it proposes for cannabis.

Problems with conceptualising harmful use and thresholds are compounded by the difficulties of developing the screening tools themselves. Measures such as MINI use items from the 'problem domain' and refer to them as criteria of dependence. It also seems problematic to define dependence by its consequences, for example criterion 6 in the DSM-IV. As the definition of dependence is so strictly delimited in DSM, a link between dependence and its potential consequences cannot be proven (Soellner, 2002). 'Drift' in the use of items from the problem domain can also be criticised as these items do not measure whether users intend to quit. Intention to quit is crucial, as research shows that cannabis users argue that they would and could quit if cannabis consumption led to suffering (Swift et al., 1998), and cannabis use is not necessarily viewed as a problem by dependent users.

Other variables are also problematic. Some of the dependence criteria, such as spending a great deal of time around the substance, might be confounded by the illegality of the drug (this is a problem for MINI and ICD-10, for instance). In CUDIT and CAGE there is a question about feelings of guilt after using cannabis, which could also be confounded by the illegality of the drug. Thus, most screening measures combine the dimensions of psychological dependence and harm. This is true of CUDIT, MINI and CAST, and thus it is not clear what they are screening for: dependence? Or abuse? These are concepts that DSM-IV makes a serious attempt to separate, and combining the two areas is problematic for an illicit substance: many of the problems have resulted from the fact that cannabis is illegal.

In general, analysis of diagnostic tools, such as DSM-III, DSM-IV and ICD, used as severity scales for drug dependence shows that diagnostic algorithms greatly influence the results (Langenbucher et al., 1995). A comparison between DSM-III R and DSM-IV emphasises the influence of the evolution of the diagnostic criteria on the screening results (Mikulich et al., 2001). These problems question the very nature of the concepts of addiction: what should be measured, why and how?

An examination of concepts used in American and European definitions of the stages of drug use disorders reveals some cultural differences. For example, the definition of *drug abuse*, according to the American DSM-IV, contains moral criteria and characteristics, either in the concepts themselves or in the wording of the concepts, whereas the European definition of *harmful use*, according to the ICD-10, seems more pragmatic. Law transgression or failing in social roles are included in DSM-IV's definition of *abuse*, in addition to *using despite knowledge that damage results from use*. Use in hazardous

situations, such as driving, may be seen as risky behaviour that increases risk of being injured or of causing injury, yet an accident may never occur. In DSM-IV's definition of dependence, criterion 7 presupposes that use itself is bad, even if it brings a benefit and contributes to the psychological balance of the user, who might have made a rational decision to continue using. In a sense, the user under DSM-IV is presupposed to have a social duty and responsibility: he or she must conform to social and legal norms. Users' knowledge of the law and their psychological reaction both contribute to the definition of *abuse*. Such moral rationale seems less present in ICD-10's definition of *harmful use*, although these concepts should perhaps be examined when defining drug-related harm.

Conclusion

Measuring the proportion of problematic or dependent cannabis users from among the wider cannabis user base is complex. It presents far more challenges than measuring prevalence by lifetime or last month cannabis use in general population surveys. Faced with an increase in cannabis use, policymakers may choose to add some tools to general population surveys or the monitoring instruments used by addiction treatment centres.

Today, a great number of concepts and tools exist to monitor problematic cannabis use, and they vary in terms of both quality and robust scientific validation. Nonetheless, these instruments do offer valuable insights into use patterns. Implementing a common screening tool, even if not validated, can deliver important information to inform the fields of prevention and treatment. Policymakers should be prepared for some criticism based on the lack of consensus surrounding dependence and abuse, but screening at least delivers a base of knowledge that can be used by specialists in defining public policy.

There is clearly a need to develop screening tools that are more reliable in measuring adverse effects of cannabis use than those presently in use. Some existing instruments, such as CIDI and CAST, go some way to providing a standard, practical tool, and can provide a basis for further work. In Europe, screening projects for cannabis are under way in Germany, France, the Netherlands, Poland, Portugal, the United Kingdom and, most recently, Spain (EMCDDA, 2007). It is hoped that such initiatives will help to develop a reliable and comparable indicator of problematic cannabis use in the general population.

Acknowledgement

Appendix A: List of tests and references

A DSM-IV dependence adapted in National Household Survey on Drug Abuse — Kandel et al. (1997)
B SDS (Severity Dependence Scale) — Gossop et al. (1995)
C CUDIT (Cannabis Use Disorders Identification Test) — Adamson and Sellman (2003)
D CAGE-cannabis — Midanik et al. (1998)
E Ontario alcohol and other drug opinion survey — Ferris et al. (1994)
F *Know cannabis* test — Kerssemakers (2000)
G MINI-cannabis — Lecrubier et al. (1997), Sheehan et al. (1997)
H CAST (Cannabis Abuse Screening Test) — Beck and Legleye (2003)
I ALAC (Alcohol Advisory Council of New Zealand) — ALAC (1996)
J CPQ (Cannabis Problem Questionnaire) — Copeland et al. (2005)
K MCQ (Marijuana Craving Questionnaire) — Heishman et al. (2001)
L MEEQ (Marijuana Effect Expectancy Questionnaire) — Schafer and Brown (1991)
M MSI-X (Marijuana Screening Inventory) — Dale (2003)

A: Measuring cannabis dependence based on DSM IV (Kandel et al., 1997) (the numbers refer to DSM items, the following sentences to the corresponding question in the NHSDA)

1 Tolerance: during the past 12 months, for which drugs have you needed larger amounts to get the same effect; that is, for which drugs could you no longer get high on the same amount you used to?
2 Withdrawal: for which drugs have you had withdrawal symptoms; that is, you felt sick because you stopped or cut down on your use of them during the past 12 months?
3 Greater use than intended: which drugs have you felt that you needed or were dependent on in the past 12 months?
4 Unsuccessful efforts to cut down or control: during the past 12 months, for which drugs have you consciously tried to cut down on your use? During the past 12 months, for which drugs have you been unable to cut down on your use, even though you tried?
5 Great deal of time spent in using: have you used three joints or more nearly daily (three times or more a week) in the past 30 days; or 2 oz or more (86 joints or more or 43 g or more) in the past 30 days; or traded service for cannabis?
6 Reduction in social, occupational or recreational activities: as a result of drug use, at any time in your life, did you, in the past 12 months, get less work done than usual at school or on the job?
7 Continued using cannabis despite knowing it caused significant problems: as a result of drug use at any time in your life, did you in the past 12 months … (become depressed; have arguments/fights with family and friends; feel completely alone and isolated;

feel very nervous and anxious; find it difficult to think clearly; have health problems; feel irritable and upset; feel suspicious and distrustful of people; find it harder to handle your problems; have to get emergency medical help; have someone suggest you seek treatment)?.

B: SDS (Gossop et al., 1995)

In the past year:

A Did you think your use of cannabis was out of control?
B Did the prospect of missing cannabis or not chasing make you anxious or worried?
C Did you worry about your use of cannabis?
D Did you wish you could stop?
E How difficult did you find it to stop, or go without cannabis?

C: The Cannabis Use Disorders Identification Test (CUDIT)
(Adamson and Sellman, 2003)

A   Have you used any cannabis over the past 6 months?   Yes   No

If yes:

1	How often do you use cannabis?	Never	Monthly or less	2–4 times a month	2–3 times a week	4 times a week or more
		0	1	2	3	4
2	How many hours were you 'stoned' on a typical day when you had been using cannabis?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more
		0	1	2	3	4
3	How often were you 'stoned' for six or more occasions?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
		0	1	2	3	4
4	How often during the past six months did you find that you were not able to stop using cannabis once you had started?	0	1	2	3	4
5	How often during the past six months did you fail to do what was normally expected from you because of using cannabis?	0	1	2	3	4
6	How often during the past six months have you needed to use cannabis in the morning to get yourself going after a heavy session of using cannabis?	0	1	2	3	4
7	How often during the past six months did you have a feeling of guilt or remorse after using cannabis?	0	1	2	3	4
8	How often in the past six months have you had a problem with your memory or concentration after using cannabis?	0	1	2	3	4
9	Have you or someone else been injured as a result of your use of cannabis over the past six months?	No			Yes	
		0			4	
10	Has a relative, friend or doctor, or other health worker been concerned about your use of cannabis or suggested that you should cut down over the past six months?	No			Yes	
		0			4	

D: CAGE (Cut down, Annoyed, Guilty, Eye-opener) questionnaire for cannabis smoking (Midanik et al., 1998)

1 Have you ever tried to, or felt the need to, Cut down on your smoking?
2 Do you ever get Annoyed when people tell you to quit smoking?
3 Do you ever feel Guilty about smoking?
4 Do you ever smoke within half an hour of waking up (Eye-opener)?

E: Ontario alcohol and other drug opinion survey

Was there ever (and in the last 12 months) a time that you felt your use of marijuana had a harmful effect on your:

A friendship or social life?
B physical health?
C home life or marriage?
D work, studies or employment opportunities?
E financial position?

F: Know cannabis test

Source: Kerssemakers (2000). Also available at www.knowcannabis.org.uk/ and www.jellinek.nl/zelfhulp/cannabis/

1 How often do you smoke cannabis?
   1 a few times a year (0)
   2 once or twice a month (0)
   3 once or twice a week (1)
   4 almost every day (2)

2 How much money do you spend on cannabis in an average week? (Base your answer on what you pay, or should have to pay, as a consumer.)
   1 3 euros or less (0)
   2 3 to 9 euros (1)
   3 10 to 25 euros (2)
   4 more than 25 euros (2)

3 How often are you stoned?
   1 more than half of the day (2)
   2 a few hours every day (2)
   3 a few times a week (1)
   4 a few times a month (0)
   5 once a month or less (0)

4   When you smoke cannabis, how often do you light up a second joint or pipe to get extra stoned?
    1   never (0)
    2   sometimes (0)
    3   regularly (1)
    4   almost always (2)

5   Do you ever smoke cannabis in combination with other drugs or alcohol?
    1   yes, often (2)
    2   yes, sometimes (1)
    3   no, never (0)

6   When do you usually smoke cannabis? (More than one answer possible.)
    1   morning (1)
    2   afternoon (1)
    3   evening (1)
    4   night (1)

7   What are (three of) the most important reasons why you use marijuana and/or hash?
    1   it's more fun than drinking alcohol (0)
    2   to relieve boredom (1)
    3   to feel good (0)
    4   I'm just accustomed to taking it/it's part of the game (1)
    5   it's nice to smoke with friends (0)
    6   to relieve feelings of depression (1)
    7   to help me relax, like before going to sleep (0)
    8   to perform or concentrate better (1)
    9   I forget my problems for a while (2)
    10 to change the effects of other substances (drugs or alcohol) (1)
    11 I don't know (0)

8   When you smoke cannabis, what people do you usually smoke with?
    1   always with friends (0)
    2   usually with friends, but sometimes alone (0)
    3   usually alone, and sometimes with friends (1)
    4   always alone (2)

9   Could you stop smoking marijuana or hash whenever you want?
    1   no, I couldn't (2)
    2   maybe, but it would take me a lot of trouble (1)
    3   probably, but not without some trouble (0)
    4   sure, I would have no trouble at all (0)

10 How often have you thought to yourself in the past year, 'I should cut down or stop'?
    1   never (0)
    2   a few times (0)
    3   once a month (1)
    4   once a week (2)
    5   almost every day (2)

11 In the past year, how often has your use of cannabis affected your performance in your work or studies?
    1   never (0)
    2   a few times (0)
    3   once a month (1)
    4   once a week (2)
    5   almost every day (2)

12 Do you sometimes put things off or procrastinate because you are stoned?
    1   no, never (0)
    2   yes, sometimes (0)
    3   yes, regularly (1)
    4   yes, almost always (2)

13 Have you ever felt extremely frustrated because you couldn't smoke cannabis when you wanted to?
    1   no, never (0)
    2   yes, sometimes (0)
    3   yes, quite often (1)
    4   yes, almost always (2)

14 How often in the past year have you felt worried about your use of cannabis?
    1   never (0)
    2   a few times during the year (0)
    3   a few times a month (1)
    4   a few times a week (2)
    5   every day (2)

15 Do you ever have trouble remembering what you said or did?
    1   no, never (0)
    2   yes, sometimes (0)
    3   yes, quite often (1)
    4   yes, almost all the time (2)

16 Has a friend or acquaintance of yours who also smokes cannabis ever told you that you really need to cut down on marijuana or hash?
  1 yes, sometimes (0)
  2 yes, regularly (1)
  3 no (0)
  4 no, because they don't know I smoke it (2)

Score ranges:

0–5:   No added risk, although taking drugs always carries risks.
6–15:   Definite risk. You're taking too many chances. Try to reduce the risks of your drug use.
16–36: Serious risk. Your drug use is getting out of hand.

G: MINI cannabis (Sheehan et al., 1997)

Considering your use of cannabis in the past 12 months:

A Have you found that you needed to use more cannabis to get the same effect that you did when you first started taking it?   Yes   No

B When you reduced or stopped using cannabis, did you have withdrawal symptoms (aches, shaking, fever, weakness, diarrhoea, nausea, sweating, heart pounding, difficulty sleeping, or feeling agitated, anxious, irritable, or depressed)? Did you use any drug(s) to keep yourself from getting sick (withdrawal symptoms) or so that you would feel better?   Yes   No

C Have you often found that when you used cannabis you ended up taking more than you thought you would?   Yes   No

D Have you tried to reduce or stop taking cannabis but failed?   Yes   No

E On the days that you used cannabis, did you spend substantial time (> 2 hours), obtaining, using or in recovering from the drug, or thinking about the drug?   Yes   No

F Did you spend less time working, enjoying hobbies, or being with family or friends because of your cannabis use?   Yes   No

G Have you continued to use cannabis, even though it caused you health or mental problems?   Yes   No

Considering your use of cannabis in the past 12 months:

H Have you been intoxicated, high, or hungover from cannabis more than once, when you had other responsibilities at school, at work, or at home? Did this cause any problem?   Yes   No

I Have you been high or intoxicated from cannabis more than once in any situation where you were physically at risk (for example, driving a car, riding a motorbike, using machinery, boating, etc.)?   Yes   No

J Did you have legal problems more than once because of your drug use, for example, an arrest or disorderly conduct?   Yes   No

K Did you continue to use cannabis, even though it caused problems with your family or other people?   Yes   No

H: Cannabis abuse screening test (CAST) (Beck and Legleye, 2003)

		No	Yes
	During the last 12 months:		
1	Have you ever smoked cannabis *before midday*?	0	1
2	Have you ever smoked cannabis *when you were alone*?	0	1
3	Have you ever had *memory problems* when you smoke cannabis?	0	1
4	Have *friends or members of your family* ever told you that you ought to reduce your cannabis use?	0	1
5	Have you ever tried to reduce or stop your cannabis use *without succeeding*?	0	1
6	Have you ever had problems *because of your use* of cannabis (argument, fight, accident, bad result at school, etc.)? Which: …………………………………………………	0	1

I: ALAC (ALAC, 1996)

1	Have people close to you complained about your cannabis use?	1 ☐ Yes	2 ☐ No
2	Do you have problems with short-term memory?	1 ☐ Yes	2 ☐ No
3	Have you experienced 'paranoid' episodes following cannabis use?	1 ☐ Yes	2 ☐ No
4	Do you consider it difficult to go through a day without a 'joint'?	1 ☐ Yes	2 ☐ No
5	Do you lack the energy to get things done in the way you used to?	1 ☐ Yes	2 ☐ No
6	Do you ever worry about the effects of your cannabis use?	1 ☐ Yes	2 ☐ No
7	Do you have more difficulty in understanding new information? (difficulty in studying)	1 ☐ Yes	2 ☐ No
8	Have you ever unsuccessfully attempted to cut down or stop your cannabis use?	1 ☐ Yes	2 ☐ No
9	Do you like to get 'stoned' in the morning?	1 ☐ Yes	2 ☐ No
10	Are you spending more and more time 'stoned'?	1 ☐ Yes	2 ☐ No
11	Do you experience cravings, headaches, irritability or difficulty in concentration when you cut down or cease cannabis use?	1 ☐ Yes	2 ☐ No

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Chapter 3
Patterns of cannabis use among students in Europe

Keywords: adolescent prevalence – cannabis – epidemiology – Europe – ESPAD – schools – survey

Setting the context

Cannabis is the most used illicit drug among adolescents in Europe. The European School Survey Project on Alcohol and Other Drugs (ESPAD) is the key transnational instrument for comparing adolescent cannabis consumption in Europe. This chapter provides a summary of recent ESPAD findings on cannabis.

Use of alcohol, illegal drugs and other substances among young people is of great concern in all countries. Acute consequences can be harmful for the individual and negatively affect the development and future well-being of an adolescent. Another concern is that the heavier the use in adolescence, the larger the risk an individual may encounter substance-related problems in the future [1].

The literature is plentiful on suggested associations between early-onset drug consumption and wider psychosocial problems, both in late adolescence and in later adulthood [2]. However, cannabis is usually placed in a wider psychosocial context of risk factors, and direct causal links are not attributed to the drug. Still, studies among youth detention centres and school drop-outs, for example, highlight associations between delinquent behaviour and high prevalence of intensive drug or alcohol consumption [3].

[1] For a wider discussion of risk factors and cannabis use, see Coggans, this monograph.
[2] A review of psychosocial correlates with ESPAD data (Bulgaria, Croatia, Greece, Romania, Slovenia and United Kingdom) was recently carried out (Kokkevi et al., 2007).
[3] A study in Spain by the Centro de Estudios sobre Promoción de la Salud (CEPS, 2004) of a sample of youths at protection and reform centres found approximately one-third reported weekly cannabis use. Two Dutch studies (Korf et al., 2005; Vreugdenhil, 2003) also reported high prevalence of cannabis use among youths in detention centres (see Dutch National Focal Point, *Netherlands* National report, 2006).

Moving from deviant patterns to normative behaviour, studies have suggested correlations between cannabis use and impaired educational performance, and (less strongly) occupational performance, interpersonal relationships, mental health issues and suicide [4].

There is also a strong economic argument for building strong epidemiological data to inform cannabis prevention activities [5]. With school drug prevention budgets in the larger Member States running to tens of millions of euros, it is not surprising that debate in the area is lively. Points of contention include: the 'gateway' or 'stepping stone' theory (cannabis use as a risk factor for use of 'harder' drugs) [6]; effects on adolescent neurological development (including some genetic predisposition debate); means to evaluate the efficacy of programmes [7]; polydrug patterns in adolescents, in particular correlations to alcohol, tobacco and inhalant misuse; the dangers of episodic or 'binge' patterns; the role to be played by prevention actors (peers, teachers, family, drugs workers, police); and delivery of drug prevention in the context of general health programmes (smoking, alcohol, sex education, obesity, healthy lifestyles) [8].

Beyond the enormous volume and varied quality of school prevention and harm reduction materials (websites, brochures, films, cartoons, posters), a number of recent European publications have sought to distil the research literature into practical publications. Resources include practical guidelines for teachers and parents [9], screening instruments [10] and grey literature (see Appendix). On the internet, the *Drugs*

[4] A useful synthesis is given by Hall and Pacula (2003); see further reading list. Key studies include: Lynskey and Hall (2000); Macleod et al. (2004); the ESTUDES project (Spain, 2004); and Silva and de Deus (2005).

[5] For a wider discussion of prevention in Europe, see Burkhart, this monograph.

[6] For a concise analysis of the gateway theory, see 'What is the current evidence for cannabis as a gateway drug?' in the 2006 Australian publication *Evidence-based answers to cannabis questions: a review of the literature* (Copeland et al., 2006). Longer analysis can be found in Chapter 10 of *Cannabis use and dependence* (Hall and Pacula, 2003).

[7] The EU-Dap study (Austria, Belgium, Germany, Greece, Italy, Spain, Sweden) has reported on evaluation mechanisms for school-based drug prevention programs (Faggiano et al., 2005) — see www.eudap.net. A strong introduction to the principles of school drug prevention evaluation is the Australian government's *Principles for school drug education* (2004) and its series of eight monographs, *Innovation and good practice in drug education* (2003).

[8] A long-running study in the area of general health concerns is the WHO's *Health behaviour in school-aged children*. See www.hbsc.org/

[9] Publications include: *Unplugged*, a teaching manual produced in the context of the EU-Dap project (www.eudap.net); in Germany, *Schule und Cannabis* (BZgA, 2004) and materials for the *Bekifft in der Schule* project (SuchtPräventionsZentrum Hamburg, 2004); in Switzerland, *Ecoles et cannabis* (OFSP, 2004); in France, *Repérage précoce de l'usage nocif de Cannabis* (INPES, 2006); in the United Kingdom, *School drug policy: a review process* (Blueprint, UK Home Office, 2004) and *Advice for teachers on delivering drug education* (Drug Education Forum, 2004). A Rowntree Foundation study of cannabis supply routes to adolescents is scheduled for 2008 (see www.jrf.org.uk/knowledge/wip/record.asp?ID=804400).

[10] For a discussion of screening instruments, see Beck and Legleye, this monograph.

Education Forum's newsblog ([11]) has evolved into a strong channel for practitioner information and debate in the area. Cross-border cooperation training (study visits, staff exchange) in school drug programmes is likely to benefit from funding under a current European Commission programme on drugs prevention and information ([12]).

Further reading

Drugs in Focus No. 5: *Drug prevention in EU schools* (EMCDDA, 2002) — includes a short reading list.

Drugs in Focus No. 10: *Drug use amongst vulnerable young people* (EMCDDA, 2004) — includes a short reading list.

EMCDDA website on school-based universal prevention
www.emcdda.europa.eu/index.cfm?nnodeid=1578

ESPAD website
www.espad.org/

Hall, W., Pacula, R. (2003), 'Adolescent psychosocial outcomes', Chapter 11 in *Cannabis Use and Dependence: Public Health and Public Policy*, Cambridge University Press.

McBride, N. (2005), 'The evidence base for School Drug Education Interventions', in Stockwell, T., Gruenewald, P. J., Toumbourou, J. W., Loxley, W. (eds), *Preventing harmful substance use: the evidence base for policy and practice*, John Wiley and Sons, Chichester, 101–112.

Soole, D. W., Mazerolle, L., Rombouts, S. (2005), *Monograph No. 07: School based drug prevention: a systematic review of the effectiveness on illicit drug use*, DPMP Monograph Series, Fitzroy: Turning Point Alcohol and Drug Centre.

Recent focused publications

Youth detention centres

CEPS (2004), *Análisis de la situación de los centros de protección y reforma en el ámbito de la prevención*, Centro de Estudios de Promoción Social, Madrid.

Korf, D. J., Benschop, A., Rots, G. (2005), 'Geweld, alcohol en drugs bij jeugdige gedetineerden en school drop-outs', *Tijdschrift voor Criminologie* 47(3): 239–254.

Vreugdenhil, C., Van den Brink, W., Wouters, L. F., Doreleijers, T. A. (2003), 'Substance use, substance use disorders, and comorbidity patterns in a representative sample of incarcerated male Dutch adolescents', *Journal of Nervous and Mental Disease* 191(6): 372–378.

Cannabis, schools and educational performance

Faggiano, F., Vigna-Taglianti, F., Versino, E., Zambon, A., Borraccino, A., Lemma, P. (2005), 'School-based prevention for illicit drugs use', The Cochrane Database of Systematic Reviews 2005, Issue 2.

Lynskey, M., Hall, W. (2000), *Educational outcomes and adolescent cannabis use*, NSW Department of Education and Training, Sydney.

([11]) http://drugeducationforum.blogspot.com/
([12]) Ref. COD 2006/0037 Belgium;
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52006PC0230(02):EN:NOT

Macleod, J., Oakes, R., Copello, A., Crome, I., Egger, M., Hickman, M.,Oppenkowski, T., Stokes-Lampard, T., Smith, G. (2004), 'Psychological and social sequelae of cannabis and other illicit drug use by young people: a systematic review of longitudinal, general population studies', *The Lancet* 363(9421): 1579–1588.

Plan Nacional Sobre Drogas (2004), *Encuesta estatal sobre uso de drogas en enseñanzas secundarias* [State survey on drug use in secondary schools] (ESTUDES) 1994–2004, Plan Nacional Sobre Drogas, Madrid.

Silva, A., de Deus, A. (2005), 'Comportamentos de consumo de haxixe e saúde mental em adolescentes: Estudo comparativo', *Análise Psicológica* 2(23): 151–172.

Gateway theory

Copeland, J., Gerber, S., Swift, W. (2006), *Evidence-based answers to cannabis questions*, National Drug and Alcohol Research Centre, University of New South Wales, Sydney, 51.

Morall, A. R., McCaffrey, D. F., Paddock, S. M. (2002), 'Reassessing the marijuana gateway effect', *Addiction* 97(12): 1493–1504.

Patterns of cannabis use among students in Europe

Björn Hibell and Barbro Andersson

Debate on policy and prevention for young people requires accurate data. This is the rationale that drives the European School Survey Project on Alcohol and Other Drugs (ESPAD)[13]. ESPAD collects comparable data on alcohol, tobacco and drug use among students aged 15–16 years in European countries. It also monitors trends in alcohol and drug habits among students in Europe and compares trends between countries and groups of countries.

ESPAD began in the early 1990s. So far, data have been collected three times in an increasing number of countries[14]. The first survey was done in 1995 with 26 participating countries, the second in 1999 with 30 countries and the third in 2003 with 35 countries. More than 100 000 students answered the ESPAD questionnaire in 2003. The surveys were carried out on nationally representative samples of school classes[15]. However, there were three exceptions from this. One is Germany, in which the study was limited to 6 out of 18 Bundesländer. In Turkey, data were collected in six large cities, and in Russia the survey was carried out only in Moscow. In addition to the 35 countries that participated in the 2003 data collection, the report also included data from Spain (collected in 2002) and the USA (Hibell et al., 2003).

Awareness of cannabis: a well-known drug

Of all illicit drugs, marijuana and hashish[16] are the best known by students aged 15–16. This is true for nearly all countries and among boys as well as girls: gender differences for cannabis awareness are small. Looking at the averages of all the 35 ESPAD countries in the 2003 data collection, 92 % of students admitted that they had heard of marijuana and hashish. Equally well known are cocaine and heroin (91 % each). Next in terms of awareness are ecstasy (83 %) and amphetamines (66 %). In some countries nearly all students have heard about marijuana or hashish. This is the

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[13] The ESPAD website is at www.espad.org

[14] 'Country' here refers to a political entity, but not necessarily a national state. Such subnational entities as the Faroe Islands and the Isle of Man are included.

[15] A full description of survey methodology is available on the ESPAD website at www.espad.org/method.asp.

[16] 'Marijuana and hashish' is used together with 'cannabis' in this chapter as 'marijuana and hashish' are the terms used in the ESPAD questionnaire. Elsewhere in the monograph, 'herbal cannabis' and 'cannabis resin' are the preferred terms.

case among 95% or more of the students in 11 ESPAD countries. The highest figures (98–99%) are found in the Czech Republic, France and Slovakia. The lowest proportion of students who have heard of cannabis products is found in Turkey (six cities), where 68% of the students reported that they were aware of cannabis. In all other countries, 81% or more of the students reported that they had heard of cannabis.

Availability: the most available illicit drug

To measure the perceived availability of different substances the ESPAD students were asked the following question: 'How difficult do you think it would be for you to get each of the following?'. For each of the listed substances the response categories were: 'impossible', 'very difficult', 'fairly difficult', 'fairly easy', 'very easy' and 'don't know'. Besides beer, wine and spirits, the highest proportion of students answering 'very easy' and 'fairly easy' is for inhalants (41%, in ESPAD 2003).

However, if one looks only at illegal drugs, cannabis is the drug that is perceived as most available. On average, this was the case for a little more than one-third of the students in the ESPAD countries (35%). Other substances perceived to be readily available are tranquillisers and sedatives (21%), followed by ecstasy (17%). The perceived availability differs widely between countries; from 7% in Turkey (six cities) to 60% in Ireland. In seven countries a majority of the students answered that marijuana or hashish is 'very easy' or 'fairly easy' to obtain. These include the Czech Republic, Ireland and the United Kingdom (58–60%), as well as Denmark, the Isle of Man, Slovenia and Switzerland (51–55%). Hence, countries with high perceived availability of cannabis are spread throughout Europe. However, more of them are found in the north-west, including all the countries of the British Isles.

A high perceived availability is also found in the two non-ESPAD countries from which some data are available in the ESPAD report. In Spain 67% of the students reported that marijuana or hashish was 'very easy' or 'fairly easy' to get, and in the USA the figure was even slightly higher (74%). Turkey (six cities) showed particularly low perceived availability (at 7%), and other countries reporting low perceived availability were Cyprus, Romania and Ukraine, at 10–13%.

Supply channels: mainly available in discos and bars

ESPAD students were asked where they thought that they could easily buy marijuana or hashish if they wanted it. The proportion of students reporting places of purchase varies considerably between countries. In some countries many students do not know where

to buy cannabis. The highest figures in this respect are found in Turkey (six cities) and Ukraine (80–83 %), followed by Romania and Russia (69–73 %). 'Disco, bar, etc.' is the option selected by most students. The ESPAD average was 27 % in 2003, followed by 'street, park, etc.' (23 %) and 'home of a dealer' (21 %). In 20 countries the option 'discos, bar, etc.' was recognised as the easiest place to buy cannabis. 'Streets and parks' was the most popular option in seven countries and 'home of a dealer' in six.

When looking at individual countries, the highest figure for 'discos and bars' was found in the Czech Republic, where 55 % gave this answer. Other countries with high figures (40–46 %) include Belgium, Denmark, Germany (six Bundesländer), Austria and Slovakia. 'Streets and parks' was reported mainly from Italy (45 %), followed by Belgium, Ireland, Norway, Slovenia and Switzerland (35–38 %). The highest figures for 'home of a dealer' were found in France, Italy and the United Kingdom (39–43 %). However, the highest single figure is found in the Netherlands, where 60 % of the students answered 'coffee shops' ([17]). This category was included only in the Dutch and Belgian questionnaires. In Belgium it was mentioned by a far smaller number of students than in the Netherlands (29 %).

The availability of drugs in schools is a sensitive issue ([18]). However, on average, 'schools' was the least reported option for purchasing cannabis. Nonetheless, 16 % of ESPAD students reported availability at school. The variation between the countries with the smallest and highest figure is large. Among Italian students, as many as 43 % reported that cannabis products could easily be bought in schools. Other countries with high figures include Belgium, the Czech Republic, France and Ireland, where 30–36 % gave this answer. Countries in which only 3 % of the students reported that cannabis was easily available in schools include the Faroe Islands, Greenland, Turkey (six cities) and the Ukraine. Responses about places where marijuana and hashish can easily be bought are similar for both boys and girls. The most striking gender difference in the ESPAD averages is that more girls (30 %) than boys (24 %) answered that they can buy cannabis products at a disco or a bar. Among the boys there is no difference in the averages for the two alternatives 'disco, bar, etc.' (24 %) and 'street, park, etc.' (25 %).

[17]   'Coffee shop' in this context refers to the category of shops in the Netherlands where cannabis is openly available to those aged 18 and above (see Korf, this monograph).
[18]   With regard to legislative approaches to cannabis possession, a number of countries include references to cannabis use which places minors at risk. See the ELDD map of European legislation on cannabis possession at: http://eldd.emcdda.europa.eu/index.cfm?nnodeid=5769

Lifetime prevalence: the most widely used illicit drug, yet large differences between countries

Cannabis is the most commonly used of all the illicit drugs([19]) (Figure 1). In 2003 the ESPAD average for lifetime cannabis prevalence was 21%. However, the proportion of students who have tried cannabis varies from 3 to 44% between countries.

Figure 1: Lifetime experience of marijuana or hashish. Percentages among boys and girls, 2003
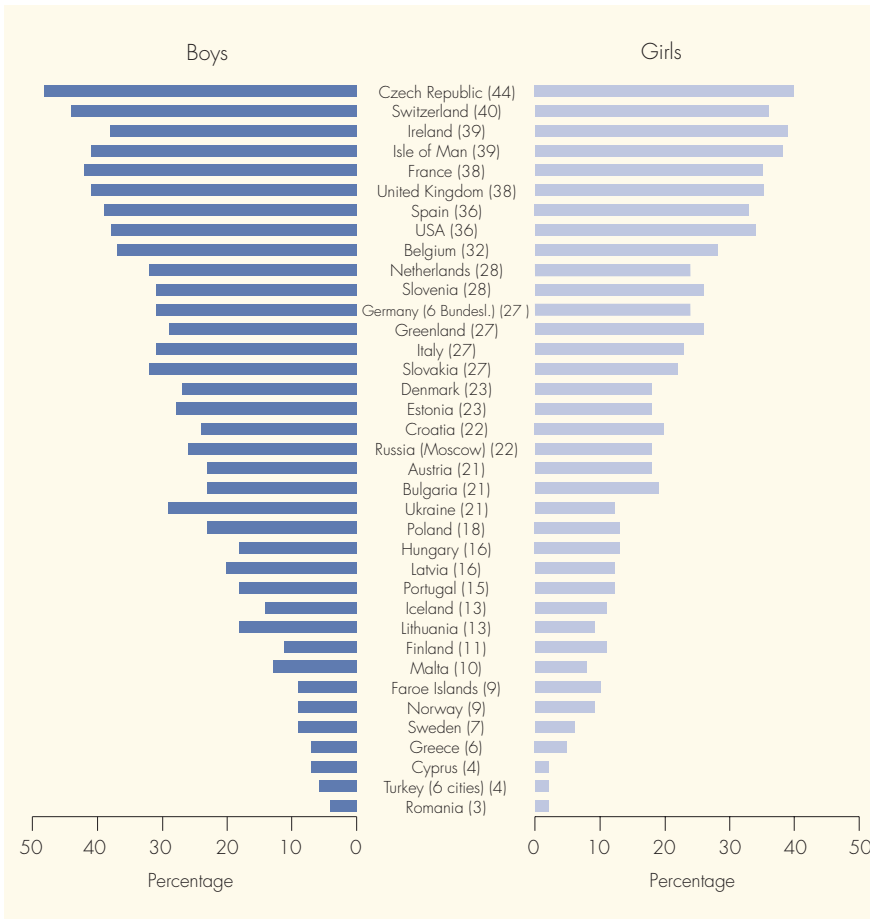
Note: Values within brackets refer to all students. Germany and Turkey — limited geographical coverage. Spain and USA — limited comparability.

([19]) Far behind cannabis comes ecstasy, which was mentioned on average by 3% of students. The highest prevalence rate for any drug other than cannabis in any single country is 8%: 8% of Czech students reported use of ecstasy as well as of magic mushrooms.

Students in the Czech Republic reported the highest cannabis use, at 44%, yet high prevalence rates were also reported from Switzerland (40%), Ireland and the Isle of Man (39% each), France and the United Kingdom (38% each). Other countries where more than a quarter of students have used cannabis include Belgium (32%), the Netherlands and Slovenia (28% each), Germany (six Bundesländer), Greenland, Italy and Slovakia (27% each). The lowest levels of cannabis use are reported from Romania (3%), Cyprus, Turkey (six cities) (4% each), Greece (6%) and Sweden (7%). Low prevalence rates are also found in the Faroe Islands, Norway (9% each) and Finland (10%). Data from the non-ESPAD countries Spain and the USA reveal that 36% of students in both countries had ever used cannabis (Figure 2).

Figure 2: Lifetime experience of marijuana or hashish. Percentages among all students, 2003
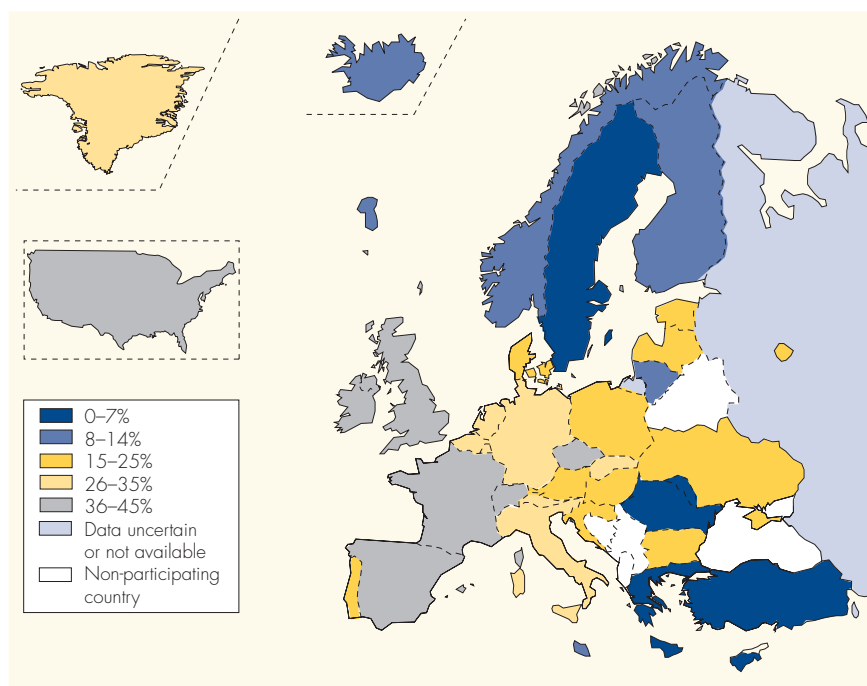
Note: Germany and Turkey — limited geographical coverage. Spain and USA — limited comparability.

Recent use of cannabis (last year and last month prevalence) — between 2 and 36 %

In adult populations regular drug use can be measured in different ways. One of these is last month prevalence (drug use in the last 30 days). In many cases this indicates not only recent use but also more regular consumption. However, for a 15- or 16-year-old student, last month prevalence may very well be identical with first use. A better way of defining regular use is to ask young people to declare frequency information for last year (use in the last 12 months) and last month prevalence. For example, to measure whether a student has used cannabis '10 times or more during the last 12 months' and 'three times or more during the last 30 days' [20].

In the current absence of explicit frequency-of-use data, one way to build a picture of recent use is to compare the figures for last year prevalence with those for last month prevalence.

As mentioned earlier, an average of 21 % of ESPAD students reported ever-in-lifetime use of cannabis. By comparison, 16 % of ESPAD students reported last year prevalence and 9 % last month prevalence. For other drugs, the highest figure for any other drug was 2 % for the last year prevalence for ecstasy and 1 % for last month prevalence of amphetamines, ecstasy and magic mushrooms. Thus, there is a broad overlap between average ever-in-lifetime use (21 %) and last year prevalence (16 %).

The Czech Republic reported the highest last year prevalence (36 %), while other high-prevalence countries include the Isle of Man (34 %), France, Ireland, Switzerland and the United Kingdom (31 % each). Countries where very few students have used cannabis during the last 12 months are to a large extent the same that reported low lifetime prevalence rates. Thus, the smallest number of students reporting this behaviour are found in Romania (2 %), Cyprus, Turkey (six cities) (3 % each), the Faroe Islands (4 %), Greece and Sweden (5 % each). In the non-ESPAD country, Spain, 32 % of the students had used cannabis during the last 12 months. The corresponding value for the USA is 28 %.

Not unexpectedly, the high- and low-prevalence countries with regard to last month prevalence are about the same as for last year prevalence. Countries with the highest last month prevalence include France (22 %), the Isle of Man (21 %), Switzerland, the United Kingdom (20 % each) and the Czech Republic (19 %). Other countries with relatively high rates are Belgium, Ireland (17 % each) and Italy (15 %). In some countries, however, very few report last month prevalence. The six countries with the lowest figures

[20] This information is available in the ESPAD national datasets, but at the time of writing it was not available for comparative analysis.

are the Faroe Islands, Romania, Sweden (1 % each), Cyprus, Greece and Turkey (six cities) (2 % each). In Spain and the USA last month prevalence rates are 23 % and 17 % respectively.

Gender differences?

There is a clear gender gap in cannabis prevalence [21], with boys generally more likely to have tried cannabis, or to have recently used cannabis, than girls.

For lifetime prevalence, with one exception (Ireland), in no country are there more girls than boys who have tried cannabis. Boys are in the majority in about two-thirds of the ESPAD countries (see Figure 1). However, in some countries there are no strong gender differences. Few differences in gender can be seen in the British Isles and among the Nordic countries, including the Faroe Islands, Finland, Greenland, Iceland, Ireland, the Isle of Man, Norway and Sweden. Greece is also an exceptional southern country, reporting near-equal lifetime prevalence for girls and boys. In the Czech Republic, Denmark, Estonia, Ireland, Latvia, Poland, Slovakia and Norway the gender gap has narrowed in successive surveys. It may also be noted that countries with near-equal prevalence between genders relate to both high- and low-prevalence countries.

More boys (19 %) than girls (14 %) on average report last year use of cannabis. This pattern applies to the majority of reporting countries, and applies to both high-prevalence countries (e.g. Czech Republic, France, the United Kingdom) and low-prevalence countries (e.g. Cyprus and Turkey). The largest gender gap in last year prevalence is found in the Ukraine, with 18 % for boys and 6 % for girls. Large gender divides in last year prevalence are also reported by Belgium (32 % boys, 22 % girls) and Slovakia (24 % boys, 14 % girls).

For last month prevalence, on average 11 % of boys and 7 % of girls reported cannabis use in the last 30 days. The pattern is reflected in nearly half of the countries. There is no real geographical pattern in the gender distribution.

The typical debut drug

Cannabis is the illegal substance most commonly reported as a debut drug among both boys and girls. On average, 18 % of all ESPAD students report that cannabis was the first illegal substance they have tried, corresponding to about 80 % of all students who

[21] Gender issues in drug use were explored in the EMCDDA selected issue, *A gender perspective on drug use and responding to drug problems* (EMCDDA, 2006), available at: http://issues06. emcdda.europa.eu/en/page013-en.html

have tried any illicit drug. Cannabis is the leading debut illegal drug in all but three ESPAD countries. Second to cannabis, but with much lower figures, are tranquillisers or sedatives, reported by 2 % of all students, about 9 % of students who report having tried any illicit drug.

Early onset

If one excludes inhalants, which are not defined as an illicit drug, cannabis is the most common drug that is used at an early age. Of all ESPAD students, 4 % report that they were 13 years or younger when they tried cannabis for the first time ('early onset') [22]. The figures for early onset vary between countries, from 0 % in Romania to 13 % in the United Kingdom. Examples of other countries with high early onset figures include the Isle of Man (12 %) and Switzerland (11 %). These figures are similar to those reported in the USA (10 %). Very small gender differences appear when it comes to early onset. In the very few cases where a gender gap exists, figures are slightly higher for boys. The largest gender difference is found in Belgium, where 10 % of boys and 5 % of girls report trying cannabis at age 13 or younger.

Increased use in many countries

Between the first ESPAD data collection in 1995 and the second in 1999, a majority of countries reported an increase in lifetime cannabis prevalence. Many countries also showed continuing increases between 1999 and 2003.

Of the ESPAD countries that participated in 1995, 21 provided comparable data from the second data collection. Two-thirds of these countries reported higher lifetime cannabis prevalence in 1999. These countries were spread geographically across Europe and include countries with high lifetime prevalence (e.g. the Czech Republic, with 35 % in 1999) and low lifetime prevalence (e.g. Finland, with 10 %, and Hungary, with 11 % in 1999). Three countries reported a decline in lifetime cannabis prevalence between 1999 and 1995. Two of these were the top countries in both 1995 and 1999: the United Kingdom (35 % in 1999) and Ireland (32 % in 1999). The third country was a low prevalence country: the Faroe Islands (7 % in 1999).

Six countries reported minor decreases in lifetime prevalence between 1999 and 2003: Denmark (23 % = –1 %), Greece (6 % = –3 %), Sweden (7 % = –1 %), Norway (9 % = –3 %), Iceland (13 % = –2 %) and Latvia (16 % = –1 %) (Figure 3). In a majority of the countries that participated in both surveys (18 out of 28) the figures were about the same in the two data collections. However, lifetime prevalence increased in absolute percentage

[22] For further discussion of early initiation into cannabis use in Europe, see Kokkevi et al. (2006).

Figure 3: Changes between 1999 and 2003 in lifetime prevalence of marijuana or hashish
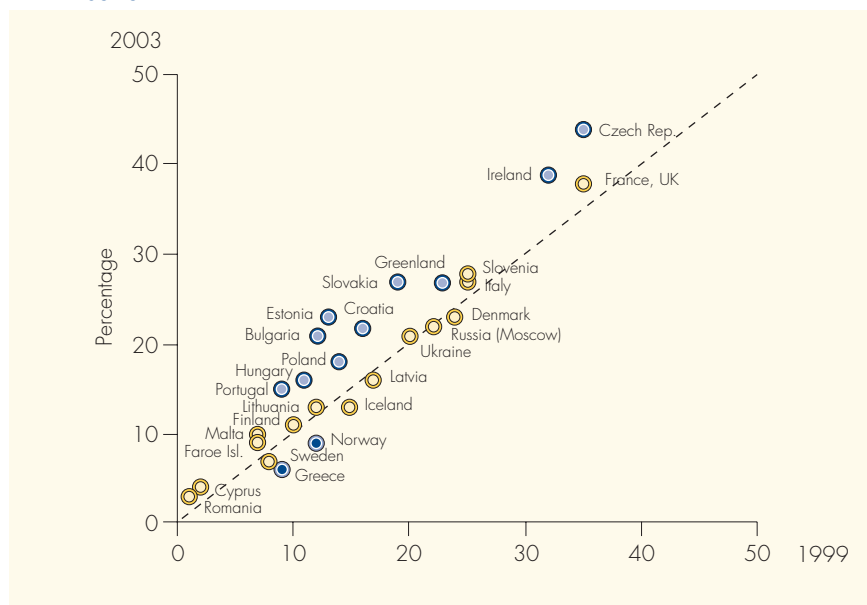
Note: Countries above the line have increased prevalence rates, and countries below have decreased. All students.

points by over 4% in 10 countries: Czech Republic (44% = +9%), Ireland (39% = +7%), France (38% = +4%), Slovakia (27% = +8%), Estonia (23% = +10%), Croatia (22% = +8%), Bulgaria (21% = +9%), Poland (18% = +4%), Portugal (15% = +6%), Hungary (16% = + 16%).

Of the 21 countries that have comparable data from all three data collections, six show an increased trend through all three data collections. These are Croatia, Czech Republic, Estonia, Hungary, Poland and Slovakia: all Eastern European countries. In 1995 some of these countries were among those with lowest prevalence (e.g. Hungary with 4% and Estonia with 7%). In 2003 one of these was at the top of all participating countries (Czech Republic with 44%), three others are in the upper half and two are around the middle (Hungary with 16% and Poland with 18%) [23]. The number of countries which showed an increase in prevalence between 1999 and 2003 are about the same both for last year prevalence (nine countries) and for lifetime prevalence (10 countries). However, relatively few countries reported an increase in last month prevalence (three countries). In nearly all countries the trends over time have been about the same among boys and girls.

[23] For a more detailed analysis of cannabis in these countries, see Moskalewicz et al., this monograph.

Increased perceived availability in many countries

Perceived availability of cannabis ([24]) increased strongly compared with other substances from 1999 to 2003, from an average of 29–35%. Changes in perceived availability are also very similar for boys and girls. The number of countries in which perceived availability increased for other drugs is much smaller, and averages were about the same in 2003 as in 1999.

Increases in cannabis perceived availability were reported in nearly half of the countries with available information (13 out of 28). These countries were broadly concentrated in the eastern parts of Europe (10 out of these 13 countries). Increases were reported in countries with low as well as high perceived availability; for example, Romania (11%) and the Czech Republic (58%). Only three countries — Denmark (52%), Greece (20%) and Norway (26%) — reported lower perceived availability of cannabis in 2003 than in 1999.

In seven countries perceived availability of cannabis increased in all three data collections from 1995 to 2003 (Croatia, the Czech Republic, Estonia, Lithuania, Poland, Slovakia and Slovenia). All are Eastern European countries, and five of them are among the six countries in which the lifetime prevalence increased in 1995, 1999 and 2003 (Croatia, the Czech Republic, Estonia, Poland, Slovakia).

Consumption and perceived availability — strongly correlated

ESPAD uses, to some extent, the same questions that are used in the *Monitoring the Future* ([25]) studies in the USA, where they have a long series for grade 12 students (17–18 years old), dating back to the 1970s (Johnston et al., 2005). In the USA, it is evident that there have been changes in cannabis use over time. However, during the whole period the perceived availability seems to have remained relatively stable among 12th graders.

Information about students in grade 10 (15–16 years old), i.e. students of about the same age as the ESPAD target group, is available in the US studies only from 1991. The use of marijuana increased in this group between 1991 and 1997, then levelled off, before decreasing from 2001 onwards. For the whole period the availability trend has followed the use trend very closely.

([24]) Defined as the share of students reporting that marijuana or hashish were 'very easy' or 'fairly easy' to obtain.
([25]) The website of the Monitoring the Future Study is www.monitoringthefuture.org/

As mentioned in the previous section, in five out of the six ESPAD countries in which the lifetime prevalence for cannabis increased consistently in 1995, 1999 and 2003, perceived availability also increased. This indicates that there is a strong relationship in the ESPAD countries between changes in the level of consumption in a country and changes in the perceived availability of cannabis. This relationship is found in 2003 when one compares the proportion of students in different ESPAD countries who have ever used cannabis and the proportion of all students who perceive marijuana and hashish 'very easy' or 'fairly easy' to obtain (Figure 4). It is obvious that there is a strong positive relationship between lifetime prevalence of cannabis and perceived availability ($r_{xy} = 0.85$, $r_{rank} = 0.85$).

These results indicate that use of cannabis and perceived availability are highly correlated among 15- to 16-year-old students in Europe, as well as in the USA. However, this is not the case among 17- to 18-year-old American students. Possible explanations for this could include age (12th graders are about two years older than the ESPAD target group), degree of availability (in 2003, 87 % among the 12th graders,

Figure 4: Correlation between lifetime use of cannabis (Canlife) and the proportion of students answering that cannabis is very/fairly easy to obtain (Verfaireas) ($r_{xy} = 0.85$, $r_{rank} = 0.85$)
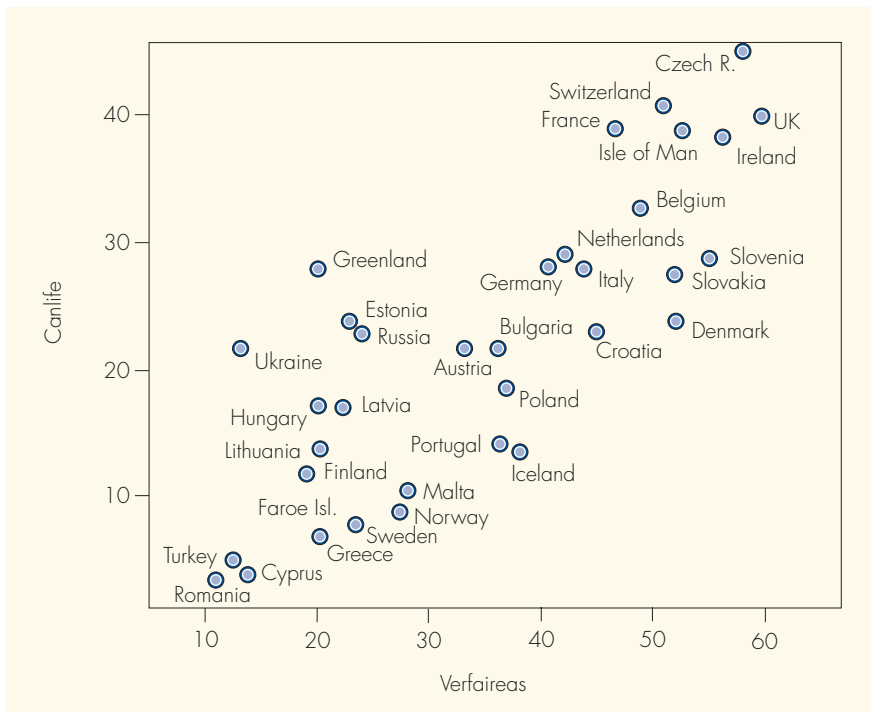
Source: ESPAD data from 2003.

74 % among 10th graders, compared with 35 % on average among the ESPAD students, with a range from 7 to 60 %); the degree of stability of perceived availability (this has changed among the 15- to 16-year-old students, while it has been stable among American 12th graders). A conclusion from this is that changes in the availability of cannabis are linked to changes in consumption among 15- to 16-year-old students, even though any direct causal link needs to take into account other psychosocial factors.

Consumption and risk perception — strongly correlated

The *Monitoring the Future* study in the USA has found a strong relationship between changes in the perceived risk of cannabis use and changes in consumption levels. This has been interpreted as reflecting a causal connection (Johnston et al., 2005). With only three data collections within ESPAD, a similar analysis of the possible influences of changes over time is difficult. However, a comparison between the countries in the 2003 data collection shows a very strong relationship between the risk perception of cannabis and consumption level. The correlation at the country level between the lifetime prevalence rates of cannabis use and the proportion of students who indicated that there is a 'great risk' related to using it once or twice was strongly negative ($r_{xy} = -0.76$, $r_{rank} = -0.79$). This indicates that at the country level there is a strong negative relationship between risk perception and consumption levels, i.e. the lower the risk perception, the higher the consumption levels.

Correlates of adolescent cannabis use

The research literature offers numerous studies of psychosocial factors that correlate with adolescent cannabis use [26]. However, findings are mixed or inconsistent, and focus on a single country or restricted group of countries, with different methodological aspects influencing the results. Moreover, such statistical associations are far from deterministic: there is hardly any correlate of adolescent substance use that has not been found to be non-significant in some study.

As ESPAD data collections in the different countries are carried out in a standardised way, the ESPAD project includes data that may be more suitable for cross-cultural comparison. One of the chapters in the latest ESPAD report includes correlates at the individual level from nearly all ESPAD countries (Hibell et al., 2004: 194–199). The summary below provides an overview of correlates for cannabis. Some caveats are

[26] A review of psychosocial correlates with ESPAD data from Bulgaria, Croatia, Greece, Romania, Slovenia and United Kingdom was recently carried out (Kokkevi et al., 2007). Another recent study analysed correlates of adolescent cannabis use and consumer expenditure (PCE), unemployment and peer factors in 31 countries (ter Bogt et al., 2006).

required, however. ESPAD is based on a clustered not random sample (samples of classes, with classes as the sampling unit), which complicates statistical calculations. Yet, for pragmatic reasons standard *t*-tests have been used in this section, based on the understanding that these tests of statistical significance are likely to overestimate any correlates: the results must be interpreted as offering useful general guidelines only.

The lifetime use of cannabis was correlated with parents' education ([27]) (father's and mother's education separately), family structure (single parents and one parent together with a step-parent) ([28]), economic situation (how well-off the students thought their family is compared with other families), perceived parental control (the students' opinions concerning the extent to which their parents know where they spend Saturday nights), truancy (the number of days of school skipped during the last 30 days) and siblings' use of cannabis (Table 1).

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([27]) Parental education with the options of: (i) primary school or less; (ii) some secondary; (iii) completed secondary; (iv) some college/university; (v) completed college university; and (vi) don't know.

([28]) Students are asked who they share a household with. Options are: (i) I live alone; (ii) father; (iii) stepfather; (iv) mother (stepmother); (v) brothers/sisters; (vi) grandparents; (vii) other relatives; and (viii) non-relatives.

| Table 1: Lifetime use of cannabis correlated with family variables | | | | | | | |
	Father's education	Mother's education	Poor family economy	Single parent	One parent + step-parent	Poor perceived parental control	Truancy	Sibling's perceived cannabis use
Belgium	0	0	0	+	+	+	+	+
Bulgaria	+	+	0	0	0	+	+	+
Croatia	+	+	0	+	0	+	+	+
Czech Republic	–	–	0	+	+	+	+	+
Denmark	0	0	0	+	+	+	+	+
Germany (six Bundesländer)	+	+	–	+	+	+	+	+
Estonia	0	0	–	0	+	+	+	+
Ireland	0	0	0	0	NA	+	+	+
Greece	0	+	0	0	+	+	+	+
Faroe Islands	0	0	0	0	NA	+	+	+
Finland	0	0	0	+	+	+	+	+
France	NA	NA	NA	+	+	NA	+	NA
Iceland	0	0	+	+	+	+	+	+
Italy	0	0	–	+	+	+	+	+
Greenland	0	0	–	+	+	0	+	+
Iceland	0	0	+	+	+	+	+	+
Isle of Man	–	0	0	0	+	+	+	+
Cyprus	0	+	0	NA	NA	+	+	+
Lithuania	–	0	0	0	0	+	+	+
Hungary	0	0	0	+	+	+	+	+
Malta	+	+	0	+	+	+	+	+
Netherlands	0	+	–	+	+	+	+	+
Norway	0	–	0	+	+	+	+	+

Austria	+	+	0	+	+	+	+	+
Romania	+	+	0	0	+	+	+	+
Russia (Moscow)	0	0	−	0	+	+	+	+
Slovenia	+	+	0	0	+	+	+	+
Slovakia	+	0	0	+	+	+	+	+
Sweden	0	0	0	+	+	+	+	+
Switzerland	+	+	0	+	+	+	+	+
Turkey (six cities)	0	0	−	0	+	0	0	+
Ukraine	0	0	0	+	+	+	+	+
United Kingdom	−	−	+	+	+	+	+	+
Number of positively indicated correlations	9	11	2	22	23	30	32	31
Number of non-significant correlations	17	16	22	9	6	1	0	0
Number of negatively indicated correlations	4	3	7	0	0	0	0	0

Notes

0, the correlation is not significant.

NA, data not available.

Limited or no correlations: The correlations are different for the different variables. In the majority of the countries (16 or 17) *parental education* is not significantly correlated with drug use. However, there is a significant positive correlation in 9–11 countries, and three or four countries have negative associations. The picture is similar for *poor family economy*, even though the number of countries without any significant correlation (22) is even higher than for parental education. Where associations are found, there are more countries with negative (seven) than positive (two) significant correlations.

Moderate correlations: *Poor family structure* is positively correlated with cannabis use in a large majority of the countries. This was the case in 22 to 23 countries for the single-parent variable, as well as for the case when one of the parents lives together with a step-parent. In all other countries the relationship was non-significant.

High correlations: The picture is even clearer when it comes to perceived *parental control* and cannabis use. In all countries but one (30) there is a positive association between poor perceived *parental control* and cannabis use, that is, the less the parents know where their children spend Saturday nights the higher the proportion of the children that have tried cannabis. In all 32 countries with available information there is a positive correlation between *truancy* and cannabis use. This means that the more days a student has skipped school during the last 30 days, the higher the probability that he/she has used cannabis. Another factor for which the correlation is the same in all analysed countries is perceived *sibling's use of cannabis*. In all 31 countries there is a positive correlation between perceived sibling's use of cannabis and the student's own use. In other words, having a sibling that uses cannabis increases the probability for a student to have used this drug.

Chapter 4
Cannabis in the context of polydrug use: results from the Dutch National School Survey

Keywords: adolescent prevalence – alcohol – cannabis – epidemiology –
Europe – polydrug use – schools – survey – tobacco

Setting the context

Polydrug consumption, the consumption of more than one drug, is one of the great confounders of our knowledge of drug use. A vast array of psychoactive substances, both legal and illegal, are consumed in Europe today: alcohol, tobacco, prescription drugs, ecstasy, inhalants, cocaine, amphetamines, heroin, hallucinogens, not to mention the long list of synthetic substances monitored by the EMCDDA's early warning system (GBL, TMA, 4-MTA, MDBD, etc.). This wide range of substances means that, in practice, drug use can come in many forms.

Despite the puzzle it represents, examination of polydrug consumption is rewarding, providing valuable insights into the context of drug use and complementary risk patterns. People who consume psychoactive substances commonly do not restrict themselves to a single drug (i.e. cocaine or heroin alone). Nonetheless, there are pairings and combinations that often go hand in hand. This is particularly the case with cannabis, which is very often combined with tobacco, and is commonly consumed together with alcohol, and, less commonly, other illicit substances. In terms of drug use among young people, studies looking at contexts such as schools, youth detention centres and recreational nightlife settings have sharpened our insight into polydrug use.

This chapter outlines two of the key concepts in defining polydrug use: 'concurrent use', i.e. use of multiple substances within a defined time period, and 'simultaneous use', i.e. use of multiple substances on the same occasion. It also looks at means of 'clustering', a technique that helps us to identify common pairings or clusters of drugs used in a given population, and to build a typology of different groups of drug users. Such typologies are useful in enabling practitioners, teachers and parents to identify 'at-risk' groups.

School surveys provide a useful opportunity for examining drug use across the population. This chapter looks in particular at school students aged 12–16 years in the Netherlands. This age group encompasses younger students than in the most exhaustive European school survey, ESPAD, which surveys students aged 15–16 years (see Hibell, this monograph). Using a younger sample for drugs surveys is interesting. Teenagers are at a stage in life when many will encounter drugs for the first time, with some of them beginning to drink alcohol or smoke in their early teens. And, as with many other aspects of life, experiences at school, even if they do not determine or accurately predict later behaviour, strongly influence drug-using behaviour in adult life.

So, while this chapter provides a national case study of polydrug consumption within a restricted sample, its insights will have wider relevance. They are particularly valuable for those attempting to decipher the many complexities of polydrug use, with a view to informing intervention.

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Cannabis in the context of polydrug use: results from the Dutch National School Survey

Karin Monshouwer, Filip Smit and Jacqueline Verdurmen

Summary

A survey was conducted to describe the position of cannabis in the wider context of polydrug use among secondary school juniors (aged 12–16 years) in the Netherlands. Data were derived from the 1999 sample of the Dutch National School Survey on Substance Use. Studied substances were alcohol, tobacco, cannabis, ecstasy, amphetamines, opiates and cocaine. Among the total student population, 56.7 % use one or more substances, of whom 41.8 % are polydrug users in that they used more than one substance during the previous four weeks. Projected to a Dutch student population of 1 million, 237 000 are polydrug users, of whom 142 000 use only alcohol and tobacco, 65 000 combine alcohol or tobacco with cannabis, and 20 000 combine alcohol, tobacco or cannabis with at least one hard drug such as ecstasy, cocaine, amphetamines or heroin. The risk of polydrug use increases with age. Prevalence rates were highest among ethnic Dutch students, very low among Moroccan students and high at the lower educational levels. By comparison with girls, boys had a specific risk of becoming the type of polydrug user using soft or hard drugs. The position of cannabis use in the context of polydrug use is an ambiguous one. On the one hand, cannabis use is more strongly associated with drinking and smoking than with the use of hard drugs. On the other hand, among cannabis users, higher prevalence rates of hard drug use can be observed than is the case among drinkers and smokers.

Introduction

Although it has been well established that cannabis and other substance use often co-occur, relatively few studies have focused on polydrug use and its relation to cannabis use. In the Netherlands, for example, reliable epidemiological figures about polydrug use are rare (NDM, 2001).

Yet polydrug use is important: using combinations of drugs can have often unpredictable risks through additive and synergetic effects (Earlywine and Newcomb, 1997; Leccese et al., 2000). Studies have shown that the combined use of substances increases the likelihood of both physical and psychological damage (Feigelman et al., 1998). For

example, Stronski et al. (2000) found that cannabis users who were also using other illicit drugs were at higher risk for risk-related behaviour (for example, antisocial behaviour and accidents) than those who were not using other drugs in addition to cannabis. Furthermore, in 2003 in the Netherlands, 40% of the newly registered individuals in addiction care had a problem with more than one addictive substance other than tobacco use (IVV, 2001). Of all clients reporting a cannabis use disorder as their primary problem, 38% also had a secondary substance use problem, most commonly alcohol (reported at 18% of all primary cannabis clients).

However, the number of people in treatment does not provide a strong picture of polydrug use in the general population. With regard to polydrug use, secondary school students form a group that warrants special interest. Most substance use is initiated in adolescence and students can easily be targeted with preventive interventions. In addition, this group can be regarded as a new generation, in which the contours of what lies ahead, in an epidemiological sense, start to appear. After all, polydrug use during the teenage years is a significant predictor of polydrug use in adult life (Galaif and Newcomb, 1999; Jessor, 1987).

For these reasons, in our study, we sought answers to the following:

- What polydrug use patterns can be discerned among secondary school students, and where does cannabis fit in?
- What types of user groups can be defined among students, and how many students can be found in each of these user groups?
- What are the corresponding social and demographic risk profiles?

This chapter is based on the work of Smit et al. (2002a), which appeared in *Drugs, Education, Prevention and Policy* (DEPP). The editorial board of DEPP kindly gave permission to make use of the original work.

Method

Sample, data collection and response

Data were used from the fifth wave of the National School Survey on Substance Use, conducted in 1999 (De Zwart et al., 2000). The school survey methodology has been fully described elsewhere (Smit et al., 2002b). In short, a questionnaire was administered in classes, which included questions on substance use during the previous four weeks. The non-response rate was low: on average, 4.8% of students in each class were not reached due to illness, truancy or other reasons, and only 0.07% of the students refused participation. Analysis was limited to secondary school students between the age of 12 and 16 years, an age at which school attendance is compulsory ($n = 6\,236$). In this way,

insight was gained into a broad group of students attending all different school types and we avoid overrepresentation of students older than 16, who mostly attend school types of a higher, pre-university level.

Polydrug use

In the literature, two forms of polydrug use are distinguished: concurrent and simultaneous polydrug use. Concurrent polydrug use is the use of at least two substances in the same time period, for instance the previous four weeks. A specific form of concurrent polydrug use is simultaneous polydrug use, in which a user combines two or more substances on the same occasion (see Earlywine and Newcomb, 1997; Collins et al., 1998). In this study, polydrug use was operationalised as the use of two or more substances by one person in the four weeks preceding the study, i.e. 'concurrent polydrug use'. According to this definition, polydrug users can also be people who use several substances on the same occasion and who therefore may be called 'simultaneous polydrug users'. In this study we included the following substances: alcohol, tobacco, cannabis, ecstasy, amphetamines, heroin and cocaine.

Demographics

The following demographic characteristics were included: gender, age, level of urbanisation, school type (first class secondary school, lower vocational, lower general, higher general and pre-university education) and ethnicity. The five levels of urbanisation used by the central bureau of statistics in the Netherlands (Statistics Netherlands) were collapsed into two categories: the index category 'very urbanised', i.e. more than 2 500 addresses per km^2, and a reference category, 'all other urbanisation levels'. This division was made because in a number of studies (e.g. Monshouwer et al., 2003) we concluded that 'very urbanised' living environments are significantly associated with substance use, and the same association has also been found by others (Abraham et al., 1999). Ethnicity was divided into six categories: Dutch (reference category), Caribbean, Surinamese, Moroccan, Turkish and others. Following the rules of Statistics Netherlands, a person was regarded, for example, as Surinamese if he or she was born in Surinam, or if at least one of the parents was born in Surinam. With the aid of these demographic variables, the recognition of the group with an increased risk of polydrug use can be enhanced. This information can be useful for targeting preventative interventions.

Analysis

In order to assess the representativeness of the sample, we compared the multivariate distribution over the variables of school type, school year and level of urbanisation in the sample with the corresponding distribution in the Dutch student population, as described

by Statistics Netherlands. The small differences between sample and population were corrected by weighting, after which the distribution in the sample was exactly the same as in the population.

It is of note that we obtained a cluster sample, as all students from the same class were drawn as a single group. This method is not without consequences. Students from the same class share several characteristics, such as having the same teacher, or being exposed to the same educational system. This results in dependence between the observations and this, in turn, can influence the standard errors, confidence intervals and *P*-values. Therefore, robust variance-related statistics were obtained, using the first-order Tailor-series linearisation method.

A number of substance use variables suffered from non-response to items. The item non-response rate was highest for alcohol, at 6.1%, followed by cannabis, at 2.2%. For the remaining substances, item non-response was less than 1%. The missing values were imputed with the help of a regression model, using the demographic variables as predictors. Under the regression model, the most likely values were calculated and used to replace the missing values. Tables 1, 2 and 3 include only percentages. In Table 4 odds ratios (ORs) are presented, obtained by multiple logistic regression analysis. The interdependence between the use of the various substances was studied with 'homogeneity analysis through alternating least squares' (HOMALS; cf. Van de Geer, 1993; Van der Heijden et al., 1999). HOMALS is a multivariate scaling technique, similar to factor analysis, but applicable to nominal variables. HOMALS can be used for finding homogeneous clusters of substance users who resemble each other (see Figure 1). In this chapter only, the statistics after imputation, weighing and correction for cluster effects are presented.

For the HOMALS analysis SPSS version 8.0 was used (SPSS Inc., 1988). For all other analyses, Stata version 6.0 was used (StataCorp, 1997).

Results

Demographic characteristics

Of the total student population, 76.2% were Dutch, 1.3% Caribbean, 4.7% Surinamese, 4.1% Moroccan, 2.8% Turkish and the remaining 10.9% were of another, mainly European or Asian, origin. The average age was 14 years (range 12–16 years). Of the students, 30.3% attended the first year of secondary school, 25.3% lower vocational, 19.6% lower general, 12.8% higher general and 12.1% pre-university education. A minority (15.1%) of the students lived in densely urbanised areas.

Prevalence of substance use

Table 1 shows the four-week prevalence rates of use of the different substances, by gender. The prevalence rates were highest for the use of alcohol and tobacco, followed immediately by the use of cannabis. The prevalence rates of the use of hard drugs were relatively low. Cocaine ranked at a similar level to ecstasy and amphetamines. Heroin occupied the last place.

Table 2 shows the top 10 of the most frequently occurring patterns of use, divided according to non-use, mono- and polydrug use. Of the 12- to 16-year-olds, 43.3% had used no substance during the previous four weeks, 28.2% had used only alcohol and 14.7% had combined alcohol with tobacco. In fourth position was the combination

Table 1: Four-week prevalences (%) of the separate substances by gender			
Substances	Girls	Boys	Total
Alcohol	45.8	54.1	49.8
Tobacco	26.6	25.2	25.9
Cannabis	5.9	10.0	7.9
Ecstasy	0.6	1.8	1.2
Cocaine	0.4	1.7	1.1
Amphetamines	0.6	1.2	0.9
Heroin	0.2	0.4	0.3

Table 2: Top 10 of four-week prevalences (%) of no use, mono- and polyuse by gender			
Substances	Girls	Boys	Total
Nothing	48.0	41.5	43.3
Only alcohol	24.8	31.2	28.2
Alcohol, tobacco	15.3	12.9	14.7
Alcohol, tobacco, cannabis	4.0	6.0	5.4
Only tobacco	5.9	3.4	4.8
Alcohol, cannabis	0.5	1.4	1.0
Tobacco, cannabis	0.2	0.6	0.5
Alcohol, tobacco, cannabis, other	0.3	0.5	0.4
Alcohol, tobacco, cannabis, cocaine	0.1	0.3	0.2
Alcohol, tobacco, cannabis, amphetamine	0.2	0.2	0.2
Total	99.2	97.7	98.5

of alcohol, tobacco and cannabis, with a prevalence of 5.4%, followed by the group of students using only tobacco (4.8%). All other patterns of substance use showed prevalence rates of 1% or less. We counted 46 patterns of use, but the top 10 accounted for 98% of the students and, consequently, gives an accurate picture. Of the students who had used at least one substance during the previous month (56.7% of students), 41.8% were polydrug users.

Pairwise associations between substances

Table 3 shows how the use of one substance increased the likelihood of the use of another substance. For instance, the use of any other substance was about double for alcohol users compared with the general population. Among tobacco users, the likelihood of cannabis use was three times higher than among the general population. To use another example, cocaine use had a low prevalence among the general population. However, among cannabis users, the prevalence of cocaine use was almost 10 times higher, and among ecstasy users the prevalence was 43 times higher. Heroin use appeared to coincide mainly with the use of amphetamines and cocaine.

Clusters

Table 3 shows the associations between pairs of substances. However, we also wanted to know whether clusters of three or more substances could be found. These clusters are depicted in Figure 1.

A homogeneity analysis (HOMALS) solution of substance use results in a graph in which the distances between the substances illustrates how drug use clusters. The line in Figure 1 runs from non-use, via alcohol, tobacco and cannabis use to ecstasy, cocaine and amphetamines use, and finally reaches heroin. It shows that non-use and the use of alcohol and tobacco are located close together. This mutual proximity points to a relationship which may be interpreted as the level of social acceptance of non-use and the use of alcohol and tobacco. The associations between alcohol, tobacco and cannabis use can then be regarded as a second cluster. Noticeably, a third cluster, in which ecstasy, cocaine and amphetamines were found close together, was located at some distance from the first two clusters. These 'harder' substances appear to be mainly used in recreational settings, and are, therefore, otherwise known as 'party drugs'. Heroin was located the furthest from the 'normal' use of alcohol and tobacco.

Table 3: Percentages of use of one substance (in rows) given the use of another substance (in columns). In the first column the (unconditional) prevalences are presented

Substance	Prevalence	Alcohol	Tobacco	Cannabis	Ecstasy	Cocaine	Amphetamines	Heroin
Alcohol	49.8	–	80.0	93.0	93.3	94.0	87.7	83.7
Tobacco	25.9	41.6	–	86.0	85.4	85.4	80.9	73.4
Cannabis	7.9	14.7	26.3	–	76.1	74.5	72.1	55.0
Ecstasy	1.2	2.3	4.0	11.8	–	53.9	49.7	46.2
Cocaine	1.1	2.0	3.5	10.1	47.0	–	52.9	49.8
Amphetamines	0.9	1.6	2.9	8.4	37.2	45.4	–	46.7
Heroin	0.3	0.6	0.9	2.3	12.5	15.5	16.9	–

Figure 1: Clusters of three or more substances
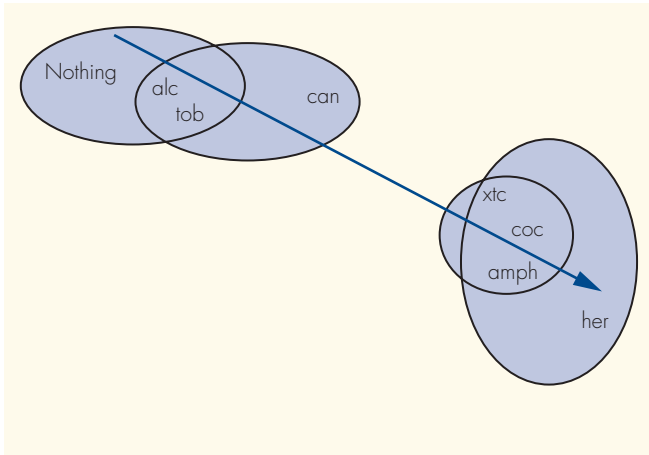
Note: Alc, alcohol; amph, amphetamines; can, cannabis; coc, cocaine; her, heroin; tob, tobacco; xtc, ecstasy.

Typology of polydrug users

The previous analyses showed, in different ways, that a number of clusters of substances can be found. Closer inspection of Table 3 reveals a hierarchy which resembles Russian dolls, each enclosing the other: a heroin user almost certainly uses one or more of the party drugs, while a user of party drugs is more than likely to use alcohol, tobacco and cannabis. Taking these patterns into account, we tried to construe a hierarchical typology of polydrug users. In so doing, we strove to place in a concise typology as many polydrug users as possible. We came up with three types of polydrug users:

* Type A: students who combined only alcohol and tobacco and used no other substances. We called this type the 'ordinary' polydrug users.
* Type B: students who used cannabis in addition to alcohol or tobacco, but did not use hard drugs. We called this type 'soft' polydrug users. It should be mentioned here that, under Dutch law, cannabis is recognised as a 'soft drug' as opposed to a 'hard drug' such as ecstasy, amphetamines, cocaine or heroin, hence, our use of the phrase 'soft polydrug user'.
* Type C: students who used one or more hard drugs (ecstasy, cocaine, amphetamines, heroin) in addition to alcohol, tobacco or cannabis. We called this type of user a 'hard' polydrug user.

Type A represented 59.9% of polydrug users, type B 27.4% and type C 8.6%. In all, 95.9% of polydrug users were described by this typology. The remaining 4.1% must be classified as 'atypical', since they used two or more hard drugs, without combining them with alcohol, tobacco or cannabis. Extrapolating our findings to 1 million students in the

Figure 2: Classification of adolescent drug use and prevalence rates (per 1 million)
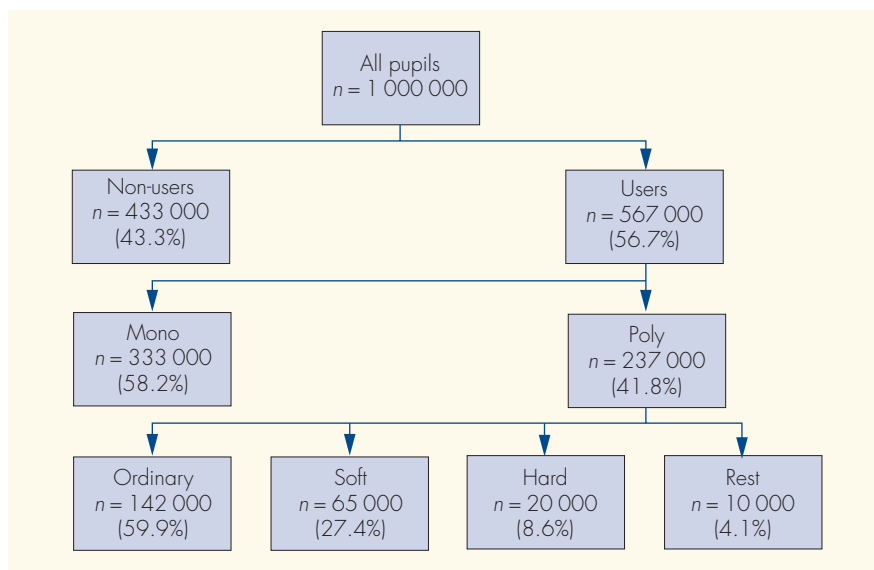
population, we would expect to find 142 000 'ordinary', 65 000 'soft' polydrug users, 20 000 'hard' polydrug users and 10 000 'atypical polydrug users' (Figure 2).

Risk profiles per type

Table 4 shows the associations between the demographic characteristics and the three types of polydrug users. The group that did not use any of the substances during the four weeks before the study was used as the reference group. A measure for association is the odds ratio (OR). An OR < 1 implies that the presence of a demographic characteristic is associated with a lower risk being the type of polydrug user concerned. A demographic characteristic with an OR > 1 implies a higher risk. All ORs were corrected for the influence of the other variables in Table 4.

Age was related to every group type. As the age of the student increased, the risk of belonging to one of the three types of polydrug users also increased. The risk of becoming an 'ordinary' polydrug user increased by a factor of 2.17 for every additional year. For 'soft' and 'hard' polydrug use, these factors are 3.09 and 2.58, respectively. Age, therefore, was a general and not a specific risk factor.

There was no statistically significant difference between boys and girls in the risk of becoming an 'ordinary' polydrug user. However, boys had a greater risk of becoming a type B or type C. As gender was a differentiating factor, it could be regarded as a

	Type A (alcohol and tobacco only)		Type B (alcohol or tobacco and cannabis)		Type C (soft drug and hard drug)	
Table 4: Demographic risk profile of polydrug users compared with abstainers						
Risk factor	OR[a]	Significance	OR	Significance	OR	Significance
Age (years)	2.17	***	3.09	***	2.58	***
Gender (ref = girls)	0.96		1.80	**	2.51	**
Urbanisation[b]	0.62	*	0.69		0.63	
School type (reference = lower vocational education)						
First-class secondary school	0.61	*	0.76		0.44	*
Lower general	0.91		1.29		0.53	
Higher general	0.73		0.69		0.50	*
Pre-university	0.47	**	0.42	*	0.20	*
Ethnicity (reference = Dutch)						
Caribbean	0.72		0.79		0.30	
Surinamese	0.38	***	0.81		0.75	
Moroccan	0.03	***	0.11	***	0.06	**
Turkish	0.14	***	0.20	*	0.58	
Other	0.53	**	0.84		1.40	

Notes
[a]OR, corrected odds ratio.
[b]index = very densely urbanised (versus the rest).
*$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.

specific risk factor for 'soft' and 'hard' polydrug use. Living in a highly urbanised area coincided with a smaller risk of becoming an 'ordinary' polydrug user. Students who attended lower vocational education had the highest risk of polydrug use, and especially of 'hard' polydrug use. Students who attended pre-university education had the lowest risk of polydrug use. Students in higher general education had a significantly lower risk of becoming a type C. Students in the first year of secondary school had a significantly lower risk of belonging to types A and B.

Compared with different ethnic groups, autochthonous Dutch had a larger risk of belonging to any type of polydrug users. Moroccans, in particular, had a very low risk of becoming a polydrug user. This also applied, but to a lesser extent, to students of Turkish origin and, as far as the A-type was concerned, to Surinamese students and students from other ethnic origins. Students from the Caribbean did not differ significantly from the Dutch.

Discussion

Main findings

With this study we wanted to answer three questions concerning polydrug use among secondary school students: Which combinations occur most frequently and where does cannabis fit in? What are the numbers of students per user type? What are the corresponding risk profiles? We are now able to answer these questions as follows.

Looking at all the students (abstainers included), almost a quarter (23.7%) were polydrug users. Thus, among a student population of 1 million students in the age range 12–16 years, approximately 237 000 would be polydrug users. Among students who reported using one or more substances (abstainers excluded), almost one-half (41.8%) were polydrug users. We were able to classify nearly all of these polydrug users using a simple typology. 'Ordinary' polydrug use (only alcohol and tobacco), which extrapolates to 142 000 students per million, was by far the most common type. This was followed at some distance by a group of 65 000 students who might be classified as 'soft' polydrug users (alcohol or tobacco combined with cannabis). 'Hard' polydrug use (alcohol, tobacco or cannabis combined with a hard drug) is relatively rare, extrapolating to 20 000 students.

Thus, the position of cannabis use in the context of polydrug use is an ambiguous one. On the one hand, cannabis use is more strongly associated with drinking and smoking than with the use of hard drugs. On the other hand, cannabis users show higher prevalence rates of hard drug use than is the case among drinkers and smokers. In other words, cannabis use occupies the 'middle ground' between alcohol/tobacco and 'hard drug' use. The risk of belonging to a 'soft' or 'hard' type of polydrug user increases with age, is largest for ethnically Dutch students, is very low among Moroccans and limited among Turkish and Surinamese students, and seemed to be concentrated mostly in the lower educational school types. Compared with girls, boys have a specific risk of becoming a 'soft' or 'hard' polydrug user; however, the risk of becoming an 'ordinary' polydrug user is equal for both sexes.

Limitations of this study

Before we discuss the implications of our findings, we want to address the limitations of our study. Firstly, our data come from a cross-sectional study. Therefore, we cannot make causal inferences. However, the associations found can be helpful in identifying groups at risk. Secondly, the data were based on self-reports. Consequently, recall errors could have occurred (Engels et al., 1997). However, we expect these errors to play only a minor role, because the questionnaire was concerned with recent behaviour,

i.e. during the last four weeks. This idea finds empirical support elsewhere (O'Malley et al., 1983; Johnston and O'Malley, 1985). Systematic errors (bias) in self-reports are another concern. It is conceivable that not all students disclosed the true rates of their drug use and some under- or over-reporting cannot be ruled out.

Thirdly, in this study polydrug use was measured as the use of two or more substances in the four weeks preceding the study. It is possible that this type of polydrug use is less harmful and therefore of less importance than simultaneous polydrug use, when a user combines two or more substances on the same occasion (see Earlywine and Newcomb, 1997; Collins et al., 1998). However, regarding these effects, the distinction between the forms of polydrug use is not unequivocal, because metabolites of a substance can still be present in the body when another substance is used several days later. Moreover, the study of Collins et al. (1998) showed that, among people who used several substances during the previous year, 76 % used these substances simultaneously.

Finally, because we have only looked into substance use during the preceding four weeks, it is unknown whether it concerned occasional (i.e. experimental) use or a longer history of substance use. In addition, this study does not provide information on the frequency and the amounts that were used. For example, while we have proposed that a 'hard' polydrug group of users exists, we cannot determine whether this group represents problematic behaviour as we have no additional information on the length and frequency of the use and the amounts used.

Implications for future research

Taking into account the findings and limitations of this study, we want to present the following considerations. First, Table 3 and Figure 1 suggest an 'axis of use', with alcohol on one side being the most commonly used substance, followed by tobacco, cannabis, ecstasy, cocaine and amphetamines, and ending with heroin. A Norwegian study (Pedersen and Skrondal, 1999) found an almost identical sequence, although they did not include cocaine. Similar sequences are also found in longitudinal studies (cf. Bailey, 1992; Kandel et al., 1992).

Since cannabis is usually smoked, it is suggested that cigarette smoking might act as a 'gateway' to cannabis use (Kandel et al., 1992). However, although there seems to be a natural sequence in the use of the various substances, it is not clear whether there is a direct causal influence. For example, Lynskey et al. (1998) concluded from their results that correlations between tobacco, alcohol and cannabis use during adolescence are largely or wholly non-causal and arise because the risk factors and life pathways that encourage the use of one substance also encourage the use of other substances.

Furthermore, there are also indications for a reverse influence. Amos et al. (2004) found that, among those who wanted to quit smoking, cannabis use reinforced cigarette smoking (see also Coggans, this monograph). While smoking and alcohol use often precede cannabis use, most drug users use cannabis first before progressing to other drugs. Findings from a 21-year longitudinal study of a New Zealand birth cohort seem to support the view that cannabis may act as a gateway, encouraging the use of hard drugs. However, the authors state that they cannot rule out the possibility that the association is non-causal and reflects uncontrolled confounding factors (Fergusson and Horwood, 2000). The mere existence of a sequence does not imply a causal role. More important is the question of how many people follow this route, and how far they venture on that route. Considering our data, we are inclined to conclude that, as far as a 'route' exists, it does not imply that everybody takes that route, or follows it to its full 'extent'.

Our cross-sectional snapshot study identifies some groups that were more inclined to venture a long way on this route. These were mainly ethnically Dutch boys in the lower secondary school types. Explaining why this is so, although an intriguing subject, lies beyond the scope of this study. Again, it must be emphasised that in this 'snapshot' study, the observed sequence cannot be read as a deterministic longitudinal pathway of individual drug use careers.

Second, the HOMALS analysis reveals an interesting finding: use of cannabis was relatively far removed from the use of hard drugs. Likewise, 'hard' polydrug use was less prevalent than either 'soft' or 'ordinary' polydrug use. This might be, in part, a reflection of the Dutch policy on drug use, in which the markets for soft and hard drugs are separated as much as possible, in order to prevent people who buy cannabis getting into contact with hard drugs and criminality (Verdurmen and Van Laar, 2005). However, how the licit/illicit divide affects the prevalence rates cannot be deduced from our data.

Third, this study shows that drug use should, to a very large extent, be equated with polydrug use, especially as far as alcohol, tobacco and cannabis are concerned. Until now, information regarding polydrug use was lacking in the Netherlands and it is fairly rare elsewhere. This information gap forms an obstacle for adequate policymaking.

Finally, the polydrug use patterns discerned in this study could be leveraged in future research:

- Can the typology found in this study be replicated?
- What are the prevalence rates per user type, and do these rates differ across countries?
- Is each user type associated with a distinct risk profile, enabling high-risk groups to be recognised and targeted?

- In longitudinal studies, can we determine whether young people progress toward the use of harder drugs by moving from one user type to another?
- What kind of qualitative research will help us shed light on the main drivers (or motives) that influence how a student moves from one user type to another?

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Chapter 5
Cannabis users and their relation to Finnish society

Setting the context

The great societal themes — power, status, wealth, religion, tolerance, class, mainstream culture, subcultures, generational divides, crime, respect for the law — all have a bearing on drug use and the way it is perceived. In Europe, in a similar way to consumption patterns, societal acceptance of cannabis use and perceptions of its users varies greatly across the continent.

As if to demonstrate the complexity of cannabis's role in society, the languages of Europe have spawned entire vocabularies to describe cannabis, its users, its paraphernalia and its cultural symbolism. Cannabis has many street names in all European languages. In English, dictionaries of cannabis slang run to several hundred terms. When crossing linguistic borders from Lisbon to Helsinki, a cannabis cigarette will be variously named a 'charro', 'porro', 'pétard', 'joint' or 'pind'. It may be associated with all kinds of youth tribes and subgroups, from surfers and skaters, through *okupas* and *pasotas, casseurs*, *hoodies*, *clubbers* and *kiffers*, *new bohemians* and *bobos*, to rastas, hip-hoppers, and — perhaps the core archetype — hippies. Yet cannabis will also be consumed by people who would consider themselves entirely mainstream, and not affiliated to any particular sociological groups.

In this chapter, we take an anthropological look at cannabis. Based on structured interviews with cannabis users, the author examines social attitudes to cannabis use in Finland. Subcategories of cannabis users are defined, and the author looks at reasons why people smoke cannabis and the meanings they attach to the substance. In including this case study in a European monograph, the EMCDDA does not suggest that

observations in the Finnish context will translate wholeheartedly to a wider Europe in which diversity, not homogeneity, is the norm.

Nonetheless, readers are likely to recognise many of the experiences, thoughts and ideas expressed by the interviewees. Numerous concepts bubble up to the surface: escapism, group affiliation and individuality, clandestine activity, fear of exclusion from employment, confrontation, rebellion and rejection, taboo-breaking, societal withdrawal and engagement. There are also interesting insights common to all societal subgroups: visible signals of affiliation to the group and adapting behaviour to fit when in a mainstream environment.

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Cannabis users and their relation to Finnish society

Taru Kekoni

Abstract

This article examines the relationship of Finnish cannabis users to society. A total of 35 cannabis users were interviewed for the study. The narrative modes that were identified, which interviewees employ to describe their relationship to Finnish society, included 'concealed use', 'open activism' and 'social withdrawal'.

In the narrative of 'concealed use' the cannabis user wishes to appear as an upholder of traditional values and conventional lifestyles, even though there is a hidden, 'deviant' behaviour in the background. The most significant denominators of the relationship to society are controls and mechanisms related to concealment. In the narrative of 'open activism' the relationship to society is constructed on the basis of an openly alternative lifestyle connected to cannabis use and the associated activism. In the 'social withdrawal' narrative, the user's relationship to society is characterised by experiences of being offended or excluded because of his or her cannabis use. Withdrawal may also be a personal choice to stay outside the constraints of social activity.

Background to cannabis use in Finland

Cannabis is the most frequently used illegal narcotic substance in Finland, though cannabis prevalence is low compared with the European average. According to information for 2004, lifetime prevalence in the age group 15–64 years was 12.9 %, last year prevalence 2.9 % and last month prevalence 1.6 %. Judging by these figures, the maximum number of 'regular cannabis users' in Finland could be estimated at about 40 000. The majority of cannabis users are below 29 years of age, and two-thirds are male. As regards socio-economic status and marital status, cannabis use is most prevalent among students and unmarried or co-habiting persons, reflecting the young age of the majority of users. In terms of geography, cannabis use is clearly concentrated in the capital region around Helsinki and elsewhere in southern Finland. Overall, prevalence of use and experimentation with cannabis increased by about 50 % from the mid-1990s to the 2000s, although in recent years the level of experimentation reported among school students has declined. Increases in regular use are estimated to have levelled off at the beginning of the 2000s (Hakkarainen and Metso, 2003). Cannabis use, home growing, possession, buying, importing and distribution are all criminalised

under Finnish law. The consequence of being caught using cannabis is most often a fine, although incarceration of up to 10 years is a possible penalty for cannabis-related crimes.

Seppälä and Mikkola (2004) consider that the cultural meaning of cannabis use in Finland is distributed along at least two distinct axes. On the one hand, cannabis does not possess a single homogeneous 'world of meaning', but different circles associate it with widely divergent 'meanings'. In addition to its symbolic value, cannabis has emerged as a kind of 'universal drug', with its use defined not only by different meanings related to subcultures, but also by loose and flexible mainstream meanings. On the other hand, cannabis use itself is associated with an abundance of tangible cultural products and paraphernalia, which is manifested, for example, by various implements for its use, by cannabis varieties and by historical and cultural stories linked to cannabis.

In their study of cannabis use from the viewpoint of research into social identity, Hammersley et al. (2001) note that cannabis users are connected to the surrounding society and the mainstream population in many ways. Nevertheless, their use of cannabis also requires the ability to manage an illegal activity carrying negative sanctions, including potential exclusion from arenas of social activity. This is equivalent to managing a hidden 'disability' (Goffman, 1963) or hidden deviancy (Becker, 1963) (cf. Young, 1999). There is a requirement that cannabis use is hidden from one set of people but revealed to another, to the right people under the right social circumstances. The social identity of the user is, in fact, shaped depending on the situation (Hammersley et al., 2001), and is a continuously evolving, dynamic characteristic.

Analysis and description of the data

This chapter examines the relationship of Finnish cannabis users to society, and the conditions under which the relationship is constructed. The users' 'relationship to society' is defined as the individual's experience of his or her own social status and the means by which this status is constructed and maintained in relationship to the mainstream population and social constraints. The questions posed were:

• In relation to personal cannabis use, how did the user perceive his or her relationship to the structures of surrounding society and the mainstream population?
• What meanings, behaviours and coping mechanisms do the cannabis users associate with their relationship to society?

The analysis combines the methodological approaches of grounded theory and narrative research. It aims to identify the narrative modes which cannabis users employ

in interviews to describe their relationship to Finnish society to the researcher. These narrative modes have been structured into concepts that have been categorised into 'concealed use', 'open activism' and 'social withdrawal'. In the analysis of the data, it is considered possible to move between realistic and constructionist discourse (cf. Glassner and Loughlin, 1987: 34–35). The data reveal something of what actually happens but, at the same time, information is generated precisely in the research situation and for it (cf. Pösö 2004: 35–36).

A total of 35 cannabis users were interviewed for the study. Since the focus of interest was the ideological thinking and social activity related to cannabis use in more general terms, data collection was initiated by submitting an interview request to the electronic mailing list of the Finnish Cannabis Association. Leaflets containing a description of the study and the researcher's contact data were also distributed during the Million Marijuana March in Tampere in the spring of 2003. The way in which data were collected has a clear effect on the selection of interviewees. The data were considerably affected by the recruitment of persons who use cannabis exclusively, or as their main drug. Because of this, the extensive group who use cannabis in addition to other drugs has been almost completely excluded from the data. On the other hand, it seems obvious that the data do not include people who deny using cannabis, people who use it only very occasionally and people who express very little (or no) ideological 'choice' in using cannabis.

The majority of the interviewees were men (23). The average age of the interviewees was 32 years, ranging from 19 to 56 years. The interviewees mainly lived in or near large cities in south and south-west Finland, but a few came from further north and smaller localities. All the interviewees contacted the researcher voluntarily.

'Concealed use' as the relationship to society

'Concealed use' is defined as the type of cannabis use and the associated relationship to society in which efforts are made to conceal use of cannabis from organisations and persons who might have a negative impact on the user's social status if they learned about its use. Among the interviewees who described their relationship to society within a 'concealed use' narrative, nine were students in secondary or tertiary education, six were gainfully employed and one was unemployed at the time of interview. Among the total of 12 women in this study, 10 were placed in this category. The average age of the group members was 29.5 years, ranging from 19 to 47 years. The youngest interviewees belonged to this group. Two of the interviewees were married, seven were co-habiting and six were single, of whom one was divorced and one lived with his parents.

In terms of gender and employment, the figures for this group differ significantly from the statistical data available on Finnish cannabis users (see Hakkarainen and Metso, 2003). The narrative of 'concealed use' appears understandable in the light of the socio-economic situation of those who described their relationship to society within this narrative. In one way or another, being revealed as a cannabis user could endanger the relatively stable social status these interviewees had achieved, or could lead to unfortunate consequences for the family situation or other social relationships. 'Concealed use' has clear links with the 'hidden deviancy' behaviour described by Becker (1963). The person's behaviour deviates in some aspects from social rules and norms, and the behaviour is concealed from the mainstream population (Oinonen, 2002).

The general motives mentioned for 'concealed use' are the fear of losing one's job or study opportunity or, in general, the fear of being stigmatised if cannabis use becomes known to the employer or a teacher. The fear in itself is not groundless, for several interviewees had actually lost their jobs after being revealed as cannabis users. On the other hand, a significant cause for fear is that a projected course of study or work career would founder due to cannabis use if a narcotics crime were to be listed on the user's criminal record. In Finland, an extract of criminal records is required of persons applying for jobs with minor children, and one of the categories relevant to this occupation is crimes related to narcotics.

Another important motive for concealed use is the fear of being caught by the authorities. Besides an entry in their criminal records, the interviewees fear a house search or surveillance by the police. Interviewees with families also fear the intervention of the social services in family life if the parents are found to be using cannabis. The fear of being caught is most acutely linked to the buying of cannabis, which often brings the users in contact with 'actual' drug criminals. In fact, after becoming parents many interviewees have purposefully distanced themselves from criminal circles. Users do not necessarily want to give up cannabis because of their children, though all interviewed mothers did report that they had given it up during pregnancy and breast-feeding, and the solution adopted may be to grow cannabis either at home or at a friend's home.

Means of concealment

Cannabis users describe various ways in which concealment is practised and their relationship to society maintained. 'Not telling' as a means of concealment means that the use is hidden from most of one's acquaintances and only revealed to one's most intimate circle, who are themselves often users or otherwise approve of cannabis use. 'Not telling' is the easiest solution if one wants to avoid guilt-inducing or condemnatory reactions from third parties. Not telling is also relatively easy. Cannabis use is not a

general topic of conversation. On the contrary, several interviewees report that a kind of 'culture of silence' prevails both within families and in public.

'Controlling use' is another important means of concealment vis-à-vis the mainstream population. At the same time, it is a qualitative or quantitative check on the habit. Means of control may be related to the place and time of use, as well as to the mode and intensity of use. In most cases, use is reported to take place at home or in another private space, alone or with certain friends. Users also report that the time of use is significant in terms of how 'deviant' they consider their behaviour to be. Users mostly say that use is generally accepted in the evening, which is when the interviewees mostly reported using cannabis. Controlling use in order to be courteous and well mannered are also described. For instance, it is not considered appropriate to use cannabis in children's play areas, in non-smoking areas, or in situations where others may feel offended or confused because of it. These controls of use are described as 'gentlemen's agreements', whose purpose is not to reveal one's use to others, and also not to weaken the reputation of cannabis use in general any further.

'Not telling' may be experienced as an awkward solution, if one feels compelled to hide a part of one's life that is important for one's identity. In addition to relaxation or enjoyment, cannabis use may contain other meanings, which may be religious, ritual or otherwise strongly linked to one's world view (see, for example, Booth, 2003). In spite of this, it may be necessary to hide one's use to safeguard one's social status, and this may actually be experienced as the biggest problem related to cannabis use. For this reason, affiliation to cannabis culture may be indicated by various symbolic signals. Dreadlocks, or an exceptionally relaxed style of dress, may indicate membership to those who are able to read these symbolic messages. Cannabis use may also be referred to by using terms which outsiders may not understand in the context or by employing gestures which only another user can understand.

It has been noted within cultural criminology research (Ferrel, 2003) that deviant and criminal subcultures are becoming fragmented in a world of symbolic communication. Symbolic communication for cannabis users may partly depend on the desire to experience a community and belonging with other cannabis users, but also on practical needs and the usefulness of revealing oneself or another person as a user. The usefulness may be linked, for instance, to a desire to extend the established circle of users, perhaps with the interest of finding new channels of acquiring cannabis.

'Open activism'

Instead of concealment, the relationship to society of a cannabis user may also be based on 'open activism'. This denotes a relationship with the mainstream population

and social domains in which there is no attempt to hide cannabis use. Rather, there is a desire to bring the matter out into the open, as a topic of debate in both private and public spheres. In the 'open activism' narrative, the most important aspect of cannabis use in relation to social status is considered to be the desire to break the so-called 'culture of silence' surrounding cannabis use. In this context, the interviews also often refer to the taboo aspect of cannabis. The aim of 'open activists' is to bring cannabis, as a topic, from the marginal to the mainstream arenas. On the other hand, in the open activism narrative, openness is also manifested as the personal choice of individuals. Since the matter is strongly linked to the user's way of life, he or she does not want to keep it a secret, but rather shows honestly in all situations his or her personal attitude towards it.

Among the cannabis users interviewed, 13 were 'open activists'. They were all male. The average age of the group was 32.5 years, ranging from 21 to 56 years. Nine of the interviewees were employed at the time of the interview, two were unemployed, one was a secondary school student and one in civilian service (in lieu of conscripted military service). Eight of the interviewees were unmarried, two married, two co-habiting, and one was divorced. Their educational level varied from comprehensive school to university degrees, as in other groups. However, in this group the proportion of interviewees with university degrees was slightly higher than in the others: four out of the total of eight university graduates belonged to this group (three belonged to the 'concealed use group' and one to the 'withdrawal from society' group).

The desire to act as an active proponent of cannabis may be rooted in events in the person's biography, or may be a lifestyle choice. Some activists reported that they were motivated by events in their early childhood. For example, someone with alcoholic parents may view society's relatively permissive attitudes about alcohol and sharply condemnatory attitudes about cannabis as contradictory. This may lead to active defence of cannabis. Similarly, someone who has once been strongly labelled as a cannabis user and faced the consequences may be encouraged to become an open activist. Someone who has already served a prison sentence may feel that loss of social status is already complete, and that it is therefore relatively easy to become an activist.

By contrast, younger activists did not necessarily report alienating experiences related to cannabis use. For them, activism may be only one way of working towards a better and more liberated society. In this narrative, cannabis activism is viewed not so much as a discrete movement but more as a part of a 'culture of resistance' or a general lifestyle that attempts to call into question current values and to create a new, individual value base. It might include criticism of consumer behaviour and the global or national economy. Similarly, the unpleasant effects of continued concealment of cannabis use and the fact that cannabis has become increasingly important for one's lifestyle may have the result that even a younger user becomes an activist. In this narrative, even

being caught by the police may appear as positive, as was noted by an interviewee when describing this situation: 'So I also thanked the police and said, like, "hey, this is great, now you know about me so I needn't try to hide anything!"'

In the 'open activism' narrative, the relationship to society was described from the viewpoint of personal ideology and lifestyle more markedly than with the preceding group. For activists, personally defending cannabis as a positive substance, a medication and the raw material of various industries is so important that they are ready to jeopardise their own social status.

Means of open activism

As might be expected, open activists are more likely to be active members of a cannabis advocacy organisation than those belonging to the two other groups. For them, activity in organisations serves as a means of making their cannabis-related thinking and lifestyle more visible and also more acceptable in different social spheres. At the same time, it serves their needs for a community and for sharing experiences with like-minded people. Although the use of cannabis is not regarded personally as wrong or as a criminal activity, the culture constructed around it is constrained by the fact that cannabis use is nonetheless illegal.

Activist organisations strive to spread their message chiefly by means of information provided on their internet pages and through the discussion groups they maintain. Among activists, online media are regarded as very useful channels for disseminating information and promoting more favourable attitudes. By contrast, the Million Marijuana March introduced in 2001 in Finland is regarded as a slightly more dubious way of spreading the message of legalising cannabis. Some of the activists do not take part in the march, for they believe that it attracts stigma for both the participants and cannabis users in general. Finland's longest-established association, the Finnish Cannabis Association (FCA), active since 1991, has been most assiduous among the cannabis organisations in attempting to establish dialogue with members of parliament and political decision-makers. The means used by FCA for this include position papers and press releases drafted as a result of membership and/or board meetings, which are distributed as widely as possible, including to members of parliament and other political actors. FCA was also consulted when Finland's first national drug strategy was drawn up in 1997.

Cannabis activists are also prepared to discuss the topic in the arenas of their 'opponents' or the mainstream population, and in a manner approved by these opponents. In the open activism narrative, an important enabler of discussion with the mainstream population is the way in which the discussion is conducted. This involves

such concepts as 'adjustment to censorship' and 'orientation to the media'. These imply that it is important to present their message in a form that is not too aggressive towards general social attitudes to cannabis and does not directly offend anyone, not even those who oppose cannabis most strongly. The activists report that they achieve this by 'disguising' the message so that, for example, an item in the press may not even mention the word cannabis, but the attitudes involved are visible in the text in other ways. Another point stressed by interviewees was that the story needs to match the format of the particular media outlet to which it is offered.

The most infrequent means of activism in the interview data is the attempt to exert influence in mainstream arenas. In the data this primarily means activity in party or municipal politics, and defending cannabis together with other personal values in this context. One of the interviewees describes involvement in party politics as a means of open activism and as a personal cause:

> It's like, they [cannabis use and becoming aware of its social status] have had a fairly strong impact on my, let's say, awakening, on becoming a conscious human being instead of a sleepwalker, so to speak. So I read the papers more carefully, looked for ways to make an impact, I even joined the party and went to the party convention. Incidentally, I even gave a speech at the convention. There are people there, too, who support legalisation, and, well, my three minutes were that, it was a reply to another speech, in which I mentioned that in my personal opinion people who can't distinguish say, marijuana from coke, then I think a person like that is incapable of taking decisions at all in this matter. Meaning, get informed, you guys, get informed.

Withdrawal from society

The third narrative mode is one in which cannabis users describe their relationship to society within the narrative of withdrawal from arenas of social activity. 'Withdrawal' may be explained as a personal choice, which is resorted to in order to avoid conflict with the authorities, or more generally, with condemnatory attitudes. On the other hand, withdrawal may also include strong elements of exclusion, whether economically from working life, socially from the mainstream population or judicially from the spheres of 'decent citizens'. In this case, withdrawal may be understood as social exclusion as defined by Young (1999). The withdrawal narrative may also be linked by a strong feeling of being mistreated by society, which is linked either to judicial conflicts or more generally to a feeling of losing one's 'human rights' and being shunned because of one's lifestyle.

Six cannabis users described their relationship to society within the social withdrawal narrative. Two of them were female, and the average age of the group was 36 years,

with actual ages varying from 26 to 50 years. Thus, those classified as belonging to this group were slightly older than those in the other groups. At the time of interview, one of the interviewees was employed, four were unemployed and one was on parental leave. Four group members had completed comprehensive school, one had a secondary-level qualification and one an almost complete university degree. The group included one co-habiting couple, one married person with minor children, one divorced and two unmarried single persons. An interesting distinguishing factor in the demographic data of the social withdrawal group is that they reported having started using cannabis considerably earlier than the other groups. The most commonly reported starting age in the interview data was around 20 years, but in this group the most general starting age was 13–15 years. The average age in Finland for starting the use of cannabis is about 16–18 years (Hakkarainen and Metso, 2003).

The interviewees within the 'social withdrawal' narrative reported problems with intoxicant use more frequently than interviewees in the other groups. They reported earlier problematic use of other illegal drugs, medications or alcohol, which had then been dropped as cannabis became the drug they chiefly used. One of the interviewees did not report earlier problematic use of other substances, but did report continuing experimental use of other illegal drugs. In this narrative, more clearly than in the other groups, interviewees suggested that earlier use of cannabis and also current cannabis use was linked, to some degree, to problems or addiction. The problems could be associated with social relationships and with the necessity of withdrawing from them, conflicts with the judiciary, family problems, health problems or difficulties in finding work. Many reported several of these problems. On the other hand, the interviewees could also have experienced addiction as a neutral or even a pleasant experience.

Within the 'social withdrawal' narrative, use was almost invariably justified from the viewpoint of maintaining mental balance and/or of mental health problems, mostly depression. The interviewees felt that cannabis use helped to 'smooth the edges' of an otherwise bumpy life or to 'heal traumas' created during one's life. Several interviewees reported having used mood medication earlier for the same problems, but had felt that it was of no help or that it had caused severe addiction or other problems.

Two people within the 'social withdrawal' narrative reported that a significant factor for their habit was its medicinal impact on physical illnesses which had not been alleviated by any other medicine. Physical symptoms of varying severity (such as headache, flu, asthma, menstrual cramps, migraine, nausea, indigestion) were also reported as the cause of use in the other groups, but the social withdrawal narrative includes the interviewees who reported using cannabis primarily for medicinal reasons.

Withdrawal as a relationship to society

For these interviewees, social withdrawal primarily meant being excluded from society in one way or another and an experience of being labelled as criminal or otherwise unfit for society. Three people within this narrative talked about recent experiences of being caught by the police or customs. They had been charged with growing cannabis at home, driving under the influence of cannabis and with a crime related to the sale of cannabis products. A house search by the police and the subsequent sentence appears as one example of experienced social exclusion. A cannabis user recently sentenced for the sale of seeds describes the experience as one entailing severe exclusion, which also has unfortunate future consequences:

> But now I've actually lost everything, in that I lost all the money I had and it's really difficult getting a job in Finland now that I've a record of drug crimes. And all the liquids that they found, fertilisers and spices, they were sent to the drug laboratory, and they took my photos, my employment certificates and all possible documents. They took my bank statements, my mobile phone and just everything … And apparently they figured that I'm some drug Mafia man or something. And they just walked into my flat on the grounds that they wanted to see if I had any weapons and so on …

This extract imparts a strong feeling of an experience of stigmatisation, apparent in such terms as 'drug Mafia man' used by the interviewee to describe himself through the eyes of the authorities. Becker (1963) noted that deviancy does not consist of the behaviour itself, but of the *stigmatisation as deviant* of a behaviour, as a result of the rules and norms of the mainstream population. Thus, a deviant person is a person labelled as such. According to Becker, stigmatisation is a two-directional process. With stigmatisation of the deviant, changes occur in the identity of the person and he or she also begins to feel excluded from society on the level of his or her identity.

More frequently than the other two, the 'social withdrawal' narrative describes the user's intimate circle as consisting mainly of other users. The circle may also include users of stronger drugs than cannabis or persons with links to the sale of cannabis and other criminal activity. This could naturally be caused simply by the fact that friends and acquaintances are generally selected from among people who uphold the same values and have the same hobbies. On the other hand, the mainstream population and old friends may also shut out a cannabis user if, for example, he or she is labelled as criminal or otherwise deviant. Clearly, more often than the other two, the narrative of social withdrawal is linked to unemployment.

Conclusions

Finnish cannabis users' relationship to society has been categorised into the narratives of 'concealed use', 'open activism' and 'social withdrawal'. The interviewees suggested that in Finland users of illegal drugs are often portrayed in black and white terms and assumed to exist outside domains of social activity, at the margin of society, where distinctive modes and motives of action are constructed for them. Cannabis use is not portrayed differently from use of other illegal substances. On the other hand, cannabis use in the present day may be seen as involving a diverse group of people — especially in the framework of relaxation or recreational use — and it is not necessarily regarded as having any impact on the conditions of a person's relationship to society.

A positive outcome of this study is to reach a set of cannabis users who have been invisible in Finnish drug research before. Reaching and researching hidden populations is one important role of qualitative drug research (Rhodes, 2000). To my knowledge, the relationship of cannabis users and cannabis use to society has previously not been researched or called into question in Finland or in any other European country. According to Rhodes (2000), both the nature of knowledge itself and the process by which it is acquired shape the lived experience and perceived meaning of drug use. Two key tenets of qualitative research are to describe the social meanings participants attach to drug use experiences and the social processes by which such meanings are created, reinforced and reproduced (Moore, 1993; Rhodes, 1995; Agar, 1997). An examination of Finnish cannabis users' relationship to society reveals how cannabis use is lived and interpreted through social interactions.

I have shed some light on the motives, means and ideologies attached to cannabis use in Finland. The study reveals the mechanisms and controls that are employed to make cannabis use possible in a social situation, an activity that carries a risk of relatively strict control policy and judicial sanctions. It also brings to light different ways of viewing society and the divergent positions in which people live. In addition, it reveals different meanings and contents in the internal culture of cannabis use, which may not be easily visible to the mainstream population and therefore unidentified by them.

When studying the use of drugs, one should bear in mind the thesis presented by Howard S. Becker (1970), concerning research on deviancy, according to which it is not the researcher's task to be involved in the value debate concerning the research topic, but simply to study deviancy as behaviour that is condemned by some and approved by others. The study of internal meanings of the culture of use and its relationship to society is one way of understanding cannabis users' way of regarding drug use and its meanings.

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Health effects of cannabis use

PART II
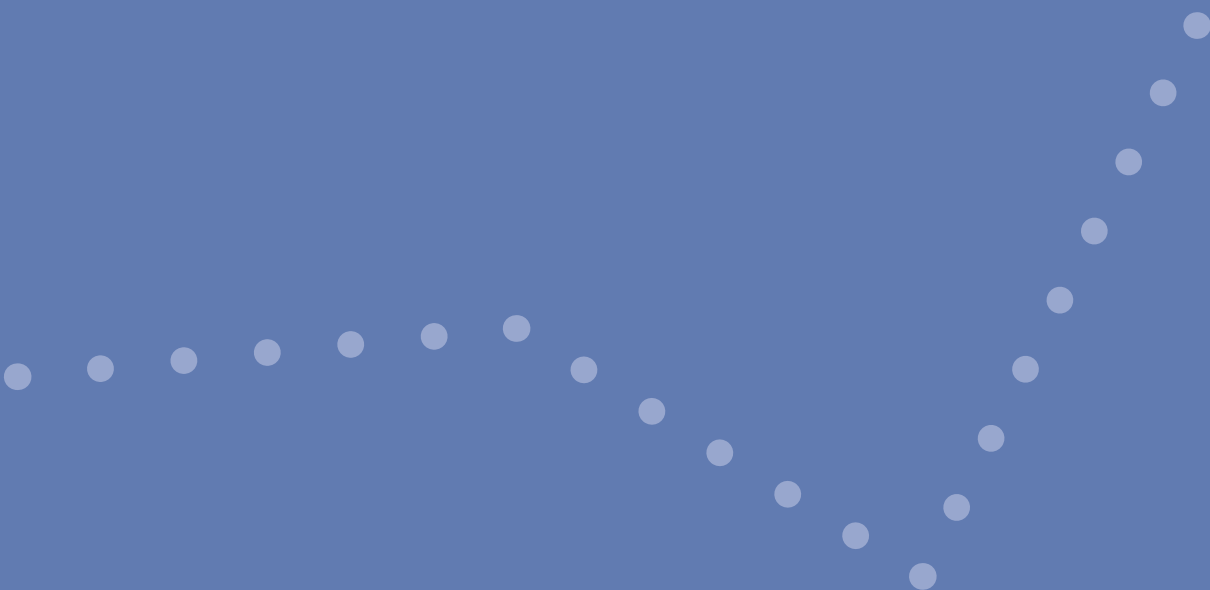
Chapter 6
Cannabis use and physical and mental health

Keywords: cannabis – comorbidity – health – lung and respiratory health – mental health – psychosis

Setting the context

In 1956, the novelist William Burroughs wrote about cannabis that 'the effects of this drug have been frequently and luridly described'. He mentioned such effects as 'acute sensitivity to impressions', 'disturbance of space–time perception' and an increase in appetite. Yet he also warned that cannabis was 'a sensitizer' and that its effects are 'not always pleasant': 'depression becomes despair, anxiety panic'[1].

So what, 50 years later, can be said about the health effects of cannabis use and cannabis smoking in particular? Cannabis use has been associated with a range of adverse health effects, and new studies regularly appear that are extending our knowledge of the possible adverse health consequences of cannabis use.

From a review of this growing literature, John Witton argues in this chapter that it still remains difficult to make conclusive statements about the health effects of cannabis. Despite the wealth of available information, there still remains a shortage of robust research from well-designed studies. Moreover, a number of basic hurdles exist that make it difficult to disentangle the effects of cannabis from other drug use and other confounding factors. These methodological problems are compounded by the difficulties of ascertaining dose–response relationships.

Nonetheless, some health problems can be identified. Links between chronic cannabis use and respiratory disease, carcinogenesis and adverse child development after

[1] Burroughs, W. (1956), 'Letter from a master addict to dangerous drugs', *British Journal of Addiction* 53(2).

maternal cannabis use have been identified. There has also been a recent increase in research interest examining the association between cannabis use and psychosis and depression. This brief chapter summarises the many hundreds of studies into the health effects of cannabis. It is important to note, however, that new research is emerging in this area at such a pace that any review is likely to become quickly out of date.

So while this chapter represents a snapshot of current knowledge — a recent Spanish monograph (Ramos Atance et al., 2007) covers the subject of cannabis and mental health in further detail — it is likely that the knowledge base on the health effects of cannabis will develop further over the coming years, and any conclusion drawn based on the current evidence must be regarded as tentative.

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See also the grey literature list in the Appendix to Volume 1 of this monograph.

Cannabis use and physical and mental health

John Witton

Introduction

The health effects of cannabis have been the subject of a number of scientific reviews by national and international bodies since the seminal Indian Hemp Commission of 1893–4. Yet, over a century later, the health effects of cannabis are still regularly debated. Uncertainty about these effects seems to contribute to confused scientific, public and political arguments. This is perhaps a surprising situation, given that there is now no shortage of recent authoritative reviews to draw upon to help weigh up the evidence (Joy et al., 1999; Kalant et al., 1999; Inserm, 2001; Hall and Pacula, 2003; UK Advisory Council on the Misuse of Drugs, 2002; Kalant, 2004; Iversen, 2005). So what makes it so difficult to arrive at a consensus view about the health effects of cannabis?

In his chapter in this monograph, Wayne Hall outlines the factors that prevent us from arriving at the same kind of consensus view of cannabis as we have for alcohol and tobacco. In particular, there is a paucity of good quality studies of cannabis and health effects or long-term studies that enable a careful assessment of the possible causal role of cannabis in the development of a range of health concerns (Macleod et al., 2004).

Analysts seeking to make conclusive statements on the health aspects of cannabis are faced with three major hurdles. The first is the absence of a standardised product. Cannabis cigarettes — 'joints' — can contain varying doses of the main psychoactive constituent of cannabis, tetrahydrocannabinol (THC), and many of the studies under review can only provide approximate indicators of the amount of THC consumed. As cannabis is an illicit product, how can we assume, with confidence, that the joint smoked by one consumer is comparable with the next joint, and the next consumer? These issues are further confounded by differences in how the substance is consumed, embracing such aspects as joint construction, other modes of administration (water pipe, vaporiser), intensity of use and frequency of use [2].

[2] For a discussion of screening for intensive use, see Beck and Legleye, this monograph. More work is needed on the nature of THC dosage among regular cannabis users and polyconsumption patterns, in particular the simultaneous use of other substances together with cannabis. Nonetheless, some studies on intensive use patterns have been published with European relevance. In the United Kingdom, Atha and Blanchard (1997, 1998) have estimated THC exposure among regular UK users; in Spain, some attempt has been made to divide regular users into 'pure' users who use cannabis alone and 'polyconsumers' who use cannabis and other illicit drugs (Calafat et al., 2000); in the Netherlands, a recent study examines intensive use of high potency cannabis (Mensinga et al., 2006).

The second hurdle is that cannabis is often consumed with other substances. It is most commonly mixed with tobacco in a joint, and frequently used concurrently with other substances, especially alcohol. Thus, the question arises: 'how can we disentangle the effects of each substance on the cannabis smoker?'.

A third hurdle is that cannabis use is more common among adolescents and young adults — generally, a physically healthy population — who often give up consuming cannabis before their mid-30s. This, combined with the paucity of long-term studies of cannabis users into middle and old age, means that the precise role played by cannabis in health problems later in life is difficult to determine.

Together, these three hurdles have meant that, although there has been a recent surge in cannabis research adding to the large number of extant studies, it is premature to pronounce conclusively on a range of long-term health concerns surrounding cannabis use.

The research evidence presented in this brief review has been identified according to the standard criteria for causal inference. These criteria imply that evidence should demonstrate that there is a relationship between cannabis use and a health outcome using an accepted type of research design. Thus, studies should have 'built-in' trustworthiness and show that:

- through statistical testing, the relationship is unlikely to be due to chance;
- drug use precedes the adverse effect; and
- that the evidence eliminates as far as possible the likelihood that the relationship is due to some other variable that is related to both cannabis use and the adverse health effect.

So this brief review presents the best currently available evidence, together with comments on any shortcomings of this evidence in the light of the above criteria.

Acute effects of cannabis

The reported effects of acute cannabis use are a sense of euphoria and relaxation, perceptual distortions, time distortion and the intensification of sensory experiences such as listening to music. Cannabis use in social settings can lead to increased talkativeness and infectious laughter followed by states of introspection and dreaminess. The user typically has a feeling of greater emotional and physical sensitivity that can include greater interpersonal empathy. Short-term memory and attention are also impaired (Joy et al., 1999; Hall and Pacula, 2003). Acute subjective effects have been found to be significantly increased according to dose of THC in laboratory studies (Hart et al., 2001).

Cannabis use can increase the heart rate by 20–100% above baseline. This increase is greatest in the first 10–20 minutes after use then decreases rapidly thereafter. The rate of decrease depends on whether smoked or oral cannabis is used, lasting 3 hours in the former and 5 hours in the latter (Joy et al., 1999). Blood pressure is increased while the person is sitting and decreased while standing. The change from sitting to standing can cause faintness and dizziness due to the change in blood pressure. These cardiovascular effects are of negligible clinical significance because most cannabis users are young and healthy and develop tolerance to these effects (Joy et al., 1999; Sidney, 2002).

However, these changes may present serious problems for older users, particularly individuals with pre-existing heart disease (Joy et al., 1999; Sidney, 2002). Cases of acute cardiovascular death in which THC was present in post-mortem blood samples, indicating recent cannabis use, have been reported (Bachs and Morland, 2001). An interview-based study of 3 882 patients (1 258 women) with recent myocardial infarctions found that the cannabis smokers in the group were 4.8 times more likely to experience a myocardial infarction 1 hour after smoking than during periods of non-use. The small number of 124 cannabis smokers in the study were also more likely to be male, overweight and cigarette smokers, and cannabis was a rare trigger of acute myocardial infarctions in this study group (Mittleman et al., 2001). A longitudinal study of risk factors for coronary artery disease in a group of young adults aged 18–30 did not find an association between cannabis use and cardiovascular risk factors such as elevated cholesterol levels and blood pressure or high body mass index (Rodondi et al., 2006). There have been a small number of case reports of strokes following cannabis use, but further research is needed to determine the relationship of cannabis use to cerebrovascular disease (Moussouttas, 2004).

Acute mood effects

Adverse mood effects can occur, particularly in inexperienced users, after large doses of cannabis. Anxiety and paranoia are the most common of these effects, which also include depersonalisation, panic, dysphoria (unpleasant mood), depression, delusions, illusions and hallucinations. These effects normally disappear a few hours after cessation of use and are responsive to reassurance and a supportive environment (Adams and Martin, 1996; Joy et al., 1999).

Acute toxicity

The acute toxicity of cannabis is very low and there is no overdose risk from cannabis. While there have been occasional reports of human deaths suspected of being related to cannabis use, these have not been confirmed by appropriate analytic techniques (Tewari and Sharma, 1980; Hall and Pacula, 2003).

Chronic effects of cannabis

Immune system

While cannabis smoking has been found to impair the function of lung macrophages, which provide a defence against inhaled pathogens, there is no conclusive evidence that cannabis impairs immune function to any significant extent (Roth et al., 2004; Kraft and Kress, 2004). The few studies that have suggested that cannabis has an adverse effect on the immune system have not been replicated. Two prospective studies of HIV-positive men have shown that cannabis use is not associated with progression to AIDS (Kaslow et al., 1989; Hollister, 1992; Joy et al., 1999).

Respiratory system

Cannabis smoke contains many of the same components as tobacco smoke, while having a higher proportion of particulate matter and some carcinogens (Tashkin, 1999). As much as four times the amount of tar can be deposited on the lungs of cannabis smokers as cigarette smokers if a cigarette of comparable weight is smoked. This difference is probably the result of differences in administration. Cannabis smokers usually develop a larger puff volume, inhale more deeply and hold their breath several times longer than tobacco smokers (Wu et al., 1988; Joy et al., 1999).

Chronic cannabis smoking effects are similar to those of tobacco smoking. Regular heavy use of cannabis can produce chronic inflammatory changes in the respiratory tract, resulting in increased symptoms of chronic bronchitis such as coughing, shortness of breath, production of sputum and wheezing (Tashkin et al., 2002). As many cannabis smokers also smoke tobacco, analysis of data from a prospective study of almost 1000 young adults in the Dunedin, New Zealand, birth cohort study (see below) took this possible confounding factor into account in assessing the effects of cannabis and tobacco on lung function. After correcting for the contribution of tobacco smoking, symptoms of bronchitis were 61–144% more frequent in in dependent cannabis smokers than in non-smokers (Taylor et al., 2000).

The epidemiological literature on the effect of cannabis on chronic obstructive pulmonary disease (COPD) is inconclusive. In a prospective study involving 990 individuals aged under 40, 'non-tobacco' smoking had a larger effect on respiratory function than tobacco smoking, an effect that was maintained in a follow-up of the sample (Bloom et al., 1987; Sherrill et al., 1991). In contrast, a longitudinal study following groups of cannabis-only smokers, cannabis and tobacco smokers, tobacco-only smokers and a control group found no significant change in lung function in the smoking groups after initial assessments (Tashkin et al., 1987; Tashkin et al., 1997).

Lung function was also examined in the Dunedin birth cohort during the follow-ups at ages 18, 21 and 26. While a correlation was found between the amount of cannabis smoking in this period and a decrease in expiratory flow rate, an indicator of COPD, this correlation became of statistically marginal significance only once the subjects' tobacco use was taken into consideration in the statistical analysis (Taylor et al., 2002). A recent exploratory study with a convenience sample of 339 participants, mainly recruited via the media, found a dose-related impairment of the large airway function, resulting in an obstruction of air flow and causing increased pressure on the lungs, with more adverse effects reported at higher doses (Aldington et al., 2007).

Carcinogenicity

Respiratory cancer

There is no conclusive evidence that cannabis causes cancer in humans, including those cancers associated with tobacco use. However, cellular, genetic and human studies suggest that cannabis smoke may be an important risk factor for the development of respiratory cancer. Laboratory studies have found little evidence that THC can cause mutations in bodily cells that may lead to cancer (Hall and MacPhee, 2002). While reviews of laboratory studies have shown that cannabis smoke can produce mutations and cancerous changes, these laboratory studies have typically used doses of the drug larger than those used by humans on a regular basis and indicate the possibility rather than the probability of such changes occurring in humans who smoke cannabis (Kalant, 2004). Biopsy samples taken from a group of crack, cannabis and tobacco smokers found evidence of biochemical and gene alterations — indicators of precancerous change (Barsky et al., 1998). These changes occurred in more of the biopsy samples taken from the smokers, whether the drugs were smoked alone or in combination, than those from the non-smokers.

There is not yet any evidence from controlled studies showing a higher rate of respiratory cancers among chronic cannabis smokers. However, there is evidence of an additive effect of cannabis and tobacco smoking on histopathological abnormalities in lung tissue, similar abnormalities to those that precede lung cancer in tobacco smokers (Joy et al., 1999; Tashkin et al., 2002; Hall and Pacula, 2003). However, several factors militate against cannabis smokers developing lung cancer. Patterns of cannabis use differ to those of cigarette smoking. Cannabis use tends to be time-limited, with most smokers stopping in their early to-mid-20s. Those who do continue their cannabis use tend to smoke 1–3 cannabis cigarettes a day, compared with 10–30 tobacco cigarettes by tobacco smokers. Finally, there are far fewer cannabis smokers than tobacco smokers (Hall and MacPhee, 2002).

There have been case reports of cancers in the aerodigestive tract of young adults with a history of heavy cannabis use. These findings are significant because these kinds of cancers are rarely found in the adults under the age of 60, even among those who smoke tobacco and drink alcohol. This suggests that cannabis smoking may potentiate the effects of other risk factors, such as tobacco smoking, and is a more important risk factor than tobacco and alcohol use in the early development of respiratory cancers (Sridhar et al., 1994; Joy et al., 1999).

Epidemiological studies have provided conflicting evidence for the likelihood of cannabis smokers developing cancers. A cohort of 64855 members of the Kaiser–Permanente Medical Care Program in California were recruited to a prospective study over a 6-year period. They were asked about their cannabis use on entry into the study and data on cancer incidence among the group were collected from a cancer registry and the California mortality data system (Sidney et al., 1997). The study did not find an excess of cancers among those who used cannabis at the entry to the study or who were current smokers compared with those who did not use cannabis when the study started. While there was a small but significant risk of developing cancer of the prostate in men and cancer of the cervix in women, there was no evidence of a risk of developing tobacco-related cancers. However, with only 22% of the people in the study being current cannabis smokers, the numbers were small and most were also followed up to an average age of 43, too young to find evidence of excess cancers among the cannabis smokers.

A second prospective study at the same centre, this time following 133811 members over a period of up to 21 years, found that those who smoked cannabis at least once a month had an increased risk of developing malignant primary adult-onset gliomas, tumours most commonly developed in the brain and spinal cord. However, other important risk factors, such as ionising radiation, were not considered in this study (Efirt et al., 2004).

Another epidemiological study retrospectively followed the medical histories of 173 cases of head and neck cancers (upper aerodigestive tract) matched with 176 blood donors at the same hospital without a history of cancer who were matched by age, sex, race, education and alcohol and tobacco use (Zhang et al., 1999). Cancer risk was 2.6 times higher in the cannabis smokers than among the non-smokers, and three times higher in those who were 55 or younger. There was an increase in cancer risk according to increasing frequency and duration of cannabis use. While this study added more weight to the suspicion that cannabis smoke may be linked to cancer, it had a number of methodological limitations, including the small numbers involved in the study and the possible role of other factors not taken into account in the study.

Two other studies failed to find an association between cannabis use and oral cancers (Llewellyn et al., 2004; Rosenblatt et al., 2004). The first, a case–control study of young adults, had only 10% heavy cannabis smokers in its sample of 116 patients. The study by Rosenblatt et al. was a large community-based case–control study with 407 patients and 615 controls aged 18–65. The study found no relation between the risk of oral cancer and ever in lifetime cannabis use or increasing duration and average frequency of use. The authors suggested that the discrepancy between their findings and those of Zhang et al. arose from the low frequency of cannabis use in the control subjects in Zhang's study, while the frequency of cannabis use in the control subjects in their study matched that predicted from population surveys of adults in the USA. However, the study had relatively low participation and may have missed cases who had used cannabis.

A recent study attempting to address the methodological deficiencies of the earlier studies used a population-based case–control design, with 1 209 cancer patients aged between 18 and 59 identified by the Los Angeles County Cancer Surveillance Program, matched to cases on age, gender and neighbourhood. Interview data were collected on lifetime histories of alcohol, tobacco and illicit drug use, socio-demographic factors, diet, family history of cancer and occupational exposures. Cumulative cannabis use was measured in joint-years, where 1 joint-year equalled 365 joints. Preliminary analysis of the data did not find a positive association between cannabis use and lung and aerodigestive tract cancers, with a positive association absent with the long-term heavy smokers as well (Morgenstern et al., 2005). Another recently reported study examined cannabis use in 611 people who had developed lung cancer and 601 people who had developed cancer of the head or neck, matching them on age, gender and neighbourhood with 1 040 people without cancer. Heavy cannabis smokers in this study had smoked more than 22 000 joints, while moderately heavy smokers had smoked between 11 000 and 22 000 joints. Neither group were at increased risk of developing cancer and were not at increased risk compared with those in the study who smoked less cannabis or none at all (Tashkin et al., 2006).

Childhood cancers

Three studies exploring the risk of cancer in childhood have found evidence of a link with maternal cannabis use during pregnancy. The most notable of these studies found an association between maternal cannabis use and acute non-lymphoblastic leukaemia (ANLL). This case–control study was designed to assess the impact of the parents' environmental exposure to petrochemicals, pesticides and radiation on childhood cancer, with maternal cannabis use recorded as one of the factors included in the analysis. The results showed that mothers of children with the cancers were 11 times more likely to have smoked cannabis than the comparison group. When the rate of cannabis use was adjusted among the control group to bring it up to the level

of other studies of childhood cancer, the risk of cancer was still three times greater (Robinson et al., 1989). In the other two case–control studies, again investigating a range of factors that may have had an impact on childhood cancers, an increased risk of rhabdomyosarcoma and astrocytomas was found in children born to mothers who smoked cannabis during their pregnancy (Kuitjen et al., 1992; Grufferman et al., 1993). However, there is no evidence for an increase in incidence of these cancers over the period 1979–95, which would be expected if maternal cannabis use was a cause of these cancers (Hall and MacPhee, 2002).

Reproductive system

THC has been found to inhibit reproductive function in the few human studies reported, although these studies have yielded inconsistent evidence. On the basis of research on animals, it has been argued that cannabis would probably decrease fertility for both men and women in the short term (Joy et al., 1999). It has been suggested that the possible effects of cannabis use on spermatogenesis and testosterone may be most significant for those males whose fertility is already impaired, for example those with a low sperm count (Hall and Pacula, 2003).

The results of research studies on the effects of prenatal cannabis use and birth outcome have been small and inconsistent. Some studies have suggested that cannabis smoking in pregnancy may reduce birth weight. Controlled studies, including a recently reported study analysing the records of live births in New South Wales hospitals over a 5-year period, found that this relation remained after controlling for any confounding variables, although this relation has not always been found in other studies (Zuckerman et al., 1989; Joy et al., 1999; Burns et al., 2006). The effects of cannabis smoking where an association has been found are small compared with tobacco (Fried et al., 1998). There is some evidence that gestation is shorter, especially for adolescent mothers (Cornelius et al., 1995; English et al., 1997; Burns et al., 2006). The relative contributions of smoking and THC are not known from the evidence available. Large, well-controlled epidemiological studies have found no evidence that cannabis causes birth defects (Zuckerman et al., 1989).

Maternal cannabis use and infant development

A review of the consequences of prenatal cannabis exposure found that, while prenatal exposure did not have an impact on global IQ, it did appear to have an impact on aspects of executive function, and, in particular, attentional behaviour and visual analysis/hypothesis testing beyond the infant stage. However, the reviewers draw attention to the limited literature, the small sample sizes and the quasi-experimental

nature of the studies reviewed and urged caution when interpreting the results of their review (Fried and Smith, 2001).

There are two major ongoing longitudinal studies examining prenatal exposure and subsequent effects on growth, cognitive development and behaviour. The first is the Ottawa Prospective Prenatal Study (OPPS), under way since 1978. The sample in this study consists of low-risk, white and predominantly middle-class families. The second study, the Maternal Health Practices and Child Development Study (MHPCD), began in 1982. The study sample is high-risk, with low socioeconomic status and just over half are African American (Goldschmidt et al., 2000).

The OPPS found that there was a developmental delay after birth in the infant's visual system with an increased rate of tremors and startle among the children of cannabis users. These effects had disappeared after 1 month and there were no detectable effects on standardised ability tests at 6 months and 12 months (Fried and Smith, 2001). The cohort has now been followed up to age 13–16 years. Effects were found on memory at age 4, attention at age 6 and visual integration and attention and visual-related aspects of executive function in 9- to 12-year-olds. There was no difference between children who were and were not prenatally exposed to cannabis on global IQ scores but there were differences in tasks that required visual memory, analysis and integration at age 13–16 (Fried et al., 2003).

A recent study from the Pittsburgh MHPCD examined the effects of prenatal cannabis and alcohol exposure on academic achievement at age 10. In contrast to the OPPS, which found no effects of prenatal exposure to cannabis on school performance, use of cannabis in the first trimester was associated with poorer performance on reading and spelling tests and a lower performance evaluation by the children's teachers. Analysis suggested these effects were mediated by the effect of first-trimester use of cannabis on the children's anxiety and depression symptoms. Cannabis use in the second trimester was significantly associated with underachievement in school performance. While a range of factors, including socioeconomic, home environment and maternal prenatal and current drug use, were taken into account in the study, other important factors such as motivation and parental involvement in the child's education did not feature in the statistical analysis (Goldschmidt et al., 2004).

Premature mortality

The two prospective studies on mortality amongst cannabis smokers are inconclusive. The Swedish study of conscripts showed an increased risk of premature death among those who smoked cannabis 50 or more times before the age of 18. Violence and accidental death were the main causes of death. This association disappeared after

alcohol and other drug use amongst this group were taken into account in the statistical analysis (Andreasson and Allebeck, 1990).

In an American study, regular cannabis use had a small association with premature mortality, which was entirely explained by the increased deaths from AIDS in men in the study. However, only men up to an average age of 43 were included in this study. With cigarette smoking and alcohol only modestly associated with premature mortality, it is too early to conclude from this study that cannabis use does not increase premature mortality (Sidney et al., 1997).

Cannabis and dependence

The US classification of psychiatric disorders, the Diagnostic and Statistical Manual of Mental Disorders (DSM), lists seven criteria for assessing substance dependence. These criteria are:

- tolerance;
- withdrawal;
- the substance is often taken in larger amounts or over a longer period than was intended;
- there is a persistent desire or unsuccessful attempts to stop or cut down use;
- a great deal of time is spent trying to obtain or use the substance;
- important social, occupational or recreational activities are given up or reduced because of substance use; and
- use is continued despite knowledge that the substance is causing or exacerbating physical or psychological problems.

A diagnosis of substance dependence is given if at least three of these symptoms are experienced in the same 12-month period (American Psychiatric Association, 1994).

Human and animal studies have found that tolerance to many of the physiological and behavioural effects of cannabis develops after repeated exposure to the drug (Adams and Martin, 1996; Joy et al., 1999). A laboratory study in which oral THC was given to human subjects over a 30-day period found a decline in the acute cardiovascular and psychological effects of THC (Jones and Benowitz, 1976). In another laboratory study, tolerance to the subjective effects of cannabis developed after oral administration of a small amount of THC for several days, with greater tolerance developing with increased amounts of THC (Jones, 1983).

Laboratory studies, while using a range of experimental approaches, have identified a number of adverse symptoms associated with withdrawal from cannabis. The most common symptoms include restlessness and nervousness, irritability, loss of appetite and

sleep disturbance. However, the extent to which the pattern of cannabis use contributes to the severity of withdrawal symptoms is undetermined. Most of the laboratory studies have involved heavy daily users as their subjects and the extent to which withdrawal may affect light or non-daily users is unclear (Budney and Hughes, 2006).

Using standardised diagnostic criteria for dependence such as DSM, epidemiological studies have estimated the extent of cannabis dependence in the general population. For example, the US Epidemiologic Catchment Study (ECA) estimated that 4.4% of the US adult population had either abused cannabis or were dependent on it at some point in their life (Robins and Regier, 1991). Seventeen per cent of those in the ECA study who used cannabis more than five times had met DSM-III criteria for dependence at some point in their lives (Anthony and Helzer, 1991). Studies of long-term cannabis users in Australia found a substantial proportion of them were dependent. In a study of 200 young Sydney adults who had used cannabis at least weekly for 11 years, 77% met the DSM-III criteria for dependence in the past year and 40% were classified as severely dependent (Swift et al., 1998).

National drug treatment systems have recorded an increase in the number of people seeking treatment for cannabis problems including dependence (see Montanari et al., this monograph). However, several studies have found that most regular cannabis users discontinue their use of cannabis by their mid-20s. For example, a longitudinal study of US school students found that less than 15% of them were using cannabis daily by the age of 28–29 (Kandel and Davies, 1992). While studies of cannabis users who are unable to discontinue their use with assistance found that they were experiencing impaired functioning and a reduction in the quality of their lives, for the most part those with cannabis dependence seem to be able to remit their cannabis use without treatment (Budney and Moore, 2002; Hall and Pacula, 2003).

Cannabis and psychosis

There is evidence that large doses of THC can produce an acute psychosis marked by confusion, amnesia, delusions, hallucinations, anxiety, agitation and hypomanic symptoms. Nonetheless, such high THC doses are rare among cannabis smokers, given that they are likely to stop smoking if they experience undesired effects. Cases do exist, however, of high doses following ingestion of cannabis (cannabis cookies, space cake), where the user has less immediate control over THC titration. Such reactions may also occur after heavy cannabis use, or in some instances, after acute cannabis use by sensitive/vulnerable individuals. These effects abate rapidly after discontinuing cannabis use. There is little evidence that cannabis alone produces a psychosis that persists after the period of intoxication in non-vulnerable cannabis users (Joy et al., 1999; Hall and Degenhardt, 2000).

Cannabis has been found to have an adverse effect on the clinical course of schizophrenia. In a Dutch prospective study which assessed patients each month over a year, the 24 people in the cannabis-using group had significantly earlier psychotic relapses than the non-cannabis-using group, an effect that was dose-related (Linszen et al., 1994). Similar findings emerged in a 3-year follow-up community study of psychotic and non-psychotic patients also in the Netherlands. The cannabis users at the beginning of the 3-year study were more likely to have psychotic symptoms and particularly severe ones at follow-up. Those who were diagnosed as psychotic at the beginning of the study had more adverse effects from cannabis use than those who were not psychotic at the start of the study (van Os et al., 2002). In a study that followed up 81 patients in acute psychiatric wards weekly for 6 months, a higher frequency of cannabis use led to more psychotic relapses in the patients, after controlling for other established factors leading to relapse in the statistical analysis (Hides et al., 2006). In contrast, a follow-up study of alcohol- and cannabis-using patients in a psychiatric outpatient continuing care programme in Canada found that symptoms of schizophrenia-spectrum disorders were reduced at 12 months (Margolese et al., 2006).

Findings from national surveys in the USA, Australia and the Netherlands have found higher rates of cannabis use in patients with schizophrenia than the general population. For example, the US National Epidemiological Catchment Area study (Robins and Regier, 1991) indicated that 50% of those identified with schizophrenia also had a diagnosis of substance use disorder (abuse or dependence), compared with 17% of the general population (Regier et al., 1990). People who used cannabis on a daily basis were 2.4 times more likely to report psychotic experiences than non-daily cannabis users, after controlling for a variety of confounding variables such as socio-demographic factors, social role and psychiatric conditions (Tien and Anthony, 1990). A study of cannabis use and psychotic symptoms at age 18 in a cohort of 3500 Greek adolescents found positive associations between frequency of cannabis use and psychotic experiences after controlling for other drug use and depressive symptoms in the statistical analysis, with a stronger association for those who started their cannabis use before age 15. However, the rates of cannabis use in the study group was low, with 6% reporting lifetime cannabis use and 0.9% reporting daily or near-daily use (Stefanis et al., 2004).

Four main views on the nature of this association have been proposed. Firstly, the link may be due to socio-demographic, economic or genetic factors common to both substance use and schizophrenia. Secondly, the self-medication hypothesis suggests that patients with schizophrenia may be using cannabis and other drugs as a form of self-treatment for their condition. Thirdly, some suggest that cannabis causes psychosis. Finally, the vulnerability hypothesis proposes that the use of cannabis can increase the risk of schizophrenia among people with a predisposition to the illness.

A number of carefully designed prospective studies have helped to assess the value of these hypotheses. These studies have been used to chart the development of a number of psychosocial and behavioural topics, and cannabis is just one issue the datasets have allowed to be explored. The findings from these studies have been summarised in a number of reviews (Arseneault et al., 2004; Smit et al., 2004; Degenhardt and Hall, 2006) and two meta-analyses and one systematic review (Henquet et al., 2005a; Semple et al., 2005; Moore et al., 2007).

The Swedish conscript study

A 15-year prospective study of cannabis use and schizophrenia in 50 465 Swedish military conscripts was the first study to report a potential link between cannabis use and later schizophrenia. The study recruited conscripts who were 18–20 years old in 1969–70. Conscripts who were hospitalised for schizophrenia or psychosis and could be linked to their military medical records were identified. Through this linkage, the relationship between cannabis use and the onset of schizophrenia might be established.

The relative risk for a diagnosis of schizophrenia was 1.3 times higher for those who had used cannabis 1–10 times, three times higher for those who had used cannabis 1–50 times and six times higher for heavy users of cannabis (defined as use on more than 50 occasions) than among those who had not used cannabis. However, over half of the heavy users had had a diagnosis of a psychiatric condition other than psychosis at conscription and when the analysis took this factor into account the relative risk fell to 2.3 (Andreasson et al., 1987; Allebeck, 1991).

A follow-up of the conscripts reported in 2002. Again, heavy cannabis users were found to be 6.7 times more likely than non-users to be at risk of a diagnosis of schizophrenia after 27 years. The risk held when the analysis was carried out on a subsample of conscripts who had used cannabis only. While not an exhaustive array, when other possible confounding factors such as psychiatric diagnosis at conscription, IQ, growing up in a city and cigarette smoking were taken into account the risk, though reduced, still remained, with heavy cannabis users having a threefold relative risk of a diagnosis of schizophrenia (Zammit et al., 2002).

The Dunedin Multidisciplinary Health and Development Study

The Dunedin Study from New Zealand has followed a birth cohort of 1 037 people from the general population born in 1972–3. At age 11 they were examined to identify any self-reported psychotic symptoms before cannabis use may have begun. At 15 and 18 they were examined for self-reported cannabis use, enabling the investigation of the age of onset in relation to later outcomes. At age 26 the subjects were interviewed to

see if they met the criteria of schizophreniform disorder according to DSM-IV diagnostic criteria. A diagnosis of schizophreniform disorder enabled the elimination of psychotic symptoms resulting from being under the influence of alcohol or drugs. Ninety-six per cent of the birth cohort had remained in the study at this point.

Those who used cannabis at ages 15 and 18 had higher rates of psychotic symptoms at age 26 than non-users, a relationship that remained after the analysis controlled for psychotic symptoms predating cannabis use. Those who started using cannabis by the age of 15 showed a fourfold increase in the likelihood of a diagnosis of schizophreniform disorder by the age of 26. The analysis also showed that cannabis use by age 15 did not predict depression at age 26, suggesting the outcome was specific to the cannabis use. The study reported that 10.3 % of the 15-year-olds using cannabis received a diagnosis of schizophreniform disorder by the age of 26, compared with 3 % of the controls. The number of 15-year-olds smoking cannabis in the study was small, however (Arseneault et al., 2002).

The Christchurch Health and Development Study

Another New Zealand Study followed a birth cohort of 1 265 people born in Christchurch urban region, with annual measurements up to the age of 16. Additional measurements were taken at age 18, including whether the individuals had a DSM diagnosis of cannabis dependence and whether psychotic symptoms were identified. This examination was repeated at ages 21 and 25. Researchers were able to draw on a sample of 1 055 participants for whom information on cannabis use and psychotic symptoms were available at ages 18, 21 and 25, when 1 011 people remained in the study. Psychosis symptomatology was measured with psychosis items selected from of the symptom checklist as representative of the psychotic symptoms. This study addressed two main questions about the relationship between cannabis and psychosis in its analysis. It attempted to control for residual confounding in its analysis and examine whether reverse causality may be in play, with an increased susceptibility to use cannabis resulting from the individual's psychological state. A wide range of confounding factors were controlled for in the analysis, including family socioeconomic status, family functioning, child abuse including physical punishment, educational achievement and psychotic symptoms at the previous assessment. Analysis also took into account non-observed fixed sources of confounding (Fergusson et al., 2003, 2005).

The results showed that young people using cannabis daily had rates of psychotic symptoms that were between 2.3 and 3.3 times higher than those of non-users. After adjusting the analysis to take into account the confounding factors, this relationship persisted with daily users 1.6–1.8 times more likely to be experiencing rates of psychosis than non-cannabis users. While the study could not control for all possible confounding factors and the diagnostic tools used in the study may not have found all the aspects

of psychosis, the research shows that increasing use of cannabis was associated with increases in the risks of psychotic symptoms, and that the increases in psychotic symptoms were not associated with increased rates of cannabis use, casting doubt on the self-medication hypothesis (Fergusson et al., 2005).

The Netherlands Mental Health Survey and Incidence Study (NEMESIS)

This study followed 7 076 adults aged 18–65 years randomly selected from the Dutch general population, who were examined in 1996, 1997 and 1999. A total of 4 848 people were still in the study at the 1999 follow-up, 4 045 of whom were considered as the 'at-risk' set. The attrition of participants was covered in the analysis of findings from the study. At the 3-year point those who used cannabis at baseline were three times more likely to show psychotic symptoms than non-users. This relationship persisted after controlling for a range of factors in the analysis, such as ethnic group, marital status, educational level and urbanicity. The study also found a dose–response relationship, with the highest risk of psychotic symptoms amongst those who used cannabis more frequently at the beginning of the study. Lifetime history of cannabis at baseline was a stronger predictor of later psychosis than cannabis use at follow-up, suggesting that the relationship between cannabis use and psychosis is not simply one resulting from a short-term psychotic episode (van Os et al., 2002).

The early developmental stages of psychopathology (EDSP) study

The EDSP study examined the prevalence, incidence, risk factors and 4-year course of mental disorders in a random representative sample of adolescents and young adults aged 14–24 in Munich. The baseline survey with 3 021 participants was conducted in 1995, with follow-up data for 2 437 participants in 1999. After adjusting for a range of factors in the analysis, cannabis use at baseline moderately increased the risk of psychotic symptoms at follow-up. The effect of cannabis was stronger for those with any predisposition for psychosis at baseline than those without, with a dose–response relation with increasing frequency of use. Predisposition to psychosis did not predict cannabis use at follow-up in the analysis, suggesting that the cannabis was not used as self-medication in this group (Henquet et al., 2005b).

What is the relationship between cannabis and psychosis?

While these various studies used a range of methodologies, measurements of cannabis use and psychosis and, in the cases of the Dunedin and NEMESIS studies, were marked

by small sample sizes, there was some consistency in the risk of developing psychosis after cannabis use across all the populations studied. The Moore et al. meta-analysis concluded that those who had ever used cannabis were 40% more likely to experience a psychotic outcome than non-users and regular cannabis use increased the chances of developing later schizophrenia or schizophrenia-like psychotic illness by approximately two- to threefold (Arseneault et al., 2004; Henquet et al., 2005a; Semple et al. 2005; Moore et al., 2007). In the Dunedin study, those who started their cannabis use by age 15 had a higher risk of developing schizophreniform disorder by age 26 than those who started at age 18, suggesting that early cannabis use may provide higher risk of psychosis outcomes (Arseneault et al., 2002). The analysis from the Christchurch population study has gone the furthest in terms of controlling for a wide range of possible confounding demographic, social and individual factors in their analysis, suggesting that the association between cannabis use and psychosis in the study population is unlikely to be due to confounding factors (Fergusson et al., 2005). The analysis also suggested that the direction of causality was from cannabis to psychosis.

With the Christchurch and other studies eliminating the self-medication hypothesis, the studies also eliminated the idea that other drugs may be involved and found that cannabis makes its own unique contribution to the development of later schizophrenia or psychotic symptoms.

The significance of the relationship between cannabis and schizophrenia to public health

However, the increased rates of cannabis use in the last 30 years have not been accompanied by a corresponding increase in the rates of psychosis in the population (Degenhardt et al., 2003a). The studies reviewed here suggest that cannabis is a modest statistical risk factor, with studies calculating that 6–8% of schizophrenia could be prevented if cannabis use was removed from the general population of adolescents and young adults (Arseneault et al., 2004; Henquet et al., 2005b). The vast majority of young cannabis smokers do not develop psychosis, and this supports the hypothesis that a small minority of users may be vulnerable to the effects of cannabis and time of onset to psychotic illness. The vulnerability hypothesis has received some support from a study that explored substance use and psychotic experiences in daily life. The acute effects of cannabis were stronger among participants with high vulnerability for psychosis (experiencing at least one bizarre psychotic symptom or at least two non-bizarre symptoms over the first month). Those vulnerable participants reported increased levels of perceived hostility and unusual perceptions, and also decreased levels of pleasure associated with the experience of using cannabis (Verdoux et al., 2003). That cannabis is a risk factor for earlier onset is further supported by a study examining first-episode psychosis in the Netherlands, which found that cannabis users in the group presented

to treatment earlier than non-users, with a median age difference of 7.5 years (Veen et al., 2004). Adding further weight to the strength of the vulnerability hypothesis is a recent study that examined a gene–environment interaction in the Dunedin population, finding that a gene called COMT moderated the influence of adolescent cannabis use on developing adult psychosis in the Dunedin population, a finding also reported in an experimental setting (Caspi et al., 2005; Henquet et al., 2006). However, this interaction was reported only in a small subgroup of participants in each study and awaits further replication.

Cannabis and depression and anxiety

There have been a number of case reports of panic reactions after cannabis use. In a survey of 1 000 young adults in New Zealand, acute anxiety and panic was the most common psychiatric problem reported by cannabis smokers in the study (Thomas, 1996). Lifetime cannabis dependence, measured using DSM criteria, was significantly related to an increased risk of panic attacks in a large statewide randomly sampled household survey conducted in the USA (Zvolensky et al., 2006). National population studies have found evidence for a link between cannabis use and depression. A study of a nationally representative sample of 7 000 adults aged 15–45 in the USA found a small increased risk of depression among the current users of cannabis (Chen et al., 2002). Another study of a nationally representative sample of 40- to 50-year-olds in the USA found a small increased risk, but one that was associated with earlier onset of cannabis use rather than current use (Green and Ritter, 2000). A national population study in Australia found that cannabis users were between two and three times more likely to meet criteria for a mood disorder than non-users. Prevalence of mood disorders increased from 6 % in non-users to 14 % of those who met criteria for cannabis dependence (Degenhardt et al., 2001).

A meta-analysis of cohort studies found a modest but significant association between early onset heavy use of cannabis and later depression but no evidence that depression increased the probability of later use of cannabis (Degenhardt et al., 2003b). For example, a follow-up study of participants with no depressive symptoms at the beginning of the Epidemiologic Catchment Area study found that those with a diagnosis of cannabis abuse at baseline were four times more likely than those without a cannabis abuse diagnosis to have depressive synmptoms at follow-up (Bovasso, 2001). In a longitudinal study of a representative sample of 1 601 secondary school students in the Australian state of Victoria, weekly or more frequent use led to a doubling of the risk for later anxiety or depression by the age of 20, while female daily users had a fivefold increase in later depression and anxiety (Patton et al., 2002). Depression and anxiety in the students did not predict later cannabis use in the analysis, suggesting that cannabis was not used for self-medication. However, findings from the smaller New Zealand

Dunedin sample indicated that those in the sample using cannabis by age 15 did not have a significantly higher risk of later depression by the age of 26 than non-users did, although the sample size may have prevented the identification of a relationship in the statistical analysis (Arseneault et al., 2002). In a follow-up study of the New Zealand Christchurch sample, the analysis controlled for a range of confounding factors that might explain the association between cannabis and a range of psychosocial outcomes including depression and suicide attempts. The link between cannabis and these outcomes and heavy (at least weekly) cannabis use still persisted, suggesting that cannabis was contributing directly to these outcomes (Fergusson et al., 2002). A recent analysis of data from the ongoing National Longitudinal Survey of Youth of 1979 with a large cohort of 12 686 men and women born between 1957 and 1964 did not find that past-year cannabis use predicted later development of depression (Harder et al., 2006). However, the study group may have been too old and restricted in age range for the relatively low level of their cannabis use to result in significant symptoms of depression (Copeland, 2006). Overall, a recent meta-analysis has concluded that the majority of studies of cannabis and affective mental health problems have not adequately addressed the issue of reverse causation, and the evidence for a link is not strong (Moore et al., 2007).

Impact of increased potency of cannabis

High-THC cannabis is reported to have become increasingly available, although the published evidence for this is scant (Hall and Swift, 2000; King et al., 2005). This may reflect an increased market for more potent cannabis amongst regular users and improved methods of growing high-potency cannabis. The health implications of this development are unclear. Those who use these high-potency products may increase their risks of developing respiratory disease or experiencing psychotic symptoms (Hall and Pacula, 2003). However, regular users may be able to titrate their dose and decrease the risks of respiratory disease, and naive users who experience adverse effects may be deterred from further cannabis use (Hall and Pacula, 2003). As yet, there is insufficient evidence to inform a conclusive view of the risks to health posed by high-potency cannabis (King et al., 2005).

Conclusion

Most cannabis users cease smoking cannabis by their late 20s or early 30s and the vast majority do not experience any adverse effects from their use. A minority continue their use into middle age, and such long-term heavy users have reported a range of negative health effects (Reilly et al., 1998; Gruber et al., 2003). However, the causal role of cannabis in the development of negative physical and mental health problems for some users remains uncertain and in need of further investigation. Recent research

has provided more information on the involvement of cannabis in the development of psychiatric disorders such as depression and psychosis in vulnerable people, or bronchial problems resulting from cannabis smoke. But more research work is needed to address the precise role of cannabis in health-related problems and the broad research agenda for cannabis remains much the same as 30 years ago.

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Chapter 7
The public health significance of cannabis in the spectrum of psychoactive substances

Keywords: cannabis – DALY – economics – health – mental health – public health

Setting the context

There has been a growth in interest in measuring and quantifying the public health impact of specific health issues, from influenza outbreaks, through obesity, tobacco smoking and heart disease, to behavioural items such as sports and workplace injuries and risks associated with mobile phones. The discipline is increasingly termed 'health impact assessment' (HIA), with an international conference on HIA in its eighth year in 2007.

Illicit and licit drugs, in particular alcohol and tobacco, are no exception to this euro- and dollar-counting trend. Increasingly, public health economists are joining forces with epidemiologists and treatment professionals to estimate or quantify the impact of drug use — social, economic or, more specifically, in terms of healthcare service and resource allocation. Specifically for cannabis, however, methodologies to gauge the global public health impact of cannabis use are yet to emerge, although studies have examined areas such as the treatment of cannabis use disorders, prevention costs, secondary health risks such as driving under the influence of cannabis (see Mann et al., this monograph) and indirect costs (truancy, workplace absenteeism or sick leave, etc.).

As this chapter demonstrates, measuring the global impact of cannabis use represents serious methodological challenges, even when compared with other areas of drug policy. There are confounding issues that arise from consumption of cannabis together with alcohol and tobacco. And whereas other illicit drugs with better understood health risks offer more clear-cut features to measure — in terms of toxicology and effects on physical health — cannabis health effects are more amorphous and offer fewer

opportunities for benchmarking harms (see Witton, this monograph). For example, studies of the impact of needle exchange, or prison-based harm reduction projects are able to record changes in drug-related deaths, HIV or hepatitis transmission. Similarly, studies of the impact of smoking bans might measure air quality in bars and clubs, or look at improvements across the general population with regards to smoking-related problems (respiratory problems, heart disease and lung cancer). While some measures can be made of the prevalence of treatment demand, population-level screening for problems related to cannabis use is underdeveloped. Furthermore, cannabis treatment takes many shapes and forms (an overview is provided by Rödner Sznitman, this monograph), making estimations of 'average cost of treatment' difficult.

Any further precision into the public health costs specifically for cannabis in Europe is likely to draw strongly on the expertise of the EMCDDA's Reitox national focal points, and on their scrutiny of treatment demand and treatment costs in particular. Yet this task is far from easy. Estimates were recently made for the EMCDDA on 'health and social care expenditure' for all illicit drugs in Europe (Reitox national reports, 2007; EMCDDA Annual Report, 2007). The exercise showed high variability in reporting: a figure for total drug-related public expenditure in the EU on illicit drugs ranged from EUR 13 billion to EUR 36 billion. Tangible expenditure on illicit drugs — treatment, prevention, enforcement, epidemiology — is subject to a wide range of labels, and is typically distributed across a range of actors: ministerial budgets, NGOs, private and public health insurance, police, customs, etc. In Europe, these actors differ not just within each country in Europe, but also on a federal or provincial level. There are further issues of country size, currency conversion, differing levels of cannabis prevalence, varying patterns of co-consumption (alcohol, tobacco, other illicit drugs) and divergence in the relative cost of healthcare provision and policing across the EU. So, estimating the full impact of cannabis on health with an accountant's accuracy is a distant prospect, even at the level of single Member States.

Nonetheless, the UNODC has begun exploration into the area, and has proposed using treatment demand rates as one of the means to 'weigh' the dangers of illicit drugs. It estimated in 2005 that 78 per 1 000 users of opiates undergo treatment, higher than for cocaine (66 per 1 000 users), amphetamines (16) or cannabis (7) (UNODC, 2005). Work by the European Brain Council, while looking at wider mental health problems, has also improved understanding of the global public health 'footprint' of brain disorders.

Further reading

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Website of the WHO's European *Observatory on Health Systems and Policies* www.euro.who.int/observatory

See also the grey literature list in the Appendix to Volume 1 of this monograph.

The public health significance of cannabis in the spectrum of psychoactive substances

Robin Room

The public health significance of psychoactive substances: the risk of harm

Cannabis is one among a whole spectrum of psychoactive substances used by humans. They are used not only for their psychoactive properties, but also in various other practical functions, depending on the substance — for example, as a medicine, a food, a thirst-quencher, a solvent. Apart from their physical effects, strong values (both positive and negative) are attached to psychoactive substances — in different circumstances, they may serve as a sacrament, as a taboo object, as a symbol of fellowship, as a symbol of stigmatisation (Room, 2005a).

Along with the positive effects and symbolic values of psychoactive substances, to a greater or lesser extent the substances also carry the risk of harm, particularly to the user but also sometimes to those around the user. The public health significance of psychoactive substances lies in these potential and actual harms. Establishing the harms is a prerequisite for deciding on effective public health responses.

It is a commonplace in the literature that the harms associated with psychoactive substances are multidimensional, and that they are greatly affected by the mode and context of use. A recent British publication on *Dangerousness of Drugs*, for instance, rates different psychoactive substances in terms of nine different domains of harm, and also in terms of seven domains of factors (such as route of administration or context of use) that can increase or reduce the dangers. Best et al. (2003) make 'no attempt … to rank order the target substances, even within each of the domains specified. This is because the dangers are not uni-dimensional nor do they generally occur in isolation'. They continue: 'Drugs are not, of themselves, dangerous, with the risk residing in the interaction between the substance, the individual, the method of consumption and the context of use' (Best et al., 2003).

The dangers are indeed multidimensional and greatly affected by mode and context of use. But still, in a public health policy context it is worthwhile to consider the risk of different psychoactive substances in an overall frame. The present international drug control regime, and national drug control regimes operating in accordance

with it, generally classify drugs into a set of classes according to 'the harm they may cause' (Advisory Council on the Misuse of Drugs, 2002). Any effort to arrive at an improved classification or ranking must start from the rankings implied by the existing classifications.

However, there is presently no clear agreement on how to arrive at an improved and scientifically defensible ranking of dangerousness or of the degree of social and public health problems from different substances (in various use-forms).

Comparing present levels of social and health harm

One relevant policy consideration, obviously, is the present level of harm in a given society, or on a global basis. Comparisons are most available here between tobacco (considering primarily cigarettes), alcohol and all illicit drugs taken together. For instance, according to the World Health Organisation's estimates for the Global Burden of Disease in 2000, tobacco accounts for 4.1% of the total burden in disability-adjusted life-years globally, alcohol for 4.0%, and illicit drugs for 0.8%. For developed societies such as the United Kingdom, the corresponding figures are 12.2%, 9.2% and 1.8% (Ezzati et al., 2002). Another mode of comparative estimation of harm is in terms of the economic costs to a society from use of different psychoactive substances. While the assumption behind such estimations are subject to substantial criticism (e.g. NIAAA, 1994: 253–259), they do have the advantage of including some of the social as well as the health costs. A representative set of estimates in this mode is for Canada for 1992: CAD 9.6 billion for tobacco, CAD 7.5 billion for alcohol, and CAD 1.4 billion for illicit drugs (Single et al., 1998). In general, the costs for illicit drugs are dominated by the criminal justice costs, primarily of policing the illicit market and punishment for illicit dealing or use.

In a new cost-of-illness analysis for Canada, cannabis, despite being by far the most commonly used illegal drug, accounted for a relatively small part of the estimated health burden from illicit drugs: 6.4% of the overall healthcare costs due to illegal drugs and 2.3% of the years of life lost due to mortality from illegal drugs (calculated from analyses prepared for Rehm et al., forthcoming).

Comparing the potential for harm

The most obvious objection to basing policy decisions on such estimates is that the present levels of social and health harm are not necessarily the same as what the levels of harm would be if policies changed. The question this leaves, however, is: what is, then, the appropriate basis for judging between psychoactive substances in terms of their adverse effects? Presumably, the answer to this question should be in terms of

realistic scenarios of the substance's potential for harm — its dangerousness — in cases of heavy use. In a research team of which I was a member (Hall et al., 1999), we took the approach to this of comparing the importance (probability and severity) of effects resulting from heavy use of the different substances in their most harmful commonly used form – in the case of cannabis, use by smoking. A more nuanced approach, from a public health perspective, would pay attention to likely rates of such heavy use in a whole population with ready and cheap availability. Rates of dependence or heavy use among users in current circumstances may give some indication in this direction, but for illicit substances they obviously fall short of the full test with ready and cheap availability. At this stage in Europe, cannabis is an in-between case; it could be argued that in the Netherlands cannabis use might not rise much from present levels with full legalisation (cf. MacCoun and Reuter, 2001).

Comparison on dimensions of danger: overdose

One important dimension of dangerousness or harm is the likelihood of an overdose from the substance. This dimension is obviously of special significance not only for overdoses among recreational and heavy users, but also in more general terms of poison control — for example, labelling and child-proofing containers of the substance. The first column of figures in Table 1 shows partial results of a recent review of the literature by Gable (2004). The 'safety ratio' shown is the ratio between 'the usual effective dose for nonmedical purposes' and the usual lethal dose, for the mode of administration specified. Gable comments, concerning the wider range of drugs considered in his review, that 'the range of safety ratios is so wide that the data appear to have the attributes of an ordinal scale'. In such a scale, cannabis would be in the lowest-risk group, those substances with a ratio of 100 or above.

Comparison on dimensions of danger: degree of intoxication

Another dimension of dangerousness is the level of intoxication produced by the substance, which 'increases the personal and social damage a substance may do' (Hilts, 1994). Obviously, the level of intoxication produced by taking a substance is highly influenced by the dose taken, and the set and setting of the consumption. A glass of alcohol with dinner will not result in intoxication, while on the other hand, traditional ways of using tobacco among some indigenous South Americans routinely resulted in intoxication to the point that the smoker passed out (Robicsek, 1978). But despite these caveats, there are inherent differences in the propensity of different psychoactive substances to intoxicate. The second column of Table 1 shows rankings made by Jack Henningfield and Neal Benowitz on this (Hilts, 1994). Cannabis was ranked as more intoxicating than tobacco, but less so than alcohol, cocaine and heroin.

Table 1: Ratings on dimensions of danger

	Safety ratio (Gable, 2004)	Intoxicating effect (Hilts, 1994)	Dependence (how hard to quit) (Hilts, 1994)	Potential addictiveness (Strategy Unit, 2005)	Degree of psychic dependence (Roques, 1999)
Cannabis	> 1 000 smoked	Fourth highest	Lowest	**	Weak
MDMA	16 oral	NR	NR	**	(?)
Stimulants	10 oral	NR	NR	***	Middling
Tobacco	NR	Fifth highest	Highest	***	Very strong
Alcohol	10 oral	Highest	Fourth highest	***	Very strong
Cocaine	15 i.n.	Third highest	Third highest	***	Strong but intermittent
Heroin	6 i.v.	Second highest	Second highest	*****	Very strong

Notes
NR, not rated; i.n., intranasal; i.v., intravenous.
Safety ratio = (usual effective dose for non-medical purposes)/(usual lethal dose).

Comparison on dimensions of danger: dependence

The dependence potential or addictiveness of a substance plays rather little part in the formal criteria for scheduling of substances under the international conventions (Room, 2005b). Nevertheless, there is no doubt that the popular imagery of addiction and addictiveness plays a part in setting the policy stage; in countries like the USA, arguments about the addictiveness of nicotine, for instance, have been secondary only to arguments about second-hand smoking in moving the political process of tobacco control forward. Accordingly, ratings are also available of the dependence potential or addictiveness of different substances. For instance, Henningfield and Benowitz (Hilts, 1994) give comparative ratings of the different substances on withdrawal, tolerance, reinforcement and dependence ('how difficult it is for the user to quit, the relapse rate', etc.). The recent report of the UK Prime Minister's Strategy Unit (2005) offers a rating on 'potential addictiveness', and a French committee chaired by Bernard Roques (1999) offers a rating on 'psychic dependence' (see last three columns of Table 1). The UNODC proposed a 'harm/risk factor' for drugs for use in creating an *Illicit Drugs Index* (UNODC, 2005), using treatment demand data as a measure of harmfulness. Though there is some disagreement in the rankings for other drugs, each of these rankings places cannabis at the lowest level for the substances in the table (the Strategy Unit shows a lower ranking for LSD).

Comparisons on dimensions of danger: more global ratings

The Roques committee also took a more global approach to the issues of dangerousness. Table 2 shows the Roques committee's rankings on 'Toxicité générale' (general toxicity) and 'Dangerosité sociale' (social dangerousness). In the usage of the Roques report, 'toxicity' includes long-term health effects such as cancer and liver disease, and infections and other consequences of mode of use, as well as the acute effects represented by the safety ratio. The concept of 'social dangerousness' focuses on

Table 2: Ratings on global dimensions of 'dangerousness' (Roques, 1999)		
	General toxicity	Social dangerousness
Cannabis	Very weak	Weak
Benzodiazepines (valium)	Very weak	Weak (except when driving)
MDMA/ecstasy	Possibly very strong	Weak (?)
Stimulants	Strong	Weak (possible exceptions)
Tobacco	Very strong	None
Alcohol	Strong	Strong
Cocaine	Strong	Very strong
Heroin	Strong (except therapeutic use of opiates)	Very strong

'states of comportment which can generate very aggressive and uncontrolled conduct … induced by the product or varied disorders (fights, robberies, crimes …) in order to obtain it and risks for the user or others, for example in the case of driving a vehicle' (Roques, 1999: 296; original in French). It will be seen that the Roques ratings on 'general toxicity' are compatible with the safety ratios reported by Gable (2004), and that the 'social dangerousness' ratings are compatible with the ratings by Henningfield and Benowitz on intoxicating effect (Hilts, 1994). Cannabis is ranked 'weak' on 'general toxicity', and 'very weak' on 'social dangerousness'.

Hall et al. (1999) took another approach to a global rating of adverse effects of psychoactive substances, comparing four classes of substances in terms of whether there was 'important effect' or a 'less common or less well-established effect' on each of 11 dimensions (Table 3). According to these rankings, alcohol clearly has the greatest potential for harm; among the four substances, cannabis has the lowest number of asterisks.

Nutt et al. (2007) used another global method, identifying three main factors that together determine the harm associated with different drugs: (i) the physical harm to the individual user caused by the drug; (ii) the tendency of the drug to induce dependence; and (iii) the effect of drug use on families, communities and society. Within these categories, they recognised three components to create a nine-category 'matrix of harm'. Physical harms were split into 'acute', 'chronic' and 'intravenous' harm. Dependence was split into 'intensity of pleasure', 'psychological dependence'

Table 3: A summary of adverse effects on health for heavy users of the most harmful common form of each of four drugs (according to Hall et al., 1999)

	Cannabis	Tobacco	Heroin	Alcohol
Traffic and other accidents	*		*	**
Violence and suicide				**
Overdose death			**	*
HIV and liver infections			**	*
Liver cirrhosis				**
Heart disease		**		*
Respiratory diseases	*	**		
Cancers	*	**		*
Mental illness	*			**
Dependence/addiction	**	**	**	**
Lasting effects on the fetus	*	*	*	**

**Important effect, *less common or less well-established effect.

and 'physical dependence'. Social harms were split into 'intoxication', 'other social harms' and 'healthcare costs'. Expert panels gave scores, from 0 to 3, for each category of harm for 20 different drugs. Cannabis was rated at 11th most harmful out of 20 substances: heroin and cocaine were rated the most harmful, while both alcohol and tobacco were rated more harmful than cannabis, with khat, alkyl nitrates and ecstasy rated as least harmful.

Accounts have appeared in Swedish newspapers of a recent ranking of drugs according to their dangerousness, circulated by the Swedish authority for prosecutions (*Åklagarmyndigheten*) to all Swedish prosecutors. Heroin was listed as the most dangerous drug, with others in descending order: ecstasy, amphetamines, cannabis, khat (TT, 2005).

In summary, on every comparison of dangerousness we have considered, cannabis is at or near the bottom in comparison with other psychoactive substances.

The implications of the comparative findings

The ratings above, and the literature considered elsewhere in this volume, do not by any means exonerate cannabis as a public health concern. In recent years, as noted elsewhere in this volume, there has been some strengthening of the evidence that cannabis may play a part in precipitating or worsening psychosis. The evidence on the adverse effects of driving under the influence of cannabis has also somewhat strengthened (see Mann et al. in this volume). In my view, the asterisks in Table 3 already accommodate these findings, in terms of relative ratings and public health significance. But, whichever way one looks at it, the findings emphasise that, as with most psychoactive substances, use of cannabis can be harmful for some users and in some circumstances.

Comparing degrees of dangerousness is a fraught topic. General comparisons of this type have often faced substantial opposition in the course of publication. The material from the Prime Minister's Strategy Unit was only released on 1 July 2005, 2 years after compilation, in partial compliance with a Freedom of Information request (Travis, 2005). The report by Hall et al. (1999) was eventually published after a media storm (Anonymous, 1998) over its omission from the report for which it was originally commissioned (WHO, 1997). The Roques report also caused considerable controversy when it appeared. As a French review noted, there were complaints not only about including alcohol among 'drugs', but also that the group of experts 'banalized the danger of cannabis by putting in evidence the weak physical and psychic dependence from this product, compared with those of tobacco and alcohol' (Jauffret-Roustide, 2004: 17–18; original in French).

The news reports of the Swedish prosecutors' ranking noted that 'few Swedish politicians admit that certain kinds of drugs are less dangerous than others'. One quoted expert noted the ranking was just 'from a legal perspective', and another that 'one must differentiate between public debate and jurisprudence'. In this perspective, distinctions on dangerousness should remain hidden knowledge: 'if one talks about drugs to youth one has to keep to what is important for them' (TT, 2005). To the question of which are the most dangerous drugs, the Swedish police website answers: 'According to the National Police Board's decision, there is no reason to discuss the dangerousness of different drugs. Preparations classed as narcotics are forbidden or require prescription; hence they are dangerous or harmful to misuse' (Rikspolisstyrelsen, 2005).

There is an enormous commitment by many involved in the international control system and equivalent national systems to keeping the status quo, with the outer defensive line often set around cannabis. But, in a broad public health perspective on psychoactive substances and their potential for harm, it is clear that, on the one hand, tobacco and alcohol are greatly underregulated in current international drug control and regulatory systems, while on the other hand, the restrictions on cannabis are too harsh.

Acknowledgement

This chapter draws in part on Room (2005b).

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Chapter 8
Assessing the population health impact of cannabis use

Keywords: cannabis – drug policy – economics – health – mental health – public health

Setting the context

There is a tendency in discussions of responses to cannabis use to rely on faulty logic. From the perspective of drugs professionals, these might manifest themselves in terms of a mild prejudice: 'study finds that mass media prevention campaign had boomerang effect' becomes 'mass media preventions do not work'. Or perhaps 'higher prevalence of schizophrenia among cannabis users' becomes 'there is a causal link between schizophrenia and cannabis use'.

In a stronger form, the media may encourage the inference of unrelated behaviours in relation to cannabis. Issues of cannabis potency, mental health and crime often share headlines. We may cite examples noted in the EMCDDA's press corpus during production of this monograph: 'Deranged cannabis smoker obsessed with Satanism stabbed country vicar to death'[1]; 'Son twisted by "skunk" knifed father 23 times'[2]. Public and political debate on cannabis users can sometimes be drowned out by the noise generated by such salacious headlines.

This chapter — written by Wayne Hall, one of the world's most published experts on cannabis use — advocates a sceptical eye with regard to claims made for the public health impact of cannabis. Developing the theme of public health impact studies discussed by Robin Room in the previous chapter, this chapter looks at the difficulties involved in assessing the global effect of cannabis use on the health of entire populations.

[1] *London Evening Standard*, 17 October 2007.
[2] *Daily Mail*, 23 July 2007.

On a practical level, the chapter provides a checklist to help researchers to question any assumptions or to avoid causal inferences [3]. From an epidemiological point of view, the data on the precise impacts of chronic cannabis use are weak, especially compared with what we know about alcohol and tobacco. Furthermore, assessing the impact of cannabis problems is difficult and beset with ethical problems, not least because of the illicit status of the drug and a tendency for it to be discussed in conjunction with, or compared with, other illicit drugs that carry higher toxicological risks.

The chapter also mentions an 'inflationary–deflationary dialectic', in which cannabis problems have been both demonised by moralists and belittled by pro-cannabis organisations. Decoupling cannabis from political discussions is necessary in order to quantify the harms of cannabis, and to place them against a neutral background where they are compared with other health issues. The chapter also suggests that the temptation to focus on adverse health effects needs to be balanced with potential positive effects of cannabis use. This argument is often applied to defend moderate alcohol use vis-à-vis the harms of binge drinking or alcoholism. While efforts to quantify the public health harms of illicit drug use are currently only in an embryonic stage, research into any 'balancing' public health benefits is extremely rare.

Further reading

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See also the grey literature list in the Appendix to Volume 1 of this monograph.

[3] See also the comments on meta-reviews by Bergmark, this monograph.

Assessing the population health impact of cannabis use

Wayne Hall

There are major technical challenges in assessing the impact that cannabis use has on the health of users and public health (Hall, 1999). These include difficulties in deciding whether cannabis use is a contributory cause of the adverse health and psychological effects attributed to its use and in quantifying the magnitude of these adverse health effects. These technical challenges are amplified by the difficulties in separating the political debate about the legal status of cannabis use from appraisals of its health effects.

Making causal inferences

Before a claim can be accepted that cannabis causes an adverse health outcome there must be evidence that there is an association between cannabis use and the health outcome; the association is not due to chance; cannabis use preceded this outcome; and we can make a case for the implausibility of alternative, non-causal explanations of the association (Tukey and Brillinger, 1984; Hall, 1987; Strom, 2000).

- Evidence of association: reasonable evidence of an association between cannabis use and a health outcome (e.g. schizophrenia) is provided by finding a relationship between cannabis use and the outcome in case–control, cross-sectional, cohort or experimental studies.
- Excluding chance: evidence that chance is an unlikely explanation of the relationship is provided by constructing a confidence interval around the sample value of a measure of association. We infer that an association exists if the confidence interval does not include the null value (i.e. the value consistent with no relationship). The width of the confidence interval provides an indication of the degree of uncertainty surrounding the inference, while its upper limit indicates how large an association may have gone undetected (Altman and Gardner, 2000).
- Ascertaining temporal order: if cannabis use is the cause of an effect, then there should be good evidence that cannabis use precedes it. The strongest evidence that cannabis use precedes certain health effects is provided by either a cohort study or an experiment. In the former the researcher observes that cannabis use precedes the health effect while in the latter the experimenter ensures by design that it does so.

- Deciding between alternative explanations: the hardest criterion to satisfy is that of excluding the possibility that the relationship between cannabis use and the health outcome is due to an unmeasured variable that causes both cannabis use and the adverse health outcome. In surveys of high-school-aged adolescents, for example, cannabis users typically perform more poorly at school than non-cannabis users (Hawkins et al., 1992). This may be because cannabis use is a cause of poor school performance but an equally plausible hypothesis is that learning difficulties cause both poor school performance and cannabis use (Lynskey and Hall, 2000).

Experimental evidence provides the 'gold standard' for ruling out these common causal explanations (Fisher, 1947; Cook and Campbell, 1979; Shadish et al., 2002). Randomly assigning adolescents to use cannabis or not, for example, would ensure that cannabis users and non-users were equivalent before using cannabis. Hence, any subsequent differences in educational performance could be attributed to cannabis use rather than to pre-existing differences in ability. When studying anything except acute and innocuous health effects, random assignment of individuals to use cannabis or not is impossible for ethical and practical reasons. It would be unethical, for example, to force some adolescents to use cannabis, and impracticable, even if ethical, to prevent those assigned not to use the drug from doing so.

Experimentation using laboratory animals is one way of getting around the impossibility of human experimentation. But suitable experimental animal models are not available for many of the putative adverse psychosocial effects of cannabis use such as psychosis, school performance and personal adjustment. In addition, there are problems in extrapolating results across species, different routes of administration (e.g. oral and parenteral in animals versus smoked in humans), and the very high doses that are typically used in animal studies.

When a suitable animal model does not exist, and randomisation of human subjects is impractical or unethical, statistical methods must be used to adjust for the effects of pre-existing differences in risk between cannabis users and non-users. If the relationship persists after statistical adjustment, the confidence is increased that the relationship is not attributable to the variables for which statistical adjustment has been made (MacLeod et al., 2004). This type of control has been used, for example, in longitudinal studies of adolescent cannabis use and psychosis (e.g. Caspi et al., 2005; Fergusson et al., 2005; Henquet et al., 2005).

Acute health effects

The acute health effects of any drug are easier to appraise than the chronic effects: the temporal order is clear; drug use and the effects occur closely together in time; and

if the effects are not dangerous, they can be reliably reproduced by giving the drug under controlled conditions. All this is true of the most common psychoactive effects of cannabis (e.g. euphoria, relaxation, sociability) and some of the more commonly reported adverse acute effects such as anxiety, panic and depression (Hall and Pacula, 2003).

It is more difficult to decide upon the causal contribution that cannabis use makes to relatively rare, acute adverse experiences such as flashbacks and psychotic symptoms. It is difficult to decide whether these are rare events that are coincidental with cannabis use, the effects of other drugs which are often taken together with cannabis, rare consequences of cannabis use that only occur at doses that are much higher than those used recreationally, cannabis effects that require unusual forms of personal vulnerability or the results of interactions between cannabis and other drugs.

Chronic health effects

Causal inferences about the long-term effects of chronic cannabis use become more difficult the longer the interval between use and the adverse effects. It takes time for adverse effects to develop and usually it takes even longer for a connection to be suspected between the two. This is largely because the longer the time interval between cannabis use and the health consequence, the more numerous the alternative explanations of the association that need to be excluded.

We often have to trade off rigour and relevance in evidence on the effects of chronic cannabis use. The most rigorous evidence is provided by laboratory investigations using experimental animals, but its relevance to human use is often uncertain. Epidemiological studies are manifestly more relevant in assessing human health effects, but they are usually less rigorous in assessing exposure to cannabis and in excluding alternative explanations of the associations. The consequence is increased uncertainty about the interpretation of epidemiological studies that affects interpretations of the causal significance of associations ('positive' studies) as well as studies that fail to find such relationships ('negative' studies).

A common interpretative problem with positive findings is that cannabis use is correlated with alcohol, tobacco and other illicit drug use that also adversely affect health. Generally, the heavier the cannabis use, the more likely that the person also uses these other psychoactive drugs (Newcomb and Bentler, 1989; Kandel and Yamaguchi, 1993). This can produce spurious associations between cannabis use and health outcomes, which makes it difficult to confidently attribute any adverse health effects to cannabis. This has been the case, for example, in interpreting the evidence on the role of cannabis use in motor vehicle accidents (Hall and Pacula, 2003; Mann et al., this monograph).

When studies fail to find adverse health effects of chronic cannabis use, for example immunological effects, it may be unclear whether this means that THC has few, if any, immunological effects in humans, or that our research has not had the sensitivity to detect its effects. The answer to this question depends upon the likely magnitude of any adverse effects, their relationship to dose, frequency and duration of use, and the ability of studies with small sample sizes to detect them (Hall and Einfeld, 1990).

An overall appraisal of causal hypotheses

Causal inferences are often made in the light of a research literature by judging the extent to which standard criteria such as those outlined by Hill (1977) are met. These criteria are not sufficient for establishing that an association is a token of a causal relationship since it is possible for the criteria to be met and yet to be mistaken in making a causal inference. In general, however, the more of the criteria that are met, the more likely it is that the association is a token of a causal relationship.

Strength of association: relationships that are stronger indicate that if cannabis is used there is a high likelihood that the health effect will also occur. Stronger relationships are generally more deserving of trust than weaker ones because the latter are more easily explained by measurement or sampling biases.

Consistency of relationship: relationships which are consistently observed by different investigators, studying different populations, using varied measures and research designs, are generally more credible than relationships which are not. This is because a relationship that persists despite differences in sampling and research methods is less likely to be explained by sampling, measurement or other biases.

Specificity is a desirable but not a necessary condition. It exists when cannabis use is strongly associated with the outcome, and the health outcome is rare in the absence of cannabis use. Specificity is desirable in that if it exists we can be more confident that there is a relatively simple and direct causal relationship but its absence does not exclude the possibility of a more complex causal relationship (e.g. in which the effect is conditional on the presence of other factors).

Biological gradient refers to the existence of a dose–response relationship between cannabis use and the health outcome: the more heavily cannabis has been used, the greater the likelihood of the health outcome. Satisfaction of this criterion is also desirable but not necessary since there may be other patterns of relationship between exposure and disease, for example a threshold effect, an 'all or none' effect or a curvilinear relationship.

Biological plausibility refers to the consistency of the relationship with other biological knowledge. If we can think of no conceivable mechanism whereby cannabis can produce such an effect, then we may have grounds for scepticism. But in the face of compelling evidence of association from well-controlled studies, implausibility may be a signal that existing theories are wrong or that we need to develop new theories that explain previously unknown phenomena.

Coherence means that the relationship coheres with, or makes sense of, other information about the natural history and biology of the disease. This, too, is desirable but not necessary: it is desirable that we have independent information that we can trust but its absence is not fatal, since the other information with which it is inconsistent may be in error.

Assessing the magnitude of risk

The standard epidemiological measures of risk magnitude are relative risk and population attributable risk. The relative risk is the increase in the odds of experiencing an adverse health outcome among those who use cannabis compared with those who do not. It may be quantified as a relationship between the frequency and duration of cannabis use and the risk of experiencing an adverse health outcome. The population attributable risk represents that proportion of cases with an adverse outcome that can be attributed to cannabis use, if it is causal.

The two measures of risk have different uses and implications. Relative risk is most relevant to individuals attempting to estimate the increase in their risk of experiencing an adverse outcome if they use a drug. Attributable risk is of most relevance to a societal appraisal of the harms of drug use. The importance of the two measures of risk magnitude depends upon the prevalence of drug use and the base rate of the adverse outcome. An exposure with a low relative risk may have a low personal significance but a large public health impact if a large proportion of the population is exposed (e.g. cigarette smoking and heart disease). Conversely, an exposure with a high relative risk may have little public health importance because very few people are exposed to it, but it may have major significance for those individuals who are exposed.

Another way of assessing the health risk posed by cannabis use is to compare its health risks with those of other widely used recreational drugs such as alcohol, tobacco, cocaine and heroin (Hall et al., 1999). Such comparisons minimise double standards in the appraisal of the health effects of cannabis use by using a common standard for comparison. The comparison, however, is more difficult than it seems at first, even in the case of the more widely used and best-studied drugs, alcohol and tobacco. Comparison is even more difficult in the case of less commonly used illicit drugs like cocaine, heroin, ecstasy and amphetamine.

First, we know much more about the risks of acute and chronic tobacco and alcohol use than we do about the risks of cannabis use. The legal drugs have been consumed by substantial proportions of the population over centuries and there have been more than 50 years of scientific studies of the health consequences of their use (see English et al., 1995). Cannabis, by contrast, has been much less widely used in Western society, for a shorter period, and primarily by healthy young adults who have usually discontinued their use in their mid- to late 20s (Hall and Pacula, 2003).

Second, the prevalence of regular use of cannabis is much lower than that of alcohol and tobacco. In principle, this problem could be addressed by estimating what the health effects of cannabis use would be if its prevalence approached that of alcohol and tobacco. Although conceptually simple, in the absence of good data on the quantitative risks of cannabis use a large number of contestable assumptions have to be made in order to make such estimates.

We cannot simply estimate what the health risks of cannabis use would be if it were as commonly used as alcohol and tobacco by multiplying its estimated risks on current patterns of use by the number of potential users in the population. This calculation assumes that the risks are the same regardless of who uses cannabis, or the legal regime under which it is used. These may be unreasonable assumptions because (i) the variability among the characteristics of cannabis users or the diversity of 'types' of people who use cannabis when its prevalence of use is low might increase under a regime of legal use and (ii) if cannabis use were legal it would be possible to reduce some of the respiratory risks of cannabis smoking by encouraging cannabis users to ingest or vaporise rather than to smoke the drug. It would also be easier if cannabis use was legal to give users advice on how to reduce other risks, for example by not driving a car for several hours after using the drug, and restricting the frequency of use to weekly or less often.

Are there any benefits of cannabis use?

The benefits of cannabis use are rarely discussed in cannabis policy debates. The exception is its possible use to treat symptoms of chronic illnesses that are unresponsive to current medical treatment (Hall and Pacula, 2003). The key role played by health effects in the policy debate has meant that there has been very little research on the benefits of recreational cannabis use. If, as economists argue, adults are the best judges of their own interests, then the fact that a substantial proportion of adults in developed societies use cannabis for recreational purposes is *prima facie* evidence that some cannabis users benefit from its use (Hall and Pacula, 2003). There is an absence of evidence for more specific benefits of cannabis use, although a number of such effects have been suggested.

One possible benefit is that moderate cannabis use may improve mental health, as recent evidence suggests may be true for moderate use of alcohol (Rodgers et al., 2000). In the case of cannabis, epidemiological studies to date have typically found that the heavier the cannabis use is, the poorer the user's mental health (see Hall and Pacula, 2003, Chapter 13) but more and much better controlled research is needed (MacLeod et al., 2004).

The evidence is also limited and mixed on a second possible benefit of cannabis use, namely, that of substituting for the use of arguably more harmful drugs like alcohol, cocaine and heroin. The epidemiology of alcohol and cannabis use suggest a complementary relationship in that heavy consumers of alcohol are more likely to be heavy cannabis users and vice versa, particularly among young people (see Hall and Pacula, 2003, Chapter 13). The evidence among adults is more mixed, with race, ethnicity and country of origin influencing the findings. The evidence on the relationship between cannabis and other illicit drugs is controversial (Hall and Pacula, 2003). Both questions deserve to be better investigated.

There is better evidence for the therapeutic uses of cannabis. There is reasonable evidence for the therapeutic use of THC as an antiemetic agent in the treatment of nausea and vomiting caused by cancer chemotherapy. More effective antiemetic agents are now available, so it remains to be seen how widely the cannabinoids will be used for this purpose. There is also reasonable evidence for the efficacy of THC in the treatment of AIDS-related wasting. There is evidence that cannabinoids may have analgesic and antispasmodic properties that warrant further research into their effectiveness (Hall and Degenhardt, 2003).

The social and political context of appraisal

Appraisals of the hazards of most drug use are affected by the societal approval or disapproval of the drug (Room, 1984). Those who approve of using the drug tend to engage in 'problem deflation' by minimising the adverse health and social effects of its use. Those who disapprove tend to engage in 'problem inflation' by uncritically accepting any evidence of harm.

An inflationary–deflationary dialectic has affected appraisals of the health effects of cannabis use. Politically conservative opponents of cannabis use, for example, justify its continued prohibition by citing personal and social harms of its use (e.g. Nahas and Latour, 1992). When the evidence is uncertain, they resolve the uncertainty by assuming that cannabis use is unsafe until proven safe. Complementary behaviour is shown by those proponents of decriminalisation who discount evidence of harm and resolve uncertainties about the ill-effects of cannabis use by demanding evidence that is difficult

to provide, arguing that until uncertainty is resolved individuals should be allowed to choose whether or not they use the drug.

Problem deflationists typically discount the adverse effects of their preferred drugs by denying that there is a causal connection between drug use and particular adverse health effects. A popular way of discounting evidence of adverse health effects of drug use is to set such a high standard of proof that we can never 'know' whether it causes the effect. The standard of proof reflects the degree of confidence we require in a causal connection between drug use and harm. In courts of law, the standard of proof demanded depends upon the seriousness of the offence and the consequences of a conviction. The standard is 'beyond reasonable doubt' in criminal cases that may lead to imprisonment if convicted while the 'balance of probabilities' is acceptable in civil cases where the penalties are fines. Sceptics often demand something close to 'beyond reasonable doubt'.

The standard legal method for resolving a dispute in the face of uncertainty is to create a default outcome by placing a burden of proof upon one or the other side in the case. The arguer who bears the burden of proof loses the case if they fail to discharge their burden. The accused in a murder trial, for example, is presumed to be innocent until proven guilty because it is the prosecution's burden to make a case for guilt beyond reasonable doubt; failure to do so means that the defendant has to be acquitted.

In the debate about the legal status of cannabis, the question of who bears the burden of proof is controversial (see Rescher, 1977, Chapter 12). If the burden of proof falls on those who claim that the drug is safe, uncertainty will be resolved by assuming that it is unsafe until proven otherwise; conversely, if the burden falls on those who claim that the drug is unsafe, then it will be assumed to be safe until proven otherwise. Proponents of continued prohibition of cannabis use appeal to established practice (Whately, 1963 [1846]), arguing that since the drug is illegal the burden of proof falls on those who want to legalise it to demonstrate its safety. Proponents of legalisation often argue that there was no evidence that cannabis was harmful when its use was criminalised. Some argue that, in any case, the burden of proof falls upon those who wish to use the criminal law to prevent adults from choosing to use a drug (e.g. Husak, 1992).

Improving assessments of the health effects of cannabis

The following proposals aim to improve assessments of the health risks of cannabis by ensuring that ignorance is disclosed, making it easier to identify what we need to know in order to reduce it, and making it less likely that empirical issues will be confused with moral ones and vice versa.

Avoid treating cannabis as a special case

According to some, cannabis is a 'mind-expanding', 'consciousness-raising' drug, which is especially benign in its effects on health. To its opponents, cannabis is a 'deceptively dangerous' drug in which the absence of acute toxic effects disguises its insidious adverse effects on users and society (Nahas and Latour, 1992). We should instead adopt the same approach to evaluating the health effects of cannabis use that are used in appraising the health effects of alcohol, tobacco and other illicit drugs.

Burden of proof should be responsive to evidence

Any inquiry into the health effects of cannabis should begin with the assumption derived from pharmacology and toxicology that it may harm the health of some users when used at some dose, frequency or duration of use, or some methods of administration (Fehr and Kalant, 1983). Given that cannabis is an intoxicant like alcohol, and a drug that is usually smoked like tobacco, there are additional reasons to expect that cannabis will share at least some of the acute and chronic health effects of these two drugs.

This expectation does not mean that we assume that cannabis use is unsafe until proven safe. Rather, it means that the burden of proof will be responsive to the state of the evidence and it may vary for different health effects. If there is a *prima facie* case for cannabis causing a specific harm, then evidence of safety should be required. A *prima facie* case could comprise either direct evidence that cannabis has ill effects in humans (e.g. from a case–control study), or a compelling argument for such an effect, for example the fact that the constituents of cannabis and tobacco smoke are similar, and that tobacco smoking causes respiratory cancers, makes it likely that heavy cannabis smoking is also a contributory cause of these cancers (Hall and MacPhee, 2002).

Use a reasonable standard of proof

If we require proof beyond reasonable doubt that there are adverse health effects of cannabis, then very few conclusions will be drawn about its health effects, and very little advice can be given on how to reduce these risks. Reasonable inferences and sensible, if fallible, health advice can be given if evidential criteria are used to draw conclusions about the probable adverse health effects of cannabis in the same way as we do about any other drug. This standard may be taken to be satisfied by the consensus of informed scientific opinion that sufficient evidence has been provided to infer a causal connection between cannabis use and a health outcome. A consensus is indicated by the views expressed in authoritative reviews in peer reviewed journals and consensus conferences of experts (e.g. Institute of Medicine, 1982; Fehr and Kalant, 1983; WHO Programme on Substance Abuse, 1997).

Apply standards consistently

There will continue to be disagreements about standards of proof, burden of proof and what kinds of evidence count, but whatever evidential standards are used should be applied even-handedly. The best protection against the use of double standards in their application is for those conducting appraisals of the health effects of cannabis to be as explicit as possible about the evidential standards that they have used, and as even-handed as possible in their application.

Separate the legal and health issues

We would improve our appraisal of the health effects of cannabis if we clearly separated it from the legal issue. The two issues are connected since the adverse health effects of cannabis use are one of the justifications offered for treating cannabis use as a criminal offence. Consequently, if there were no adverse health effects of cannabis use, a different justification would need to be found for its continued prohibition.

Even if there are adverse health effects of cannabis, the connection between the adverse health effects of cannabis and its legal status is not as simple as has been assumed. If adverse health effects were a sufficient warrant for the legal prohibition of cannabis use then logic would demand that alcohol and tobacco use should also be prohibited. Our failure to prohibit alcohol and tobacco use indicates that socially important values other than personal or public health are at stake. These include individual autonomy and personal liberty, and the economic and social costs of trying to prevent a substantial proportion of the adult population from doing something that they want to do. These values must be weighed against public health, and a balance produced as the outcome of a political process that is informed by a fair appraisal of the health risks of cannabis use (Hall and Pacula, 2003).

The failure to separate the health and legal issues means that the appraisers' views about the legal status of cannabis often prejudice their appraisals of its health effects. A clear distinction between the two issues is the best way of ensuring a fair and useful discussion of both.

Conclusions

Causal inferences about the adverse health effects of cannabis are complicated by a dearth of good studies of relationships between cannabis use and health outcomes; uncertainty in some cases about which came first, the cannabis use or the health effect; difficulties in excluding plausible alternative explanations of associations that have been observed in the absence of experimental studies; and, in the case of null

findings, uncertainty as to whether they provide reasonable evidence of the absence of effects, or only an absence of evidence. An estimation of the magnitude of the health risks of cannabis is handicapped by the absence of epidemiological studies that provide quantitative estimates of the risks in representative samples of users. Attempts to compare the public health significance of cannabis use with that of more widely used drugs like alcohol and tobacco are complicated by the greater comparative ignorance of the adverse health effects of cannabis use, and by the marked difference in their current prevalence of use. More attention needs to be given to evaluating evidence for and against benefits claimed for cannabis use.

A fair appraisal of the health effects of cannabis has been hampered by a deflationary–inflationary dialectic between opponents and proponents of cannabis use. Problem deflation has been assisted by demands for unreasonably high standards of proof, and the disagreement about who bears the burden of proof has prevented a resolution of uncertainty about these health effects.

Our appraisals of the health effects of cannabis would be improved if we: stopped treating cannabis use as a special case; distinguished clearly between health and legal issues; varied the burden of proof depending upon the state of the evidence about adverse health effects; used a reasonable standard of proof; and above all else, applied evidential standards consistently and even-handedly.

Acknowledgement

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Chapter 9
Cannabis use and driving: implications for public health and transport policy

Setting the context

While cannabis has been a topic of research interest for many years, it has only been recently that the issue of cannabis and road safety has been the subject of a substantial amount of public and government interest. In Europe, the subject has received considerable attention in recent years. An EMCDDA literature review on the effects of drug use on driving, originally published in 1999, was updated in 2007, while a selected issue on drugs and driving formed part of the 2007 *Annual report*. At the European Member State level, numerous initiatives have been carried out on drugs and driving, including specific interventions to reduce driving under the influence of cannabis. For example, in France a major research and prevention campaign ([1]) was launched in 2006, while a supporting study estimated that cannabis accounted for an additional 230 annual road deaths in France, with a significant proportion of these deaths affecting young people under 25 (French national report, 2005). A survey into drug use in recreational settings in the Czech Republic (*n* = 1 010) found that 56 % of respondents reported driving under the influence, a higher rate than for alcohol (41 %) (Czech Republic national report, 2005).

From a law enforcement perspective, a number of European countries have tightened drug driving laws in the past decade, for example to stipulate mandatory toxicological tests in the case of fatal accidents or to enable roadside drug testing. Furthermore, increased traffic controls for drug driving have been tested, although approaches vary — controls typically take the form of behavioural 'sobriety' tests and/or device-based 'quick' screening (typically, saliva testing), which are later validated with urine and/or blood analyses (EMCDDA, 2007). Yet, the 'operationalisation' of penalties in a similar

([1]) See www.cannabisetconduite.fr for information on the campaign, together with supporting studies.

way to the blood alcohol concentration (BAC) limits commonly used for drink driving is not as commonplace in Europe for cannabis as in the USA (Grotenhermen et al., 2005). Exceptions exist, however: Belgium and Luxembourg, for example, use a threshold of 2 ng THC/mL blood (Belgian national report, 2006; Luxembourg Ministry of Transport, 2007). Some states in the USA also provide blood THC concentrations to guide judicial practice.

Thus, driving under the influence of cannabis (DUIC) has become an increasingly important issue from a public policy and road safety perspective. Available evidence suggests that while the prevalence of DUIC in the general population is relatively low (Walsh and Mann, 1999), it is substantially higher in important subgroups of the population, in particular young, male drivers (Lenne et al., 2004). Among users of cannabis, and in particular those who seek treatment for cannabis problems, 50 % or more may report DUIC at least once in the previous year (Albery et al., 1999; Macdonald et al., 2004a). As well, among young drivers in North America at least, the prevalence of DUIC is similar to or higher than the prevalence of driving after drinking (Adlaf et al., 2003; Asbridge et al., 2005).

While no data on trends in DUIC over time are available, if cannabis use increases in the population DUIC, it is likely that DUIC will increase as well. Thus, there is a clear need to assess the evidence on the impact of cannabis use on collision risk, in order to provide an evidence-based perspective to discussions of the magnitude of the DUIC problem and the need for legislative or programme action. The principal objective of this chapter is to examine critically the findings connecting cannabis and traffic crashes, and a second objective is to consider the problems in developing methods to assess cannabis impairment for legal purposes.

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Cannabis use and driving: implications for public health and transport policy

Robert E. Mann, Gina Stoduto, Scott Macdonald and Bruna Brands

Impairment: effects of cannabis on performance

A substantial amount of information has accumulated on the effects of cannabis on human performance. Of particular interest here are those studies most relevant to the possible effects of the drug on driving behaviour. According to Maes et al. (1999), research measures can be grouped in the following categories: attention tests (simple and divided attention); vigilance tests (ability to sustain attention); auditory and visual tests (visual acuity, accommodation to darkness/light); reaction time (simple and choice reaction time); cognitive tests (e.g. digit/symbol substitution test, Stroop word/colour test, letter cancellation test); memory tests; mental arithmetic; flicker fusion test; visual–motor coordination tests; body sway; physiological measurements (EEG, eye movements, pulse, blood pressure); and self-awareness measures. Additionally, studies may involve simulated or actual driving tasks.

Several comprehensive reviews of this literature have emerged, and the results appear to be very consistent. A consistent conclusion is that the acute effect of moderate or higher doses [2] of cannabis impairs the skills related to safe driving and injury risk. Moskowitz (1985) concluded that marijuana use impairs driver performance under a variety of experimental conditions. Berghaus and Guo (1995) conducted a meta-analysis of 60 studies and concluded that marijuana causes impairment of every performance area connected with safe driving of a vehicle, such as tracking, psychomotor skills, reaction time, visual functions, and attention. Of these performance criteria, the most deterioration from marijuana use was found for measures of attention (e.g. the continuous performance task), tracking (e.g. the pursuit rotor task) and psychomotor skills (e.g. simple reaction time) (Coambs and McAndrews, 1994; Berghaus and Guo, 1995). Similar conclusions have been reached by other reviews (Hollister, 1981; Maes et al., 1999; Smiley, 1999; Ashton, 2001; O'Kane et al., 2002; Ramaekers et al., 2004; Lenne et al., 2004). Some authors have postulated that the various cognitive impairments mentioned previously are related to duration of drug use (Hall and Solowij, 1998). Johns (2001) notes that cannabis use can occasionally result in short-term

[2] See Corrigan, this monograph, for a discussion of dosage and the pharmacology and pharmacodynamics of cannabis.

psychiatric distress and even psychotic states, and that cannabis may provoke relapse and aggravate existing symptoms in people with major mental illnesses such as schizophrenia. In addition, potential withdrawal effects of heavy, long-term cannabis use, such as restlessness, insomnia, and anxiety, could also influence injury risk (Ashton, 2001).

Smiley (1999) concluded that marijuana impairs skills and ability. She speculated that drivers are aware of this impairment, which may prompt them to slow down and drive more cautiously, suggesting that experienced cannabis users can compensate for the deleterious effects of cannabis on driving skills. This compensation for the effects of the drug is a form of tolerance to its effects. Tolerance is defined as a reduction in response to a particular dose of a drug with repeated administration, or the requirement that larger amounts are needed to obtain the same drug effect (Kalant et al., 1971). Tolerance to cannabis over repeated administrations is observed in animal studies with cannabis (Ashton, 2001), but little systematic research on cannabis tolerance in humans is available. When considering the extent to which tolerance to cannabis might influence drivers, it is useful to consider possible parallels between tolerance to cannabis and tolerance to alcohol. Tolerance is observed for both drugs, and substantial research has addressed the issue of alcohol tolerance in humans (e.g. Vogel-Sprott, 1992). The impairing effect of alcohol on psychomotor tasks is readily observed. However, under conditions where reinforcement is provided for non-impaired performance, tolerance will develop over a series of drinking sessions (Mann and Vogel-Sprott, 1981; Beirness and Vogel-Sprott, 1984), and the extent of tolerance development is related to awareness of impairment and efforts to compensate (Mann et al., 1983). Nevertheless, impairment returns when reinforcement contingencies are withdrawn (Mann and Vogel-Sprott, 1981; Zack and Vogel-Sprott, 1993). This return of impairment indicates that even tolerant or experienced users will display impairment of psychomotor performance. Thus, the same process that Smiley (1999) suggested may alleviate performance deficits in experienced cannabis users has been extensively studied with human subjects in laboratory research with alcohol. These studies indicate that even in those who learn to compensate for a drug's impairing effects, substantial impairment in performance can still be observed under conditions of general task performance (i.e. when no contingencies are present to maintain compensated performance).

Other researchers have investigated the effects of cannabis combined with alcohol on laboratory performance measures. These studies have been stimulated in part by the apparent frequency with which both drugs are used together (Cimbura et al., 1990; Jonah, 1990; Stoduto et al., 1993; Walsh and Mann, 1999). In general, these studies typically, but not always, reveal that the effects of cannabis plus alcohol are greater than the effects of cannabis alone (Liguori et al., 2002; Chait and Perry, 1994). The research suggests that the effects of combining cannabis with alcohol on skills necessary for safe driving such as visual search and road tracking are either additive, in which the effects of both drugs together are roughly equivalent to adding the effects of the

two together, or multiplicative, in which the effects of the two drugs together are greater than the effects of the two individually (e.g. Robbe, 1998; Laemers and Ramaekers, 2001). In reviewing this literature, O'Kane et al. (2002) observed that alcohol's effects are strongest on integrative tasks while the effects of cannabis are strongest on tasks requiring attention and psychomotor skills.

Epidemiological studies on collision risk associated with cannabis use

Epidemiological studies are necessary to assess the impact of cannabis use on collision risk. In the past two decades, several studies have been published on the involvement of cannabis in collisions. In this review of the literature, conclusions from three types of studies will be drawn: (i) descriptive and analytical epidemiological studies on the prevalence of cannabis use through drug testing in injured drivers; (ii) studies of collision risk of clinical samples of cannabis users; and (iii) studies of collision risk among general populations of drivers. The purpose of this section is to review the available empirical research in order to assess the risks that cannabis may pose for traffic collisions. This assessment of risk is central to our understanding of the role of cannabis in traffic safety.

Studies using drug tests of injured drivers to detect cannabis metabolites

Studies that obtained drug tests of urine, blood or saliva from injured drivers are included in this section. Also included are studies of special populations where drug tests were taken of drivers suspected of driving under the influence or of reckless driving. A large number of descriptive studies have been conducted where the blood or urine of injured drivers has been analysed for the presence of cannabis metabolites. Thirty-two studies were found. The research methodologies and results in terms of the proportion testing positive for cannabis metabolites are described in Table 1.

There have been many epidemiological studies that have reported drug tests of fatally and non-fatally injured drivers. The percentage of fatally injured drivers testing positive for cannabis ranged from 1.4 to 27.5% (mean = 10.7%); while for non-fatally injured drivers the percentage ranged from 5 to 15.7% (mean = 11.5%) (Macdonald et al., 2003). The prevalence rates for cannabis are highest for the special driver populations, that is, those suspected of drug or alcohol impairment or reckless driving. The percentage of impaired or reckless drivers testing positive for cannabis ranged from 7.4 to 65.9% (mean = 34.6%).

Although many studies have been conducted on the prevalence of positive drug tests among injured drivers, few studies incorporated control groups so that assessments

Table 1: Summary of study results on the percentage of injured drivers testing positive for cannabis

Reference	Jurisdiction	Consent required	% positive cannabis	Comparison group
Brookoff et al. (1994)	Memphis, Tennessee, USA	No	33%	No
Budd et al. (1989)	Los Angeles, California, USA	No	19.6% (preliminary), 18.5% (follow-up)	No
Christopherson et al. (1990)	Norway	No	31.5%	No
Cimbura et al. (1990)	Ontario, Canada	No	10.9% — drivers; 7.6% — pedestrians	No
Crouch et al. (1993)	Salt Lake City, Utah, USA	No	13%	No
Drummer (1995)	Melbourne, Australia	No	11%	Yes; drivers not responsible
Drummer et al. (2003)	Australian states: Victoria, New South Wales and Western Australia	No	13.5% fatally injured drivers	No
Dussault et al. (2002)	Quebec, Canada	No for fatal drivers; yes for controls	19.5% for fatal drivers; 6.7% for controls	Yes
Everest and Tunbridge (1990)	England and Wales	No	2.6%	No
Fortenberry et al. (1986)	Alabama, USA	No	11% — drivers; 5% — passengers; 1% — pedestrians	No
Holmgren et al. (2005)	Sweden	No	33 cases positive for THC	No
Kintz et al. (2000)	Strasbourg, France	No	9.6%	No
Laumon et al. (2005)	France	No	At-fault drivers — 8.8%; control drivers — 2.8%	Yes; 3 006 not-at-fault fatally injured drivers

Study group	Comments
150 drivers stopped for reckless driving	12% positive for both cocaine and cannabis. 18.7% positive for alcohol (0.03–0.21 mg/dL)
Preliminary study: 102 fatally injured drivers. Follow-up study: 492 fatally injured drivers	18.6% positive for alcohol + cocaine/cannabis/both (preliminary). 16.2% positive for alcohol + cocaine/cannabis/both (follow-up)
3159 drivers suspected of driving under the influence of alcohol and drugs	One or more drugs present in 67%
1169 fatally injured drivers, 225 fatally injured pedestrians (aged 14 or over)	9.2% positive for cannabis + alcohol (drivers). 5.8% positive for cannabis + alcohol (pedestrians)
168 fatally injured truck drivers	Impairment due to cannabis use in all cases where THC level exceeded 1.0 ng/mL 2.3% positive cannabis + alcohol. 20% of accidents positive for drugs had driver fatigue
1045 fatally injured drivers, 1990–93	Responsibility analysis conducted. No statistical significance for cannabis
3398 fatally injured drivers, 1990–99	11.8% positive for car drivers; 22.2% positive for motorcycle drivers; 6.5% positive for truck drivers; 15.9% positive for single vehicle crash; 11.1% positive for multiple vehicle crash; 10.9% positive for 1990–93; 13.5% positive for 1994–6; 15.6% positive for 1997–9
354 fatally injured drivers; 11952 roadside controls	Fatalities were significantly associated with positive tests for cannabis in the case–control study. No significant relationship was found for the responsibility analysis. Selection bias due to the 49.6% response rate of providing a urine sample for the control group could have inflated the odds ratios
1273 fatalities (drivers, passengers, motorcycle drivers, pedestrians)	8.3% of those positive for drugs were also positive for alcohol (> 0.08 mg/100 mL)
510 fatally injured drivers, passengers, and pedestrians with urine samples	8.8% positive for both cannabis + alcohol
855 fatally injured drivers	
198 injured drivers (car, motorcycle, truck, bicycle) aged 13–57	
6766 at-fault fatally injured drivers	Cannabis increased fatal collision risk in a dose-related manner after controlling for alcohol, age, type of vehicle and time of crash

Table 1: Summary of study results on the percentage of injured drivers
testing positive for cannabis (continued)

Reference	Jurisdiction	Consent required	% positive cannabis	Comparison group
Logan and Schwilke (1996)	Washington State, USA	No	11%	No
Longo et al. (2000a,b)	Australia	No	10.8%	Yes; non-culpable drivers
McBay (1986)	Los Angeles, California, USA	No	13.4%	No
McLean et al. (1987)	Tasmania, Australia	No	6% of total sample	Yes; 387 blood donors
Marquet et al. (1998)	France	No	drivers — 13.9%; patients — 7.6%	Yes; 278 non-injured patients, aged 18–35
Mason and McBay (1984)	North Carolina, USA	No	7.8%	No
Mercer and Jeffery (1995)	British Columbia, Canada	No	13%	No
Movig et al. (2004)	The Netherlands	Yes	12% hospitalised drivers; 6% controls	Yes; 816 roadside survey controls
Mura et al. (2003)	France		10% of drivers, 5% of controls	Yes; 900 controls admitted to emergency room of six hospitals
Orsay et al. (1994)	Chicago, Illinois, USA	No	7.4% of total sample	Yes; 300 non-impaired, injured drivers
Peel and Jeffrey (1990)	Canada	No	20% of impaired drivers	No
Poklis et al. (1987)	St Louis, Missouri, USA	No	47%	No
del Rio and Alvarez (2000)	Northern Spain	No	1.4%	No
Risser et al. (1998)	Vienna, Austria	Yes	47% of 19 samples in 1993; 72% of 99 samples in 1996	No
Seymour and Oliver (1999)	Strathclyde, Scotland	No	39% of impaired drivers	Yes; 151 fatally injured drivers

Study group	Comments
347 fatally injured drivers	10% positive for alcohol + drugs; 15% positive for drugs alone; 63% of cannabis users positive for alcohol
2 500 injured drivers admitted to an ER	7.1% tested positive for cannabis-only. Blood tests taken — most drivers who tested positive for THC acid, the inactive metabolite
2 610 fatally injured drivers	2.8% of drivers were positive for cannabis without any other drug; 28% positive for drugs + alcohol
194 road users (42 fatally injured, 37 accident survivors, 115 breath-tested drivers/riders)	8% of those positive for alcohol (>0.5 g/L) had also used cannabis. Non-significant differences in drug use between groups
296 injured drivers, aged 18–35	Prevalence of cannabis among female drivers was significantly higher than for female patients ($P < 0.05$)
600 fatally injured drivers	11% positive for alcohol + drugs; 2.8% positive for drugs alone
227 fatally injured drivers	11% positive for alcohol + drugs
110 injured drivers admitted to hospital	Urine/blood test determined drug positivity. 39% of injured drivers had urine test versus 85% of controls had urine test. Effect of cannabis on risk of injury accident not significant
900 injured (non-fatal) drivers	10% injured drivers positive for THC, 5% of controls positive for THC. Among under-27-year-olds, cannabis increased collision risk significantly
285 alcohol or drug-impaired, injured motorists and motorcyclists	Impaired drivers had higher injury severity scores than control drivers ($P < 0.001$). Impaired drivers more frequently involved in collisions, cited for moving violations; found to be at fault
492 cases: 94 injured; 172 impaired and 226 fatally injured drivers	Of 53 impaired drivers, 4% positive for cannabis
137 drug positive DUI drivers, Jan. 1983 to May 1986	32 different drugs detected
285 fatally injured drivers	Of all positive for drugs, 19.6% were also positive for alcohol
205 reckless drivers from 1993 to 1996, aged 17–24 years. 199 car drivers; six motorcycle drivers	Increase in cannabis use increased significantly over time ($P < 0.05$)
752 drivers suspected of being impaired	Drugs were present in 19% of fatally injured drivers; polydrug use was prevalent; alcohol detected in 33%

Table 1: Summary of study results on the percentage of injured drivers testing positive for cannabis (continued)				
Reference	Jurisdiction	Consent required	% positive cannabis	Comparison group
Soderstrom et al. (1995)	Baltimore, Maryland, USA	No	12%	No
Stoduto et al. (1993)	Toronto, Ontario, Canada	No	13.9%	No
Sugrue et al. (1995)	Sydney, Australia	No	15.2% drivers (> 100 ng/ dL); 8% cyclists (> 200 ng/dL); 13% passengers (> 200 ng/dL); 14% pedestrians (> 200 ng/dL)	No
Terhune and Fell (1982)	Washington DC, USA	No	10%	No
Williams et al. (1985)	California, USA	No	37%	No

of relative risks could be estimated. The best methodological studies are analytic epidemiological studies that utilise the case–control method (Meulemans et al., 1996; Marquet et al., 1998; Dussault et al., 2002; Mura et al., 2003). However, these studies are very difficult to conduct, and other investigators have used methods based on analysis of crash responsibility (e.g. Drummer, 1995; Longo et al., 2000a,b; Dussault et al., 2002; Drummer et al., 2004) (see Table 1). The logic of these studies is that if a drug increases collision risk, drivers under the influence of the drug are more likely to be considered responsible for the collision based on police reports (Terhune and Fell, 1982).

In a case–control study conducted in France, 296 injured drivers at emergency room departments and 278 non-injured control patients matched by age were urine tested for the presence of cannabis (Marquet et al., 1998). Methodologically, this study is unique among case–control studies in the field because consent was not required for urine tests of either cases or controls and, therefore, the results are free of selection biases. Results indicated that drivers testing positive for cannabis were not significantly more likely than controls to be involved in collisions. However, when the analyses were restricted to women only, the relationship became significant (Marquet et al., 1998).

Findings of another case–control study have recently been reported for 354 fatally injured drivers and 5 931 roadside controls in Quebec (Dussault et al., 2002). The odds ratio was statistically significant and indicated that fatally injured drivers were 2.2 times

Study group	Comments
1 338 injured (1 077 car drivers; 261 motorcyclists)	
339 injured drivers admitted to trauma unit (291 car drivers; 48 motorcyclists)	16.5% positive for alcohol + drugs
Total 262 (164 injured drivers, 12 pedal cyclists, 31 pedestrians, 55 passengers)	16% positive alcohol + drugs
500 injured drivers	25% positive for alcohol
440 fatally injured male drivers aged 15–34	Percentage of crash responsibility increased significantly from zero drugs to two or more detected drugs ($P > 0.001$); 81% of cannabis users positive alcohol

more likely to test positive for cannabis than controls. However, this result should be treated cautiously owing to the possibility of systematic bias in the study. Little bias is likely for the proportion testing positive among the fatal drivers (19.5%); however, for the control group, consent was required by participants to provide a urine test. Only 49.6% of controls agreed to provide a urine sample. The authors used saliva samples to assess the degree of possible bias, with the rationale that the reason drivers refused both urine samples and saliva sample would be the same (fear of detection). The participation rate for saliva tests was 84.6%, which suggests that a large proportion of people found urine tests more invasive. The high rate of refusal to provide a saliva test indicates that the results should be interpreted with caution.

Meulemans et al. (1996) conducted a study where urine tests were taken from injured drivers at emergency rooms in Belgium. The authors examined injury severity of those in crashes. Being positive for cannabis metabolites was not significantly related to injury severity.

Mura et al. (2003) conducted toxicological tests on blood samples from 900 drivers involved in a non-fatal collision and 900 controls attending emergency rooms for non-traumatic reasons in France. Younger drivers (under 27) with cannabis alone in their blood were significantly more likely to be involved in collisions (OR = 2.5). This was somewhat less than the OR associated with alcohol alone (3.8), and when alcohol and cannabis were combined the OR for collision involvement increased to 4.6.

Several Australian studies have used responsibility analysis techniques and also had access to blood samples. Blood samples permit analyses of both the active and inactive ingredients of tetrahydrocannabinol (THC) and are the best approach for determining likely cannabis impairment. Longo et al. (2000a,b) obtained drug tests from 2 500 injured drivers. Their analysis found no significant differences in the degree of culpability associated with cannabis-positive compared with cannabis-negative drivers. Drummer (1995) examined the blood samples of driver fatalities linked with traffic reports in an Australian study. Similarly, he found no significant elevation of collision risk associated with cannabis use. More recently, Drummer et al. (2003, 2004) reported a responsibility analysis of 3 398 drivers killed in collisions in the Australian states of Victoria, New South Wales and Western Australia. Cannabis alone increased the likelihood of involvement in a fatal collision in a dose-related manner. The odds ratio (OR) for fatal collision involvement for those positive for cannabis only was 2.7; however, when analyses were restricted to those with concentrations greater than 5 ng/mL, the OR rose to 6.6.

A recent study from France employed responsibility analysis methods with a large sample of fatally injured drivers for whom blood samples were available. Laumon et al. (2005) reported on 10 748 drivers killed in France between October 2001 and September 2003. Blood levels of Δ^9-tetrahydrocannabinol were compared in 6 766 drivers considered to be at fault for their collisions and 3 006 drivers, selected from the 3 982 other drivers, not considered to be at fault. These authors found that cannabis increased risk of involvement in a fatal collision in a dose-related manner, after controlling for presence of alcohol, age, type of vehicle and time of crash. The adjusted odds ratio for fatal collision involvement associated with blood levels of 5 ng/mL or over was 2.12. As well, these authors estimated that 2.5 % of fatal crashes in France could be attributable to cannabis.

Studies using clinical samples of cannabis abusers in treatment

The characteristics of studies using clinical samples of cannabis users in treatment are summarised in Table 2. We know from existing studies that clinical substance abuse populations are likely to drive after using cannabis. In one study, of a sample of 210 users in treatment for heroin dependency, 58 reported driving after drug use, and 62 % of these reported driving at least once after using cannabis (Albery et al., 1999). In a study of those in treatment for alcohol, cannabis or cocaine abuse, 63 % reported driving after use of cannabis (Macdonald et al., 2004a).

Few studies exist that examine collision risks experienced by clinical samples of individuals receiving treatment for cannabis. In the first of these studies, Smart et al. (1969) observed elevated collision rates in abusers of one or more drugs other than

Table 2: Studies of self-reported drug use and injuries in clinical samples

Reference	Jurisdiction	Comparison group	Research objective	Study group	Comments
Albery et al. (1999)	London, England	No	Examine collision rates among 210 out-of-treatment drug users	210 out-of-treatment drug users	62.1% of cannabis users drove at least once after using the drug; frequency of driving after using drugs was not significantly related to collisions
Macdonald et al. (2004b)	Toronto, Canada	Yes	What is the collision risk of cannabis abuse clients in treatment compared with population controls?	Treatment clients with a primary drug problem of cannabis, matched population controls	The cannabis clients had significantly more collisions before and after treatment
Mann et al. (1993)	Toronto, Canada	No	Examine the contribution of drug use to accident rates	144 male substance users, aged 21–40	50% of the accidents that occurred in the past 5 years occurred under the influence of alcohol and/or drugs
Mann et al. (1995)	Toronto, Canada	Yes	Evaluate the effects of substance abuse treatment on accident rates	137 males, aged 21–40, who were in treatment for substance use.	There were significant declines in number of accidents ($P < 0.05$), drinking–driving convictions ($P < 0.001$) and moving violations ($P < 0.001$) after treatment
Smart et al. (1969)	Toronto, Canada	Yes	Investigate accident rates of abusers of one or more drugs other than alcohol	30 psychiatric patients	Patients had an overall accident rate 1.9 times larger than the expected rates

alcohol, but the sample was very small ($n = 30$). In another study of 144 male substance abusers aged 21–40, Mann et al. (1993) examined collision rates in the year before entry into treatment and compared these rates to collision rates in the general male population of the same age. The subjects estimated that about 50% of their collisions in the preceding year occurred while they were under the influence of alcohol and/or drugs. As well, results suggested that the frequency of any substance use, as opposed to the use of specific substances, predicted collision involvement and significant post-treatment reductions were found in moving violations, DWI convictions, and total collisions (Mann et al., 1995).

A recent study examined the driving records of a large sample of cannabis abuse clients in treatment (Macdonald et al., 2004b). This study utilised blind linkage procedures a note to explain this method to avoid non-respondent bias, and compared the clinical sample to a randomly selected, frequency-matched (age, gender, location) control group of drivers. Significant elevations in collisions were found for abusers of cannabis compared with population controls, both prior and after treatment (Macdonald et al., 2004b). While this study demonstrates an association between cannabis abuse and elevated collision risk, alternative explanations for this relationship cannot yet be ruled out.

Studies using general populations of drivers

Recently, Asbridge et al. examined the impact of self-reported DUIC on collision risk among high-school students in the four Atlantic provinces of Canada. These authors observed a significant elevation of collision risk (OR = 1.84) among students who reported DUIC, after controlling for demographic factors, driver experience, and self-reported driving after drinking. Similarly, Mann et al. (2005) examined the association of collision risk with DUIC among a representative sample of adults surveyed in Ontario. Reporting DUIC in the past year increased significantly the odds of reporting a collision, after controlling for age, gender and other demographic variables (OR = 2.61).

General discussion of cannabis and collision risk

Early reviews of the literature on the association of cannabis use with collision risk concluded that conclusive demonstrations of cannabis use as risk factor for collisions did not exist (Robbe and O'Hanlon, 1993; Ferrara et al., 1994; Chesher, 1995; Christopherson and Morland, 1997; Hunter et al., 1998; Bates and Blakely, 1999; de Gier, 2000; Morland, 2000; Vingilis and Macdonald, 2002; Macdonald et al., 2003). However, more recent studies clearly suggest that cannabis use increases collision risk (e.g. Dussault et al., 2002; Mura et al., 2003; Drummer et al., 2004; Laumon et al., 2005;). Recent reviews of this literature are reflecting this growing body of studies finding a collision-enhancing effect of recent cannabis use (e.g. Kalant, 2004).

Numerous epidemiological studies have been found where drug tests were conducted of injured drivers. Early analytical epidemiological studies that used responsibility analysis or case–control methods did not provide clear proof that cannabis use is related to increased injury risk from collisions (Bates and Blakely, 1999). These studies often have poor statistical power because the presence of drug metabolites is relatively rare and large sample sizes are required to detect significant effects. To demonstrate that a relationship exists, much larger sample sizes are likely required with methodological approaches free of biases that could inflate odds ratios.

Several methodological issues complicate the use of some types of drug tests. For example, urine test results cannot be used to measure drug impairment, only whether drug use occurred sometime in the past, up to a few weeks for cannabis (Kapur, 1994). Since urine tests are detecting those that are not under the influence of cannabis, the measure lacks specificity and, therefore, extremely large sample sizes may be needed to find a statistically significant increase in collision rates for those testing positive. Blood tests offer a more promising approach for the assessment of whether drivers are more likely to be under the influence; however, because of their more intrusive nature, they may only be feasible for studies using responsibility analysis of fatally injured drivers. Few studies that use drug tests have control groups, thereby making it difficult to determine whether drug presence is a risk factor. The likely reason few studies include controls is that consent from this group is usually required. Consent is likely to discourage the participation of drug users more than non-users, which would translate into inflated relative risks or odds ratios. Some studies have used comparison groups of pedestrians; however, this approach is likely too conservative because the pedestrian could also be at fault.

Some studies have noted that different drugs are used in combination with each other, possibly resulting in increased risk for injury. Drug metabolites, for example, are often found in combination with alcohol. Therefore, it is important to separate out the relative role of other drugs from alcohol. Although many studies reported the proportion of collisions that involve alcohol, research has largely failed to separate out the role of alcohol from cannabis in collisions.

Under these circumstances other means to assess the contribution of cannabis to collision risk are useful. One approach is to examine collision risks of known heavy users of cannabis, such as people in treatment for a cannabis abuse problem. A recent study found cannabis clients have significantly elevated rates of collisions compared with population controls (Macdonald et al., 2004b). Another approach is to examine collision risks associated with self-reported DUIC in survey data. Recent studies have found that collision risks are significantly elevated in samples on adolescents and adults who report DUIC (e.g. Asbridge et al., 2005). However, studies of clinical groups or survey samples are limited in their ability to draw causal inferences, or to control for potential

confounders. Other factors may be causally related to both drug use and collisions. Recent studies and reviews on set variables, such as aggression (Beirness, 1993; Deffenbacher et al., 2000; Wiesenthal et al., 2000; Gidron et al., 2001), risk-taking/ impulsiveness (Beirness, 1993; Jonah, 1997; Vavrik, 1997), stress (Veneziano and Veneziano, 1992; Simon and Corbett, 1996; Norris et al., 2000), fatigue (Horstmann et al., 2000; Masa et al., 2000; Connor et al., 2001) and criminality (Wells-Parker et al., 1986; Denison et al., 1997) confirm the importance of these characteristics in predicting collisions. Studies have found that many of the characteristics described above are over-represented in substance abuse populations, which might also explain higher collision rates. Withdrawal effects from cannabis, such as exhaustion, anxiety, agitation, mood swings and depression, and long-term effects of abuse, such as chronic sleep disruption, distractibility and depression (Cohen and Sas, 1993; Coambs and McAndrews, 1994; Herscovitch, 1996) could also increase risks.

One of the strengths of studies of clinical and survey samples is the accessibility and validity of information gathered. Although these studies suffer from the same limitations as survey studies of non-clinical samples, the biases related to self-reports are likely much less pronounced in the clinical samples. Since those who seek treatment have already acknowledged that they have a problem, they are more likely to provide accurate accounts regarding that problem. Good validity of self-reports has been established among substance users both during and after treatment (Hindin et al., 1994; Nelson et al., 1998).

Detecting cannabis in drivers

The availability of accurate and simple-to-use breath tests for alcohol have been central to current efforts to reduce drink driving (Mann et al., 2001). There has been a continued interest in the development of a breath test for cannabis over the years, but to date no scientifically validated tests have been reported (Verstraete, 2000). Blood tests are the 'gold standard' for assessing levels of cannabis and metabolites in the body. Results of blood tests can be influenced by such factors as the temperature at which the sample is stored and binding to the inner surface of plastic vials (O'Kane et al., 2002). The logistic and legal issues involved in obtaining and testing blood samples from drivers suspected of DUIC are complex.

As noted earlier, the mere presence of cannabis in plasma may not indicate impairment. A current focus of research is to identify a relationship between THC in blood (and other body fluids) and behavioural change, drug influence and impairment (Martin and Cone, 1999). This has led to the suggestion that *per se* levels of cannabinoids in plasma may be identified for legal purposes, similar to the identification of *per se* levels for alcohol (Martin and Cone, 1999). Ramaekers et al. (2004), in considering this question, note

that meta-analyses of laboratory studies indicate that maximal performance impairment is seen at THC concentrations greater than 14 ng/mL in plasma or 7 ng/mL in whole blood. However, they note that the link between these levels and elevated collision risk has not been absolutely established.

Urine tests are used in situations where any relatively recent use of cannabis and other drugs is of interest (e.g. in sports, in addictions treatment), regardless of whether that use occurred in the previous few hours, days or even weeks. However, urine tests do not permit an accurate assessment of when drug use occurred (Kapur, 1994). A driver who has a positive urine test for cannabis may have used the drug in the preceding hours or days (or even weeks), and, thus, his or her driving skills may not be influenced by the drug at the time the sample is taken.

The detection of cannabinoids in saliva and sweat has been an active area of research. Current kits to measure saliva involve taking a swab from the mouth and include a rapid detection kit (O'Kane et al., 2002). Available data suggest that saliva THC levels arise from a drug that has remained in the mouth during smoking or ingestion, and initial data suggest that these levels are associated with degree of impairment observed (Menkes et al., 1991). The EU has run two projects, Rosita-1 and Rosita-2, to examine technology for enabling roadside drug screening. The first Rosita project in 1999–2000 established criteria for acceptable tests (sensitivity and specificity > 90 %, accuracy > 95 %) for amphetamines, benzodiazepines and cannabis. As rapid screening in a roadside situation should aim to be as non-invasive as possible, the Rosita-2 project aimed to evaluate the useability and analytical reliability of nine on-site oral fluid (saliva) drug testing devices between 2003 and 2005. Six European countries and four states in the USA took part. At the end of the period, none of those devices met the criteria proposed during the Rosita-1 project. Six devices registered a failure rate of greater than 25 %. The procedure of obtaining the saliva samples varied greatly in terms of handling, quantities and acceptance by officials testing and persons tested, sometimes easy to perform, sometimes difficult to follow.

Assessing behavioural effects of cannabis

There has been substantial recent interest in programmes involving the training of police officers and others to detect the physiological and behavioural effects of cannabis in individuals suspected of DUIC, and research on this topic is beginning to appear. Drug recognition expert (DRE) programmes have been developed to enable police officers to identify an individual who may be under the influence of a drug. These indicators can range from pupil size and body sway to the presence of drug paraphernalia in the vehicle. Walsh and Cangianelli (2002) reported that, in drivers suspected of driving under the influence of drugs (DUID) by DRE-trained police officers, subsequent blood

testing revealed that 32.5 % were positive for at least one drug other than alcohol. This low level of sensitivity improved to 79.3 % when officers were subsequently given an improved training programme. Tzambazis and Stough (2002) presented evidence that cannabis-induced impairment of performance on behavioural tests (standardized field sobriety tests, SFSTs) was significantly correlated with impairment of driving. Similarly, Papafotiou et al. (2004) showed that impairment of SFST performance increased with increasing dose of cannabis.

Driving under the influence of cannabis legislation in Europe

Currently, European Union countries have legal provisions on driving under the influence of drugs but impairment must be proven in court in most countries (Moeller et al., 1999; EMCDDA, 2007). Germany (in 1998), Belgium (in 1999), Sweden (in 1999; Jones, 2004) and Finland (in 2003; Lillsunde et al., 2004) passed laws that allow for sanctions based on detection of drugs alone and other countries have proposed similar laws. This type of legislation depends on the police force's authority to collect human specimens at the roadside for testing or for confirmatory analysis, and this authority is regulated by other legislation that differs by jurisdiction. Some countries allow the police to control and test the public randomly and suspicion is not necessary for testing. However, the majority of countries treat roadside testing as an infringement of civil rights and suspicion is necessary for testing. Some countries have improved the process for initial suspicion by training the police to identify intoxicated drivers on the basis of physical and psychomotor signs.

Germany and Belgium currently use roadside testing devices routinely (sweat and urine are collected) and some countries have used urine or saliva or sweat test devices on an experimental basis with the driver's consent. Very few European countries have regulations prohibiting the use of roadside drug testing devices. However, many do not use these devices because of concerns regarding their validity or because of their unavailability. The preferred test is a single use, multi-parameter test, which is able to provide a clear, unambiguous test result within 5 minutes. According to Moeller et al. (1999), saliva is the preferred test specimen for cannabis due to its easy availability, low invasiveness and good correlation with impairment. Sweat was the second in preference because it allows testing without collaboration of the driver, and its low invasiveness and good availability at the roadside. Roadside drug screening is being trialled in a number of European Member States at the time of writing (EMCDDA, 2007). There have been some teething issues. For example, tests carried out in France in the summer of 2007 used three different devices and required the presence of a doctor for validating a urine sample. Introduction of *Drugwipe* saliva tests in Luxembourg in 2007 required explicitly by the Transport Ministry that the tests would not serve to incriminate drivers taking

legal medicines (^{3}). Portuguese police reported problems with a faulty batch of *Oratec-3* testing kits. Nonetheless, there is commitment at ministerial level to introducing saliva-based drug testing across many Member States.

Conclusions

The impact of cannabis on traffic safety is an issue of substantial public and political interest at present and will likely continue to be of interest for some time. As has become clear in this review, there is a substantial amount of information available that can shed light on this issue, but in many areas the available evidence is sparse or unclear.

First, it appears clear that, in laboratory settings, cannabis impairs the skills thought to be necessary for safe driving. This impairment is not restricted to high levels of the drug (see earlier note that this dosage level may need some explanation) and occurs at the dosage levels that result from typical use of the drug. Tolerance may occur with continued use, but even individuals who have acquired tolerance to some of the effects of cannabis may demonstrate impairment on task performance. Combining alcohol with cannabis will result in an increase in the effects of cannabis, and the interaction could be multiplicative.

After alcohol, cannabis is the drug most often found in fatally and non-fatally injured drivers. In recent, studies cannabis has been found in up to 27.5% of dead drivers (Macdonald et al., 2003). However, epidemiological studies employing control groups are necessary to identify more precisely the contribution of the drug to collision causation. While earlier reviews of the literature were unable to conclude that cannabis increased collision risk, more recent studies employing larger samples and more rigorous methods are demonstrating with more consistency that recent cannabis use will increase collision risk (e.g. Mura et al., 2003; Drummer et al., 2004; Laumon et al., 2005). Studies employing clinical samples or using survey data provide additional indications of an increase in collision risk associated with cannabis use, however, in these studies the possibility that the increased risk may be due to factors other than the effects of cannabis cannot yet be ruled out.

Central to the problems of assessing the impact of cannabis on collision risk and to the problem of detecting cannabis-impaired drivers is the problem of measuring the presence of cannabis in the body. Difficulties in measuring cannabis in the body have hampered research on the effects of cannabis and the potential development of legal initiatives to address cannabis-impaired driving. Research is now assessing issues of dose–response effects on skills and behaviour. As well, measures that may assist in the

(^{3}) See www.gouvernement.lu/salle_presse/communiques/2007/10/03lux/

detection of DUIC (saliva tests, DRE programmes, standardized field sobriety tests) show promising results in field trials.

While much information is now available, there is a clear need for more research to determine the degree and nature of the association between cannabis use and collision risk. The impact of several variables on the cannabis–collision risk relationship needs to be examined, including personality characteristics such as risk-taking, aggression, criminality and stressful life events. Additional research to discover and validate easily administrable measures of cannabis use and impairment is also needed. Nevertheless, recent research has provided a much clearer picture of the contribution of cannabis to collision risk than was available only a few years ago.

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Prevention and treatment

PART III
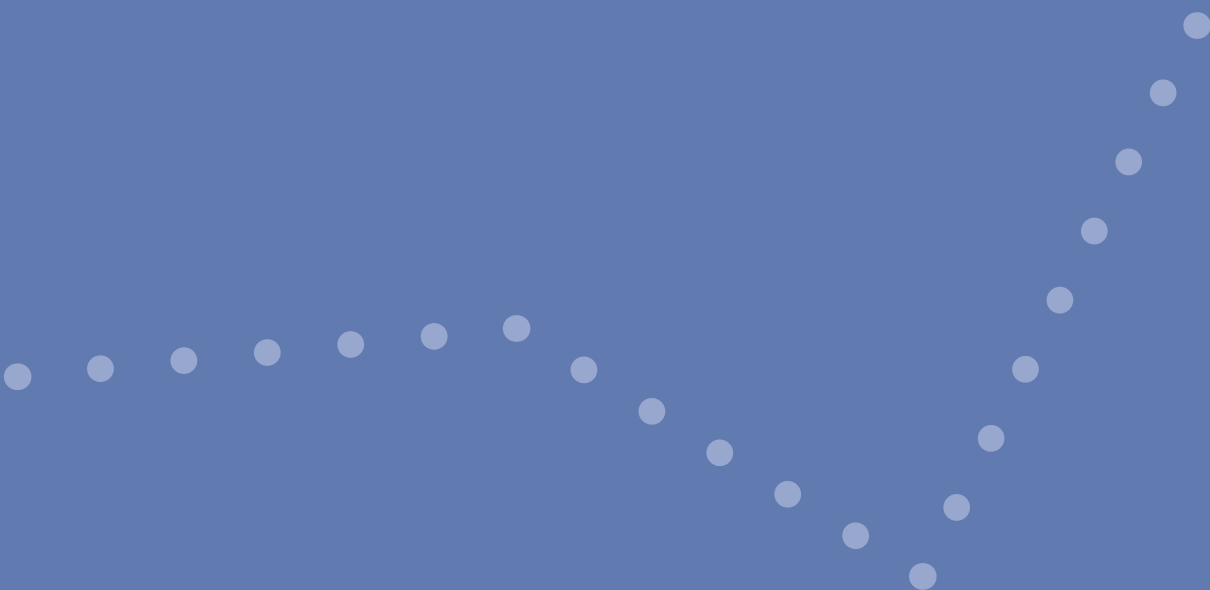
Chapter 10
Treating cannabis use disorders: perspectives and best practices

Keywords: cannabis – meta-analysis – methodology – treatment

Setting the context

One of the fears that has accompanied increasing cannabis prevalence in Europe is that more people, or rather more *vulnerable people*, are being exposed to problematic use. In particular, there are concerns about cannabis's role as a potential trigger or precipitator of mental health problems such as psychosis, depression, schizophrenia and anxiety (see this monograph's chapters by Witton, Hall and Montanari et al.). Anxiety has focused particularly on adolescents and young adults, the core cannabis-using demographic.

Few argue that more and more people — and in particular adolescents and young adults — are seeking professional help for cannabis problems. Cannabis treatment indicators were the topic of a selected issue in EMCDDA's 2004 Annual Report. Key findings were that 12 % of all treatment clients and 30 % of new clients to drug treatment recorded using cannabis as their main problem drug, and that a steady rise has been seen since the mid-1990s. The most recent data indicates that the share of those seeking help for cannabis among treatment clients has increased further to 20 %, although the share of new clients has remained stable, at 29 % (EMCDDA, 2007). Concerns about youth exposure to problems seem justified: nearly all cannabis clients new to treatment are under 30 years old, and the majority are male. Teenagers in specialised drug treatment are more likely to report cannabis as the primary drug.

Not surprisingly, health professionals – both specialists and general practitioners – are increasingly seeking advice on best practices for treating cannabis problems. While Chapter 14 by Rödner Sznitman is descriptive, answering the question 'What cannabis treatment is available in Europe today?', ideally, this chapter would now be prescriptive, detailing 'What cannabis treatment *should be* available in Europe today?'

Yet, this chapter cannot be prescriptive. As with other types of drug treatment, no 'gold standard' for cannabis exists. Nonetheless, there is some cause for optimism. The author finds that as cannabis treatment becomes more commonplace, the evidence base for 'what works' is likely to improve. What is more, the need to measure efficacy is increasingly being 'built into' emerging programmes from the start, as opposed to being tagged on as an afterthought.

Specialised cannabis treatment centres are being opened in a number of European countries — for example, in 2005, France opened 250 cannabis consultation centres, while promising psychosocial therapy development projects are underway, such as CANDIS in Germany and the five-country INCANT project (Belgium, Germany, France, Netherlands, Switzerland), and the Maria Youth Centre Project in Sweden (EMCDDA, 2007). The EMCDDA organised a Reitox academy in Berlin in March 2007 on cannabis prevention and treatment (see link below). Nonetheless, policymakers should perhaps bookmark this chapter with a large Post-it note reading 'research funding needed here'.

Further reading

EMCDDA, Annual reports, published each year in November.

EMCDDA (2007), *Presentations at the Reitox Training Academy, on cannabis prevention and treatment* (29–30 March, Berlin)
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Projekt CANDIS website (2005–2007), http://candis-projekt.de/cannabis.html

Projekt INCANT website (2006–2007), www.incant.de/

Treating cannabis use disorders: perspectives and best practices

Anders Bergmark

As in most other cases within the field of treatment of substance misuse there is no solid consensus concerning the specific effects of different treatment interventions for cannabis use disorders. Current cannabis treatment options are limited compared with those for alcohol and opiates and have only developed in recent years as the need for treatment has become more apparent. To a large extent the available knowledge-base is hard to interpret, due to a lack of standardisation of core components in clinical trials (such as client characteristics and comparison interventions). This challenge is compounded by the small amount of treatment studies to draw upon, and the reliance upon meta-analysis and reviews of clinical studies, which in itself is subject to flaws.

A digression on the limitations of scientific reviews

When mapping the fast-developing field of cannabis treatment, it is crucial to take into account both the immaturity of the existing evidence base and the challenges of making clear-cut secondary reviews. So before reviewing current work on cannabis treatment, a didactic digression is included here to encourage peers to apply a critical eye when dealing with cannabis treatment. It reviews the doubts that have been cast on the existing evidence base for alcohol treatment, thus serving as a warning to cannabis treatment researchers to avoid similar pitfalls.

Recent years have seen a shift within scientific studies away from original studies and towards more 'exhaustive' reviews. It is no longer sufficient to underpin a clinical position by a single primary study or by synthesising a handful of primary studies, but to review *all* relevant studies. In some cases several hundred studies must be analysed. However, the resulting secondary studies need to be read critically, and there is considerable discussion on the limitations of reviews in clinical and psychological literature (Widiger et al., 1990; Deeks, 1998; Rosenthal and DiMatteo, 2001).

For substance treatment, there are three broad types of scientific review: the 'narrative review', the 'box-score review', and the 'meta-analysis'.

- Narrative reviews are conducted without an explicit systematic approach concerning the synthesis of the results of the primary studies that are included.

- Box-score reviews set out to differentiate between evidence by comparing any given treatment modality's proportion of positive findings vis-à-vis the total number of studies for that modality.
- Meta-analyses are built upon 'effect sizes' (ES), an index of treatment efficacy that enables the study to determine how a standard deviation in the results for one treatment group compares to control groups.

Although guidelines exist for how a review should be conducted, the majority of reviews — across many clinical fields — fail to follow them (Widiger et al., 1990; Breslow et al., 1998; Wilson, 2000; Altman et al., 2001; Bergmark, 2001). Over time 'narrative reviews' have become less important. While they are rarely without value — essentially relying upon the insight of the authors — they are not fit for analysing a large number of original studies and because they lack statistical analysis.

Meanwhile, the difficulties involved in producing valid box-score reviews have been underestimated, and this situation is not helped by the existence of competing reviews, that is reviews that reach contradictory conclusions from the same primary material (Petticrew and Kennedy, 1997). Finney (2000), a leading substance misuse treatment researcher, has provided strong arguments to favour pessimistic interpretation of existing research in the alcohol treatment field, and points to four major problems connected with box-score reviews:

1 lack of statistical power to identify differences between the intervention and control group;
2 multiple statistical tests for treatment effects;
3 variable comparison (control) groups across studies;
4 lack of consistent and adequate data on client characteristics across studies.

The number of clients in alcohol treatment studies is generally limited to a size that only gives a 50% chance to detect a medium-size effect at the $P < 0.05$ level (Morley et al., 1996). This means that there is a substantial risk that conclusions concerning treatment effects are dependent on variation in statistical power among studies that are included in a review. It has been shown that studies on treatment settings that did detect positive differences in effects have an average probability of 77% to do so, whereas studies with negative findings only had a 55% chance to do the same (Finney et al., 1996). There is also a trend to compensate for weakness in statistical power; that is, the use of small groups of clients in studies by using a large number of tests without any regard for the type I error rate (Finney, 2000); that is, for false positive findings owing to the fact that a large number of tests will increase the probability for positive findings because of chance. In a study of settings effects it was found that studies that did identify positive effects had an average of 18.6 tests for the identified treatment effects, while those studies that did not identify any treatment effects had an average of 4.9 tests (Finney et al., 1996). A lack of standard procedure when it comes to the use

of comparison groups, that is the fact that there often is a great variation concerning what type of control condition is used within different studies, undermines the possibility of using original studies in reviews. It has been shown (Floyd et al., 1996) that only 30% of treatment studies used comparison groups that were exposed to no or minimal treatment, and as a consequence the identification of treatment effects will be dependent on which type of intervention the comparison group was subjected to. In a similar manner, the lack of information on relevant client characteristics constitutes a serious threat against the possibility of making comparisons between different studies. In a recent review of methodological issues (Floyd et al., 1996) more than two-thirds of the studies lacked information on how many years the clients have had substance misuse problems, and only 16% had any information concerning to what extent clients had received previous substance misuse treatment.

Meta-analysis is generally considered to be a better alternative than a box-score review. This is mainly because meta-analysis can avoid the serious bias connected to limited statistical power in the original studies by establishing so-called combined effect sizes. However, all the problems do not go away. As with box-score reviews there are substantial problems related to the lack of standardised comparison groups and an absence of information on relevant client characteristics. Combined, these problems bring Finney to conclude that currently, in the field of alcohol treatment, it is not possible to establish any synthesis that could direct an evidence-based practice about alcohol treatment.

It is telling that some of the most well-known researchers who have been extensively involved in such reviews have radically different views on whether existing reviews are inconsistent or not. For example, while Miller and Willbourne (2002) are encouraged by what they identify as considerable convergence between different reviews, Finney (2000) takes the opposite position.

The scientific knowledge base for treatment of cannabis use disorders

Meta-analyses

To date there have been two reviews that are specifically directed towards treatment of cannabis use disorders: SBU (2001; The Swedish Council on Technology Assessment in Health Care) and Fridell (2003). However, these two reviews, which both make use of meta-analytical techniques, arrive at two different qualitative answers to the question of whether any effective treatment for cannabis use disorders exist. They are in fact strongly related to each other: Fridell's study is an update of the SBU study (Fridell was the author of the chapter in the SBU study that dealt with psychosocial treatment for drug dependence). Most treatment approaches to cannabis use disorders involve

psychosocial approaches, which may include elements of psychological interventions such as cognitive–behavioural therapy or motivational interviewing or aspects of the client's environment, notably in interventions involving the client's family. But while the SBU study concluded 'there is no documentation of reliable effects for any psychosocial treatment for cannabis abuse' (p. 48, vol. II, author's translation), Fridell summarises his findings as follows: in 4 out of 13 published studies, behaviour therapy (pp. 5, 7) and family therapy (pp. 70, 88, 97) had a significant effect compared with control conditions for marijuana-smoking teenagers with a still-existing family network (p. 354).

The difference in the conclusion drawn in these reviews does not stem from the inclusion of new studies; although Fridell's study includes 13 studies and SBU 11, the two studies that were added to the former analysis were published in 1989 and 1982 (and should, according to the inclusion criteria stated in the latter analysis, also have been included in the SBU study). While the SBU study directly refers to the effect size (ES) of the meta-analysis that was undertaken for all psychosocial interventions, Fridell makes no explicit reference to the ES derived from his meta-analysis. Instead, he points to the fact that some treatment interventions have support for effects. But this approach begs the question why the overall meta-analysis was performed at all. To the extent that Fridell intended to evaluate the effects of specific treatment modalities, he should also have included the studies with no or weak effects that are included in the meta-analysis, otherwise the claim that behaviour and family therapy have support in some studies cannot be considered as meaningful (as the treatment modalities that are identified also are present in studies with no support for an effect).

While the meta-analysis in the SBU study produced an ES of 0.05 and, thus, points in the direction of no effects for psychosocial interventions for cannabis use disorders, Fridell's meta-analysis yields an ES of 0.24, that is, just above the 0.20 level which commonly is identified as the lower limit for a low ES (0.20–0.50; Cohen, 1978). The difference in ES from the two meta-analyses does not seem to be primarily connected to the inclusion of two new studies but to a difference in the estimated ES for three studies that are present in both studies. A study by Lewis is assigned an ES of 0.25 in SBU, while the corresponding value in Fridell's analysis is 0.49; a study of Joanning et al. (1992) has an ES of 0.63 in SBU and an ES of 1.01 in Fridell's analysis, and finally, a study by Henggeler et al. (1998) has an ES 0.54 in SBU and an ES of 0.93 in Fridell's analysis. Taken together, such inconsistencies undermine the possibility of interpreting the relationship between these two reviews and drawing conclusions that could guide practice. Thus, both the SBU's and Fridell's meta-analyses suffer from several of the problems dealt with in the preceding section. Neither of them considers the effects of the fact that there are important differences between the client groups in the studies included. Most importantly, neither distinguish between studies that only include adolescents and those directed towards adults. In the same fashion, there are no attempts to analyse the effects of the fact that there is a substantial variation in comparison groups between the studies that are included.

Recent treatment studies

Adolescent treatment

There are some new, substantial studies that are not included in SBU's or Fridell's analyses that underline the difficulties of identifying best practice. The most important is the CYT (cannabis youth treatment) study (Dennis et al., 2004). This multisite study sets out to analyse the effects of five different treatment interventions for adolescent cannabis use disorders. The design of the study aims at an identification of effects of treatment intensity as well as of treatment modalities. A combination of motivational enhancement treatment (MET) and cognitive–behavioural therapy (CBT) in five sessions was compared with the MET/CBT in 12 sessions and family support network (FSN, which was based on MET/CBT in 12 sessions and an addition of six parent education group meetings, four home visits, and case management). In a second trial of the study the five-session version of the MET/CBT intervention was compared with the adolescent community reinforcement approach (ACRA) and multidimensional family therapy (MDFT). While all the interventions led to improvements measured by days of abstinence and proportion of adolescents in recovery, the authors conclude, 'Overall, the clinical outcomes were very similar across sites and conditions' at 12-month follow-up. The study did not produce any support for the idea that an increase of the dosage of treatment had a differential effect on cannabis use, and neither did it provide any support for family-based treatment to being superior to the other interventions (which has been suggested for drug misuse in general, e.g. by Stanton and Shadish, 1997).

Brief interventions for adolescent cannabis users have been tested in a multisite study with non-treatment seeking adolescents in 10 educational colleges in London in the United Kingdom. At 3-month follow-up, the treatment group receiving a 1-hour face-to-face motivational interviewing session had reduced their weekly frequency of cannabis use by 66%, while a no-treatment control group had increased the weekly frequency of their cannabis use by 27% (McCambridge and Strang, 2004). These effects had diminished at 12-month follow-up, although cannabis use levels were significantly reduced from those at baseline (McCambridge and Strang, 2005).

Adult treatment

Concerning treatment for adults with cannabis use disorders, six relevant studies that are not included in the analyses from SBU and Fridell have been published: MTP Research Group (2004), Copeland et al. (2001), Budney et al. (2000, 2006), Stephens et al. (2000), Carroll et al. (2006). The first three of these studies set out to study the differential effect of treatment dosage and to compare treatment interventions with a delayed treatment control (DTC). All studies establish a significant effect for all interventions compared with DTC, but in two of the studies (Copeland and Stephens)

there is no significant difference in effect between the minimal intervention and the more extensive intervention.

However, methodological aspects of these studies may have detracted from the potential benefits of longer treatments. Small numbers of cannabis users were studied and recruitment may have resulted in a sample of patients more likely to succeed in treatment. Less experienced therapists conducted the interventions in group settings rather than tailoring them to individual need, and they had abstinence from cannabis use as their goal. The multisite study, involving 450 mostly cannabis-dependent treatment seekers from three US states from the MTP Research Group (2004), attempted to avoid these shortcomings. In this study, outcomes from two interventions and a delayed treatment group were compared. Both interventions involved manual-based programmes flexible enough to be directed at individual requirements and included a moderation goal as well as abstinence. There was a more positive effect for the more intensive treatment intervention involving motivational and cognitive–behavioural elements, as well as practical issues such as transport, childcare and housing than an intervention involving two motivational enhancement sessions provided a month apart. While the study confirmed that brief interventions can lead to improvements, at each of the follow-up points at 3, 9 and 15 months those who had received the longer therapy showed greater improvements: using cannabis less often; greater reductions in symptoms of dependence and attaining abstinence in greater numbers. The results suggest that many cannabis-dependent patients might benefit from a one- or two-session intervention involving motivational interviewing combined with an introduction to ways of moderating use, while longer courses of motivational interviewing and cognitive–behavioural therapy should be available for those who need it (Ashton, 2005).

In the study by Budney et al. (2000), a contingency management approach was used. Contingency management usually involves providing patients with vouchers redeemable for goods and services in exchange for the patients provided drug-free urine tests, treatment attendance or medication compliance. The value of the vouchers can vary in order to reinforce desired outcomes. For example, in the recent Carroll et al. study with young cannabis-dependent adults, participants received a voucher worth USD 25 for the first session attended, with increases of USD 5 increments for each subsequent session attended. Participants also received USD 25 for each cannabis-free urine sample they provided after testing, which also increased in USD 5 increments to a maximum of USD 540 if all urine specimens provided during the course of the study were negative. Recent meta-analyses found effective outcomes from interventions using voucher-based and contingency management approaches compared with a range of control conditions (Lussier et al., 2006; Prendergast et al., 2006). The Budney et al. study randomised 60 cannabis-dependent adults to four individual sessions of motivational enhancement therapy (MET), 14 sessions of a MET and cognitive–behavioural

therapy (CBT) combination or a MET/CBT intervention together with contingency management. Although this study indicated that monetary incentives in the form of vouchers exchangeable for retail items increased abstinence in comparison to MET- and CBT-based interventions, the fact that no long-term follow-up was performed made it uncertain if this extrinsically motivated abstinence was sustained for a longer period of time. A subsequent study of these interventions by the same research group assessed outcomes for 12 months after treatment. Monetary incentives led to continuous periods of abstinence during treatment. CBT did not add to this during treatment effect but results showed that CBT did help with post-treatment maintenance of the initial positive effects of the vouchers. However, only half of the people in the study were able to achieve abstinence during the treatment and the majority continued to use cannabis after treatment and experience cannabis-related problems (Budney et al., 2006).

Another US study tested contingency management with young adults referred to treatment by the criminal justice service. Here 136, mainly male, cannabis-dependent probationers between the ages of 18 and 25 were randomised to one of four treatment conditions: a motivational enhancement/cognitive–behavioural intervention (MET/CBT) based on the manualised approach of the MTP study, either with or without a contingency management element; or individual counselling with or without contingency management. Contingency management was provided by incentives in the form of vouchers redeemable for goods or services dependent on treatment session attendance or submission of cannabis-free urines. The interventions with contingency management interventions had a significant positive effect on treatment retention and the number of cannabis-free urine specimens, with the motivational enhancement/cognitive–behavioural intervention with contingency management proving the most effective of the interventions. While there were few positive effects of MET/CBT compared with drug counselling during the treatment period, the patients receiving the MET/CBT intervention showed more signs of continuing improvement after treatment and continued to reduce their cannabis use when followed up at 3 and 6 months (Carroll et al., 2006).

In addition to the examination and evaluation of reviews and specific original studies with a bearing on treatment effects for cannabis use disorders, it might also be worthwhile to consider some results from more general reviews of drug misuse treatment interventions (Stanton and Shadish, 1997; Ozechowski and Liddle, 2000; Williams and Chang, 2000; Prendergast et al., 2002). The review by Prendergast et al. (2002) does not find any differences between treatment modalities, but Stanton and Shadish (1997), Ozechowski and Liddle (2000) and Williams and Chang (2000) all find support for family therapy (in different forms) as a more effective intervention than non-family modalities. But such findings are contradicted by the studies of Dennis et al. (2004) and Waldron et al. (2001). Multisystemic therapy (MST) (which must be considered as family based) has been cited by NIDA (the US National Institute on Drug Abuse) as an effective,

evidence-based treatment intervention, but a recent, Cochrane-based review by Littell et al. (2005) on MST comes up with the conclusion that MST has few if any significant outcomes compared with usual services or alternative treatments.

There is an ongoing study, Projekt CANDIS ([1]), Targeted Treatment for Cannabis Disorders, at the Dresden University of Technology, due for completion in January 2008. CANDIS seeks to develop a modular treatment programme for cannabis use disorders based on treatment packages and components that have been shown to be effective in previous US and Australian trials (Copeland, 2001), and to adapt these materials to the needs of its target population (German-speaking problematic cannabis users over 16 years of age). The treatment package includes motivational enhancement, cognitive–behavioural and psychosocial problem-solving components. While results are not yet available at the time of publication, initial feedback is encouraging, with first results expected in November 2007 ([2]).

Pharmacological treatments

There have been a small number of studies assessing potential medications for the amelioration of cannabis withdrawal symptoms, all by the same research group and involving adult participants (Hart, 2005). Bupropion, a medication that has been found to be successful in treating nicotine dependence, was found to exacerbate some of the symptoms of cannabis withdrawal in a laboratory study involving non-treatment seeking regular cannabis users (Haney et al., 2001). Another laboratory study using nefazadone, an antidepressant with sedative abilities, found that the medication alleviated only some of the withdrawal symptoms (Haney et al., 2003). Divalproex, used in the treatment of epilepsy, mood disorders and migraine headaches, was found to worsen cannabis-associated withdrawal mood (Haney et al., 2004). Finally, administering doses of oral THC, at doses which did not produce subjective effects, was found to reduce withdrawal symptoms and reverse other effects associated with withdrawal, such as weight loss (Haney et al., 2004).

Naltrexone, an antagonist medication used in the treatment of opiate dependence, has been examined in relation to cannabis dependence. Antagonists block the effects of drugs by binding to receptors in the brain, with different antagonists working on different receptors and consequently blocking the effects of different drugs. Laboratory studies have demonstrated that opiates and cannabis share common receptors and animal studies have found that naltrexone can inhibit the development of cannabis dependence. However, human studies have found that naltrexone does not alter the subjective effects of low-dose oral THC and may also enhance the positive subjective effects of higher doses of oral THC (Haney et al., 2003).

([1]) www.candis-projekt.de
([2]) E-mail communication with Dr Eva Hoch, CANDIS project leader, October 2006.

Conclusion

By and large, it seems as if there is still no conclusive evidence for any specific treatment intervention concerning cannabis use disorders. On the other hand, there are indications that anything works. That is, that the treatment modality in itself is of less importance than the treatment context and the individual's choice to enter treatment. Support for this perspective is provided both by the CYT project (Dennis et al., 2004) and Project MATCH (Babor and Del Boca, 2003). In both of these projects, different treatment interventions produce the same (desired) outcome, although these outcomes did not seem to be facilitated by the stipulated theoretical mechanisms intended to produce these outcomes.

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Chapter 11
Cannabis prevention in the EU

Keywords: cannabis – EMCDDA – indicated prevention – judicial referrals – prevention – schools

Setting the context

Cannabis is the most widely consumed illicit drug. It is targeted in one way or another by most prevention interventions. However, few interventions have targeted cannabis specifically. So cannabis prevention in Europe takes place in a vast and varied landscape. What may seem an abstract term — prevention — in practice diffuses across all manner of concrete programmes. These range from diplomacy and treaty negotiation, through health promotion by ministries and community schemes, to physical products such as pamphlets, videos and leaflets.

This chapter attempts to map the diversity of interventions in Europe within the three-tier 'Gordon' classification framework of *universal*, *selective* and *indicated* prevention. The chapter is illustrative rather than exhaustive. A general overview of prevention is made difficult because of the sheer diversity of prevention projects that have been developed. Moreover, the actors and implementers involved are far from uniform across Europe [1].

What is certain is that the evidence base for cannabis prevention in the EU needs considerable work. Budgets for prevention campaigns in Europe run into tens of millions of euros, yet while considerable effort is spent on describing their scale (number of leaflets printed, number of advertisements aired, etc.) more research is needed into their effectiveness. Much knowledge originates from alcohol and tobacco prevention and from non-European studies (the USA in particular). While the evaluation of programmes

[1] An EMCDDA project monitors national drugs strategies across Europe, see www.emcdda.europa. eu/?nnodeid=1360

has matured in Europe, the evidence base is too small to develop definitive conclusions for good practice. Political efforts should focus on evaluation and rigorous outcome evaluations.

Further reading

DrugInfo Clearinghouse (2005), *Prevention reading and resource list: Cannabis*, Melbourne.

EMCDDA (2002), *Drugs in focus no. 5: Drug prevention in EU schools* — includes a short reading list.

EMCDDA (ongoing), Prevention and evaluation resources kit (PERK)
www.emcdda.europa.eu/themes/prevention/perk

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Cannabis prevention in the EU

Gregor Burkhart and Amador Calafat

This chapter focuses on a number of cannabis-specific prevention programmes in Europe. It also provides a brief overview of the rationale behind them. It must, nonetheless, be stressed that cannabis prevention rarely takes place in isolation. Furthermore, the weighting given to illicit drugs (cannabis included) in universal prevention has recently been eroded. Europe has shifted away from interventions that divide licit and illicit substances, and has moved towards an approach based on relative harms and complementary drugs, with particular focus on alcohol and tobacco in combination with illicit drugs prevention [2].

Cannabis in the context of polydrug prevention and health education

Cannabis prevention is typically delivered in the context of wider informational activities, and shares a platform with prevention for other substances — other illicit drug use, alcohol, tobacco and prescription drug misuse. Beyond substance use prevention, cannabis interventions are also frequently combined with public health prevention programmes that go beyond substance misuse, for example to cover personal health (mental health, addiction, healthy lifestyles, eating disorders, safe sex, etc.) and social education (citizenship, crime, ethics), particularly in the school environment.

A difficulty when analysing cannabis prevention activities is to identify, in this all-inclusive prevention environment, approaches that can offer insights specifically for cannabis. Reviews focusing specifically on cannabis prevention (e.g. Matthys et al., 2006) are rare. Yet, some formal approaches to analysing prevention have emerged, and prevention experts have in the past two decades begun to formalise their approach to analysing programmes, and a typology of interventions has emerged (*universal*, *selective*, *indicated* — see Box 1). This has enabled a more focused approach to evaluation of prevention initiatives.

For example, prevention can be categorised along criteria such as coverage (populations targeted), scope, duration, efficacy (what works in research conditions), effectiveness (what works in real life), resource-efficiency and cost-efficiency (what offers the best return on investment). A number of general evidence-based prevention manuals have been produced with European relevance [3]. However, cannabis-specific handbooks

[2] See EMCDDA (2006c).
[3] International examples include EU-Dap (2005); van der Stel (1998); UNODC (2002).

Box 1: Prevention classification systems

Gordon (1987), Mrazek and Haggerty (1994) and Kumpfer and Baxley (1997) have proposed a three-tiered preventive intervention classification system: *universal*, *selective* and *indicated* prevention. Amongst others, this typology has gained favour and has been adopted by the US Institute of Medicine, National Institute of Drug Abuse (NIDA) and the EMCDDA.

Universal prevention strategies address the entire population (national, local community, school, district) and aim to prevent or delay the onset of alcohol, tobacco and other drug use. All individuals, without screening, are provided with information and skills necessary to prevent the problem.

Selective prevention focuses on groups who are either known to be drug users or at heightened risk of developing problems of substance abuse or dependence. The subgroups may be distinguished by characteristics such as age, gender, family history or economic status.

Indicated prevention involves a screening process, and aims to identify individuals who exhibit early signs of substance abuse and other problem behaviours. Identifiers include falling grades among students, known problem consumption or conduct disorders, alienation from parents, school and positive peer groups, and so on.

Outside the scope of this three-tier model are *environmental prevention* strategies. Environmental approaches are typically managed at the regulatory/legislative or community level, and focus on interventions to deter drug consumption. While prohibition can be viewed as the ultimate environmental restriction, in practice environmental strategies for cannabis include increased policing in sensitive settings (near schools, at music festivals), legislative guidelines aimed at precipitating punishments (warnings, penalties, fines) and actions to limit the prevalence of complementary licit drugs (for example, alcohol advertising bans and public place smoking bans).

Another classification scheme is *primary*, *secondary* and *tertiary* prevention. Primary prevention aims at preventing drug use and is usually the aim of universal programmes. Secondary prevention aims to prevent drug use from becoming problematic or leading to addiction. Tertiary prevention aims at preventing the harm caused by those who are using drugs.

On the borders of prevention and treatment is the strategy of early intervention. Based on detection of harmful alcohol or drug use, early intervention typically targets treatment of cases before they are aware that their substance use might cause problems or major psychosocial complications.

and guidelines on specific measures for cannabis are less common, yet do exist ([4]). And despite considerable research effort, the prevention literature is largely weighted towards alcohol, smoking and general drug prevention (e.g. Aveyard et al., 2001; Loxley et al., 2004).

A panel of prevention experts recently commented that '(…) what we know about effectiveness (of illicit drug prevention) is almost entirely grounded in work with alcohol and tobacco' (Stockwell et al., 2005). This is mostly due to the nature of the phenomenon. In order to reach statistical power for prevention effects on a low prevalence problem such as cannabis use in pre-teens, a much higher number of cases to be treated is needed compared with alcohol and tobacco.

From informal to formalised programmes

As with misuse of other illicit drugs and alcohol, cannabis use is strongly associated with psychosocial risk factors that go beyond the drug's pharmacological properties and patterns of use ([5]). Those who use cannabis occasionally and those who use it frequently may have different risk factors, different problems, and may therefore benefit from different prevention and supportive approaches. Cannabis components of prevention in Europe are increasingly being formulated to reflect such specific needs. With regard to schools programmes, more countries than before have introduced, expanded or are planning more structured prevention programmes, and quality programmes have been prioritised in many Member States (EMCDDA, 2006a). In many respects, the information on drugs provided as part of these programmes has evolved in parallel with the evidence generated through relevant epidemiology and screening instruments ([6]). As the most recent example in France, a 2005 MILDT/DGESCO addiction prevention guide, firmly based on epidemiology ([7]), was tested at 80 schools and proposes sequencing

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([4]) Exceptions include: in Germany, *Schule und Cannabis* (BZgA, 2004) and materials for the *Bekifft in der Schule* project (SuchtPräventionsZentrum Hamburg, 2004); in Switzerland, *Ecoles et cannabis* (OFSP, 2004); in France, *Repérage précoce de l'usage nocif de Cannabis* (INPES, 2006); in the UK, *School drug policy: a review process* (Blueprint, UK Home Office, 2004) and *Advice for teachers on delivering drug education* (Drug Education Forum, 2004); in Belgium, *Maat in de Shit* (CAT Infopunt and VAD, 2006). A number of cannabis-specific prevention manuals have emerged in recent years from Australia (DrugInfo Clearinghouse, 2005), New Zealand and the USA (NIDA, 2003; see also Sloboda, this monograph).

([5]) For a synthetic review of risk and protective factors, see Coggans, this monograph; Frisher et al. (2007); Dillon et al. (2006); Hawkins et al. (1991, 1992); Vázquez and Becoña (2000) and the website www.drugsprevention.net.

([6]) See Hibell and Coggans, this monograph, for a discussion of epidemiology in schools and psychosocial correlates of cannabis use. See Beck and Legleye, this monograph, for discussion of screening instruments. The EMCDDA's next monograph seeks to address harm reduction in general.

([7]) The guide 'Prévention des conduites addictives: Guide d'intervention en milieu scolaire' is available at: http://eduscol.education.fr/D0190/guide.htm

prevention according to age group and substance focus: 11–12 years, tobacco; 13–14 years, alcohol; 15–16 years, cannabis; 17–18 years, polydrug consumption (French national report, 2006).

Common ground on prevention

A standard EU approach to prevention is notably absent (see Reitox national reports). Nonetheless, the EMCDDA's annual report and EDDRA database have attempted to encourage pan-European awareness of what different Member States are doing. Encouragingly, cross-border collaboration is now more commonplace.

Consistency yet gradation

There is a continuum between *drug-free society* prevention approaches and moderation approaches. For example, prevention policies might target younger groups with a *just say no* message (minimising onset and experimentation), experimenting youths with a *quit* message (minimising continuation, e.g. Germany's *Quit the Shit* programme), regular users with a *moderation* message (e.g. the UK Talk to Frank *Cannabis: Too much too often* guide, Belgium's *Maat in de Shit* peer-based approach), and heavy or problematic users with a *harm reduction* or *seek treatment* message. Prevention projects in Europe now show some gradation in objectives: to postpone (the next) consumption, to suspend use for some (extendable) time, to refuse offers, to reduce consumption, to distance oneself from consuming peers, etc. (Canning et al., 2004). However, the core scientific base remains consistent: all programmes emphasise the substance's illegality, risks and harms.

Heterogeneous actors and settings

Delivery of cannabis prevention in Europe, as elsewhere in the world, may involve a range of actors: ministries (health and interior affairs), parliamentarians, teachers, police, the judiciary, health professionals, drugs workers, community groups, theatre groups, youth services, parents (including parents of former drug users), Scouts, churches and religious communities, charities and NGOs, the media and commercial publishers. In such a populous environment where materials are freely available, 'official' programmes may compete with programmes which are not officially endorsed [8]. This is particularly the case for selective programmes. Jones (2004)

[8] For a discussion of various non-governmental prevention materials producers and Internet materials, see Tammi and Peltoniemi (1999), 39–40. Some controversy has arisen in the activities of Narconon, affiliated to the Church of Scientology (Czech Republic national report, 2005; *The Sunday Times*, 7 January 2007).

highlights that moves towards selective prevention constitutes a general shift in which European drug prevention programmes have become increasingly expansive in nature as they attempt to influence complex social environments of risk. Attention should be paid to possible problems which ensue from this. While irresponsibility is rare, such competing publications are subject to little public health endorsement, and their neutrality depends largely on who publishes them[9]. For instance, different agencies may have different conceptions of vulnerability and risk behaviours, complicating interagency cooperation (Powell et al., 2003). Additionally, complications may arise from unsuccessful negotiation of boundaries between prevention, treatment and criminal justice agendas (Kimberlee et al., 2003). Indeed, research has shown that programmes tend to lose effectiveness as they are rolled out over time and across settings (Buston et al., 2002; Dusenbury et al., 2003).

Environmental prevention strategies

Environmental prevention strategies (e.g. legislative and regulatory controls, taxes, bans, community and school rules) have gained popularity and are currently being introduced for alcohol, tobacco and cannabis in several EU Member States. While blanket prohibition could be seen as the strictest form of environmental strategy, there are many possible variations. These include: full and partial smoking bans in public places; EU-wide tobacco advertising bans; developments at EU level on a *European Alcohol Forum* to develop a code of conduct for reducing alcohol-related harm[10]; integration of roadside drug screening alongside drink driving tests; EU-wide indexation of existing minimum excise duties on alcohol; and alternative measures to criminal prosecution for personal cannabis possession. The level of enforcement of anti-smoking policies in EU Member States consistently correlates with the level of adolescent smoking (Aspect Consortium, 2004; Eurostat, 2002) and, without implying causality, there is appreciable correspondence between tolerant tobacco policies, prevalence of tobacco smoking among youth and prevalence of cannabis use (EMCDDA, 2006a). The vast majority of cannabis consumers are tobacco smokers. Inversely, there seems to be a strong intrinsic relationship between cannabis and cigarette smoking, in the sense that cannabis use perpetuates cigarette smoking (Amos et al., 2003).

Potential environmental prevention strategies for cannabis are limited by the illegal status of the drug[11]. Nonetheless, advertising controls on tobacco products or alcohol,

[9] Producers of non-official prevention-like materials include pro-drugs lobbyists, church groups (Christian, Islamic, Scientologists), parents-against-drugs and similar charities, and groups with strong commercial interests (for example, cannabis magazine publishers and seed sellers).
[10] http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/774&format=HTML&aged=0&language=EN&guiLanguage=en
[11] For discussion of hypothetical environmental measures, see Room, this monograph.

together with anti-binge measures (such as happy hour restrictions) are proven to reduce consumption of these substances, and may have a knock-on effect on comorbid cannabis consumption, although little research exists on this topic.

Cannabis advertising is generally indirect in Europe, yet is, nonetheless, present. Advertisers include seed suppliers, growshops and head shops, cannabis smoking clubs and vendors of paraphernalia such as bongs and hydroponic equipment. Publicity channels include a burgeoning cannabis culture media — The High Times, Softsecrets, Pot-TV.net and the High Life trade fair — as well as general media (inflight magazines, music magazines, etc.). Mirroring the brand-stretching vogue that has accompanied tobacco marketing controls (Camel Active, Marlboro Classics) a number of products are marketed using cannabis or cannabis-leaf logos in Europe. As well as 'directly associated' products, such as bongs and cigarette rolling papers, products include Cannabis cough drops and Swiss Hemp Ice Tea drinks (Slovakian national report, 2005), and clothing and accessories, often manufactured with hemp (in France, brands include Made in Chanvre and Terre de Chanvre). Yet, controlling such marketing and cannabis products is very much a grey area. The Australian Federal Government has promoted legislation to ban the sale of bongs and drug equipment, with a 'bong ban' recently put in place in the state of Queensland, although the effects of such legislation need to be measured.

At the 'micro' level, structural prevention measures targeting the availability of cannabis and the social norms around legal drugs are less developed than the evidence base would advise. An advertising ban forms part of the AHOJ-G prosecution guidelines for Dutch coffee shops (see Korf, this monograph). Some Dutch municipalities are beginning to ensure coffee shops are not established in the vicinity of schools, while overall retail outlet density has decreased. Policing of smart shops and growshops has tended to maintain vigilance for any shops that cross legal boundaries and actually sell cannabis: a recent parliamentary proposal in Spain called for regulating *cañamerias* (growshops). Meanwhile, some structural strategies have targeted the 'periphery' of substance use (e.g. municipal bans on drinking or drug-taking in public). Nonetheless, the apparent contradiction persists in Europe where advertisements for a legal product (e.g. tobacco) are banned yet not those for products relating to cannabis, an illegal drug.

Universal prevention: school-based approaches and mass media campaigns

Universal, multi-substance prevention programmes are the norm across Europe, with the predominant focus on school-based and mass media approaches (EMCDDA, 2006a).

Rationale

An important prevention rationale for universal school-based approaches is the gateway hypothesis, whereby delaying onset of adolescent alcohol, tobacco and cannabis use is hypothesised to reduce rates of subsequent illicit drug consumption and problematic use and other comorbid harms (e.g. truancy, delinquency). Other rationales include general health promotion and preventing comorbid behaviour such as harmful alcohol use, school drop-out rates, risky sexual behaviour, early sexual activity or pregnancies, violence and social exclusion. There is some evidence that preventing or delaying tobacco or alcohol use can reduce subsequent use of cannabis (Botvin, 2000; Caulkins et al. 2002, 2004; Ellickson et al., 2003), yet strong proof for reductions for 'harder' illicit drug use has proved both elusive and heavily contended in the USA (Gerstein and Green, 1993; Manski et al., 2001).

The political rationale for general universal prevention is robust[12]. Economies of scale are gained as the targeted population is large, while the health objectives — smoking, alcohol, drugs and obesity — are wide (Roe and Becker, 2005). By targeting youths and young adults, school-based and young adult-oriented programmes target a demographic where prevalence is highest, potential lifetime benefits the strongest, and, in many Member States at least, cannabis use is growing (EMCDDA, 2006a; Hibell et al. (ESPAD), 2003). Nonetheless, large-scale universal programmes also lead to high absolute cost, while covering large populations (low per-capita costs). Economic research into prevention cost-effectiveness remains both rare and perhaps politically sensitive in Europe.

Content considerations

A typology of different kinds of universal prevention interventions has been produced for the EMCDDA's *PERK* project and reflects the developments of the last two decades[13]. It divides content into (Burkhart and Crusellas, 2002; McGrath et al., 2006; EMCDDA, 2007):

* knowledge of drugs (prevention by providing health information to influence decision-making);
* personal skills (clarification of values and encouragement of responsible decision-making);
* social skills (in particular, peer resistance);

[12] Political commitment to school-based prevention is intuitive, as seen in a recent letter to *Addiction*: 'If we do not have up-to-date evidence then we must fall back upon rationality and human and societal values, and I tend to agree (…) that alcohol education, in the absence of evidence, should continue to be valued.' (Foxcroft, D., *Addiction* 101: 1057–1059).
[13] www.emcdda.europa.eu/index.cfm?fuseaction=public.Content&nNodeID=9753

- normative beliefs (myth correction, correcting overestimation of the 'acceptability of use');
- alternatives to drug use (activities that are deemed incompatible with drug use);
- structural or regulatory measures (reducing acceptance and availability of complementary substances such as tobacco and alcohol); and
- multi-component (a combination of these).

Debate is strong about the effectiveness of each approach, and there has been a shift away from 'traditional' or 'intuitive' prevention (knowledge and affective) to social skills, competence enhancement, and structural/regulatory and multi-component approaches based on scientific theory (Burkhart and Crusellas, 2002). Typical prevention approaches include theatre-based approaches (Canning et al., 2004) and, increasingly, IT- and Internet-based approaches (Tammi and Peltoniemi, 1999; Drugscope, 2006).

In terms of evaluating effectiveness of cannabis prevention programmes, Europe is, to a large degree, forced to look at US reviews which are furthermore focused on general substance prevention and not cannabis-specific prevention (Skara and Sussman, 2003; Faggiano et al., 2005; Thomas and Pereira, 2006). School-based approaches have generally been found to have scarce effects but — considering the methodological difficulties of implementation and research — they should not be underestimated (Milford et al., 2000; Gorman, 2002; Tucker et al., 2002; Coggans et al., 2003; Ellickson et al., 2003; Bühler and Kröger, 2006, Thomas and Pereira, 2006; Faggiano et al., 2005). Studies from Europe represent a small minority among those aimed at preventing drug use. For example, only one small study (Hurry and McGurk, 1997) was included in the Faggiano review. Among those aimed at preventing tobacco use, some failed to detect any effect (Eveyard et al., 2001) while others show inconsistent results across centres (de Vries et al., 2003) or no long-term yet limited short-term effects (Thomas and Pereira, 2006).

Beyond objections of societal comparability and applicability of general substance findings to cannabis, the US evidence is far from conclusive on programme content. The Cochrane (Faggiano) review suggests that skills-based approaches can reduce subsequent drug use compared with normal curricula. Another review in the USA (Skara and Sussman, 2003) found that 8 out of 25 studies examined programme effects on cannabis and all showed positive interim effects (3–24 months). However, only one study reported data that allowed the calculation of the percentage reduction compared with control groups and other studies did not have enough data to determine relative differences with control groups. Four studies provided long-term outcomes (24 months), of which two showed positive outcomes and two showed no significant differences. The programmes that showed positive outcomes for cannabis use were all based on the social influence model and the majority had more than one type of intervention. About half of these programmes used peer educators, as well as adults. Most had booster

sessions or a long-term component and the length of follow-up varied between 27 and 72 months.

Best practices

Prevention research tends to be descriptive and available proof of effectiveness is limited. While the literature is almost universally cautious on making recommendations, there are several examples of organisations that have distilled research into actionable materials. Practice is informed by a number of international manuals (van der Stel, 1998; WHO, 2000; UNODC, 2002, 2006), synthetic monographs in the field (e.g. EMCDDA, 1997; Bukowski and Sloboda, 2003) and exemplary projects (Ferrer-Wreder et al., 2004; the EMCDDA EDDRA database and PERK). The EMCDDA's PERK project, the *Prevention and Evaluation Resources Kit*, aims to provide an online resource in the area.

NIDA's *Red Book* recommendations (NIDA, 2003) recur in many European publications. These are:

- target all forms of drug misuse, including alcohol and tobacco;
- be family-focused, including a component for parents;
- be long term across a school career;
- be age specific and culturally sensitive;
- address local problems and seek to strengthen community norms against drug use.

A study of prevention reviews (Cuijpers, 2002; Gottfredson and Wilson, 2003; Kumpfer et al., 2003; Skara and Sussman, 2003; Shepard and Carlson, 2003) lists the following guidelines, although with some caveats on the strength of recommendations (McGrath et al., 2006):

- Interactive approaches are preferable to didactic (ex cathedra) approaches.
- Peer-led approaches offer a mild increase in effectiveness.
- Social skills approaches are generally more effective, although resistance skills training offers little evidence of effectiveness.
- Booster sessions may help effectiveness, particularly for cannabis.
- Higher programme intensity (e.g. 10 lessons or more) offers little added benefit.
- Weak evidence suggests that programmes are best delivered to students 11–14 years old [14].

[14] Frisher et al. (2007) suggest that the evidence for an 'optimal age group' for prevention is unclear, although results of late-teen interventions (> 17 years) are generally weaker. They also suggest that as problematic patterns of use typically appear in later adolescence (15–16 years), 'attempts to modify behaviour at this age may be more productive'. A case for gradation in prevention campaigns (early ages: abstentionism, older groups: less use and quitting) would require more research.

- The evidence base for favouring family-based programmes over other approaches is weak, although where used with behavioural parent training, family-skills training and family therapy offer some benefits.

Recent trends in universal prevention in Europe

Standardised programmes

In terms of recent European trends at the universal prevention level, a general trend is the increased reliance on standardised programmes (EMCDDA, 2006a) and inclusion or prioritisation of alcohol and tobacco within general substance prevention (EMCDDA, 2006c). For example, the EU-Dap trial to develop and evaluate a European school prevention programme has reported encouraging results for cannabis, finding that its programme reduced occasional cannabis use by 23 % and 24 % respectively (EU-Dap, 2006). The programme, implemented in a considerable number of countries (Belgium, Germany, Greece, Spain, Italy, Austria and Sweden, now joined by Poland and the Czech Republic), involves 143 schools, 345 classes and 7 079 students. The early findings after one year need long-term validation during phase II of the project (begun in October 2006). Still, it is worthy of mention that the EU-Dap project has strong initial results while also straddling different prevention and drug consumption cultures.

Gender focus

Gender aspects are increasingly being taken into account in prevention, although there is a trend in many countries in Europe for gender consumption patterns for cannabis to be eroded, notably in Ireland (EMCDDA, 2006a; Frisher et al., 2007). Male gender predicts more intense use (Butters, 2005), while a study suggests that girls are more responsive to parental disapproval and are more cautious in selection of their peers (Butters, 2004). For girls, the programmes that are most effective in sustaining positive effects on substance use prevention after their completion focus on behaviourally orientated life skills. In contrast, methods of delivery that involve interaction with peers or adults are particularly effective in boys (Springer et al., 2004). Competence enhancement approaches, for example, can target gender differences. For boys, a number of European projects (e.g. *Beer-Group* in Germany, *Risflecting* in Austria, *Bagmaendene* in Denmark) focus on the lack of flirting skills among boys which may be related to intensive use of alcohol or cannabis in order to feel able to approach girls. Nonetheless, across Member States, gender-specific programmes remain underdeveloped (EMCDDA, 2006b).

Recreational settings

A number of prevention programmes have targeted cannabis in the context of other recreational settings. These include campaigns at music festivals, Dutch coffee shops and nightlife settings. As with general community prevention programmes, reports emphasise the importance of engaging various actors in the process (police, licensees, staff, organisers) (EMCDDA, 2006d; Reitox national reports).

Risk perception and normative beliefs

Risk perception is a complex but important factor in prevention. Risk perception is not easy to modify with knowledge approaches alone. Own experiences, observation of others and common myths associated with cannabis modulate perception more than knowledge itself (Springer et al., 1996). Normative beliefs are particularly important as cannabis-using youth tend to extrapolate the level of use of their immediate peers to 'normality' and overestimate the prevalence of drug use (Page and Roland, 2004). This might also happen through drug-using peer selection. Recently, considerable symbolism or 'brand value' surrounding cannabis has emerged, which encourages acceptance. Cannabis is often associated with ideas such as ecology, alternative culture, non-conformism and left-wing attitudes. While some prevention programmes focus on deconstructing or neutralising such 'marketing' of cannabis, research is needed on their effectiveness. Some Member States have reported attempts to reverse the social perception of cannabis use as normative behaviour, that is to correct the misconception that the majority of adults and adolescents use drugs (EMCDDA, 2004; McGrath et al., 2006). The recent introduction in Europe of 'strong' public place smoking bans is also being monitored for any knock-on effects on cannabis, particularly with regards to adolescent smoking.

At the schools level, structural and regulatory policies — school rules — have an even higher impact than universal prevention programmes on preventing or delaying legal and illegal substance use (Hawks et al., 2002). Tobacco smoking is a good predictor for cannabis use and its escalation (Duncan et al., 1998, Vázquez and Becoña, 2000) and prior experiences with legal substances may be a significant risk factor for later illegal drug use (von Sydow et al., 2002). Consequently, some Member States encourage that schools have drug policies in place which define procedures and rules about use and availability of cannabis as well as dealing with legal and illegal substances in and around school premises. A number of countries have focused on guiding school drugs policy, and in particular approaches to 'problem students' and dealing with those found using drugs. These include the UK's *Drugs: guidance for schools* (DfES, 2004) and *School drug policy: a review process* (Blueprint, 2004), Ireland's *Guidelines for developing a school substance use policy* (Department of Education and Science, 2003), and France's *Prévention des conduites addictives: guide d'intervention en milieu*

scolaire (CNDP-MILDT, 2006). Some Member States have introduced drug testing in schools, although this practice is contested on ethical grounds (McKeganey, 2005) and because either no preventive effect has been demonstrated in the extant research literature (Council of Europe, 2005; Drug Education Forum, 2006) or the evidence base is insufficient (UK Home Office, 2007). Further research on the subject is part of the Pompidou Group's current work programme.

Family approaches

The family has an influence on drug use, and pro-social family processes have a significant impact on children's peer association, decreasing involvement with antisocial peers, and a significant negative effect on substance use initiation (Oxford et al., 2000; Ferrer-Wreder et al., 2004). A recent review of risk factors found that parental discipline, family cohesion and parental monitoring are among the strongest (Frisher et al., 2007). Compared with alcohol, parents have more difficulties to talk and address cannabis use of their children openly and to negotiate disciplinary boundaries (Highet, 2005). There are not many examples of structured and evaluated family-based prevention approaches in Europe, although parenting programmes with positive evaluation based on US studies (Kumpfer et al., 2003) have been introduced in Spain, Norway and the United Kingdom. Prevention programmes (websites, books, workshops, helplines) aimed specifically at assisting parents with children's drug problems have long been part of the European prevention landscape. Publications dealing exclusively with adolescent cannabis use are rarer, although examples exist [15].

Mass media campaigns

Mass media campaigns have been a popular option in prevention and especially in cannabis prevention. Recent major cannabis campaigns include the UK's 2006 *Brain Warehouse* campaign, Spain's *Drogas: hay trenes que es mejor no coger* and France's *Cannabis et Conduite* campaign [16], with a trend to use mass media within multi-component programmes (McGrath et al., 2002, updated 2006, citing Flay, 2000). Research — again, broadly drawn from non-European sources — suggests, however, that their effectiveness, and especially efficiency, is limited and largely depend on the objectives. They can have effects on attitudes and knowledge (Carroll et al., 2000), but rarely on behaviour (Derzon and Lipsey, 2002). The overall evidence for the impact of

[15] Examples include: in the USA, *Marijuana: facts parents need to know* (NIDA, 2004); in Switzerland, *Cannabis: mit Jugendlichen darüber sprechen* (SFA/ISPA, 2005); in France, *Cannabis: les risques expliqués aux parents* (MILDT, 2005) (www.inpes.sante.fr/CFESBases/catalogue/pdf/806.pdf).

[16] The *Brain Warehouse* cannabis campaign (www.brainwarehouse.tv) included a TV advertisement, scratchcards, leaflets and a dedicated website. The EUR 2.2 million *Drogas: hay trenes…* campaign included a TV and radio spot and posters. The *Cannabis et conduite* (www.cannabisetconduite.fr) campaign included a website and radio campaign.

mass media campaigns on consumption patterns is not strong and has mainly focused on how many people were reached by campaign messages (Paglia and Room, 1999; Hall and Pacula, 2003). Isolated studies provide evidence that recall of anti-drug advertising was associated with a lower probability of cannabis and cocaine/crack use (Block et al., 2002) or have shown that mass media campaigns aimed at high sensation seekers may be effective (Stephenson, 2003). However, the large-scale evaluation of the US billion-dollar National Youth Anti-Drug Media Campaign showed no or even negative behavioural outcomes, suggesting a 'boomerang effect' whereby those exposed to the campaign were more likely to consume (EMCDDA, 2007).

Selective prevention

Selective prevention is led by risk factor-specific research allowing for the identification of risk groups (see Coggans, this monograph) mostly by social and demographic variables. An understanding of risk factors associated with cannabis use and its adverse consequences has immediate benefits for the design, targeting and implementation of drug prevention (Kandel et al., 1978; Susser, 1987; Daugherty and Leukfeld, 1998).

Contrary to the traditional approach of secondary prevention, which targets those who already use drugs because they consume, more recent strategies acknowledge that cannabis consumption alone is not a useful predictor for the problems to be prevented (see Coggans, this monograph). The strength of selective prevention is that it is not guided by the idea that risk equals substance use, but by social and personal vulnerability factors for problematic drug use. If drug use alone is to be used as a criterion of the need for prevention, the danger is high that youths with transitory drug experimentation are wrongly classified and stigmatised as a high-risk group (Schmidt, 2001).

Selective prevention in the school setting

The most convenient setting for selective prevention interventions targeting experimenting or vulnerable youth is while they are still attending school. There are, however, challenges in selectively addressing vulnerable adolescents when the mainstream prevention messages are health promotion and non-use and when teachers are (if at all) only trained in universal prevention methods but are not prepared to deal with 'difficult' or experimenting youngsters (Parker and Eggington, 2002).

The main subgroups at which selective prevention in schools is aimed are students with social behavioural problems such as anti-social behaviour (Tarter et al., 2002), academic underachievement (Lynskey and Hall, 2000), low bonding, infrequent school attendance, and impaired learning because of drug use (Hawkins et al., 1991, 1992;

Lloyd, 1998). Targets may also include pupils with high truancy or who have been excluded from school (Goulden and Sondhi, 2001; Powis and Griffiths, 2001), students with family problems (e.g. running away from home), immigrant students and those belonging to ethnic minorities ([17]). Academic performance and school attendance are good predictors for drug problems, and monitoring these enables early and accurate intervention (EMCDDA, 2006a). Other strong patterns include early adolescent smoking and heavy drinking (Gil et al., 2002; de Vries et al., 2003; Orlando et al., 2005; Paddock, 2005), with tobacco having strong associations with later cannabis use (Duncan et al., 1998; Vázquez and Becoña Iglesias, 2000).

Social vulnerability factors

Formerly, it was believed that elements from social influence and life skills programmes would not work well in selective prevention approaches (e.g. Tobler et al., 2000). However, several elements of such programmes are suggested as moderately effective for vulnerable youth (Sussman et al., 2004; Roe and Becker, 2005; McGrath et al., 2006). The associated contents — normative restructuring (e.g. learning that most peers and the opposite sex disapprove of use), assertiveness training, motivation and goal-setting, as well as myth correction — are still not included in the typical contents of European selective prevention intervention for cannabis. The focus is instead generally placed on knowledge approaches.

Selective prevention within the criminal justice system

The association between cannabis use and crime or delinquency is well documented (Fergusson et al, 2002; Hall and Pacula, 2003). A study in Spain by the Centro de Estudios sobre Promoción de la Salud (CEPS, 2004) of a sample of youths at protection and reform centres found approximately one-third reported weekly cannabis use. A UK study of youth arrest referrals reported the following use of substances: cannabis (30 %), tobacco (30 %) and alcohol (23 %), with other drugs much lower (cocaine, 4 %, crack, 1 %, heroin, 1 %) (UK Home Office, 2007). Two Dutch studies (Vreugdenhil et al., 2003; Korf et al., 2005) also reported a high prevalence of cannabis use among youths in detention centres (see Netherlands national report, 2006). However, caution must be applied in that (i) there is consensus that there are associations, not causal links, between cannabis and offending; (ii) many studies embrace all types of drug use (illicit drugs, alcohol) not cannabis in isolation, with persistent offending associated with harder drugs (Flood-Page et al., 2000); (iii) 'crime' runs the gamut, from serious offences to delinquency and misbehaviour; and (iv) consumption is an offence *per se*.

([17]) For an overview of screening instruments for assessing cannabis use, see Beck and Legleye, this monograph.

A recent study suggests that the gateway effect of 'soft' drug use for later progression into delinquency may be overplayed (Pudney, 2003). Moreover, studies have illustrated the importance of situational, social and peer influences in contrast to individual psychological problems in initiating drug use among young people (Rhodes et al., 2003; Butters, 2004).

While the ethics of coercion into compulsory treatment have been debated, the criminal justice system represents an important setting for selective prevention in the form of referrals. In most Member States, corresponding legal provisions exist for referral of prisoners and offenders. Young offenders (especially those first notified for drugs offences) are treated with particular consideration. Drug testing for adult and (less commonly) young arrestees has been introduced in some countries. However, specific guidelines are often missing and the cooperation and coordination between social (prevention) services and judicial services, although of key importance, are considered difficult (Newburn, 1999; UK Home Office, 2007). Selective prevention programmes in the criminal justice system (see Box 2 for examples) rely on the fact that cannabis use and possession are illegal, opening up a referral opportunity for targeted intervention for young people at risk. The evaluation of the Austrian project *Way Out* showed that it could be introduced successfully in schools and by public health officers as well as school doctors, although the main channel for referrals was the police. The evaluation found fewer personality deficits among youngsters first notified for cannabis offences than expected.

Selective prevention in informal settings

A recurrent question is how to get in touch with those youngsters at risk of developing problematic consumption patterns but who are not reached at school or in other formal settings. There are many situations where it is only possible to approach adolescents in informal or recreational settings. Haas et al. (2001) point out that in Austria youngsters who experiment with drugs are frequently excluded from youth services, thereby increasing their social exclusion. As a result, occasions for selective and indicated prevention are missed. Attractive drop-in and counselling facilities with a judgement-free attitude is one strategy option. In some Member States, pro-active approaches — called 'interventionist tracking' — for vulnerable youth are applied, mostly through cooperation of different services (Green et al., 2001) and social actors (Arbex Sanchez et al., 2002).

Many strategies and projects focus on identifying, approaching and attracting vulnerable young people in order to intervene at an early stage of problem development and to provide counselling or referral to specialised services. Outreach work [18] traditionally reaches out to obviously problematic drug users and is less associated with approaching

[18] The EMCDDA's web page on outreach work is at www.emcdda.europa.eu/?nnodeid=1576

Box 2: Selective prevention for cannabis/illicit drug use – examples from Exchange on Drug Demand Reduction Action (EDDRA)

The EMCDDA's EDDRA database offers information on a broad range of evaluated drug demand reduction actions in the EU Member States. Selection criteria for this small sample were outcome-evaluated interventions with a predominant focus on cannabis. None has a control group design and outcome variables are not necessarily drug use related.

Step by Step (Austria and Germany) is a computer program for early diagnosis of drug-related problems and for possible interventions at schools. It helps teachers who are confronted with problem pupils to find out whether or not these pupils use drugs.
www.emcdda.europa.eu/html.cfm/index52035EN.html?project_id=5957&tab=overview

FreD (Austria and Germany) is a programme that targets first-time offenders up to the age of 25 who have been arrested due to the consumption of illegal drugs. They are referred to a course which motivates them to change their drug use.
www.emcdda.europa.eu/html.cfm/index52035EN.html?project_id=2091&tab=overview

Way out (Austria) is an early intervention for young drug-using first offenders. Support is offered over a period of approximately 6 months with the aim of encouraging abstinence for illegal drugs, moderation for legal substances and avoidance of drug-related problems.
www.emcdda.europa.eu/html.cfm/index52035EN.html?project_id=5038&tab=overview

MSF — Solidarite Jeunes (Luxembourg) provides therapy to youths consuming drugs and to their families referred from judicial or educational systems.
www.emcdda.europa.eu/html.cfm/index52035EN.html?project_id=3656&tab=overview

Ámbits-Esport (Catalonia, Spain) provides a sport-based programme for immigrant youths from North Africa, sub-Saharan Africa and Latin America aimed at reducing smoking and illicit drug consumption (in particular, cannabis), together with integration with Catalan peers.
www.emcdda.europa.eu/html.cfm/index52035EN.html?project_id=2918&tab=overview

vulnerable youth and cannabis users who are not addicted. From some Member States, centres for mobile youth or street work are reported, which closely cooperate with relevant help organisations so that assistance may be provided at the earliest stage possible. Such measures and their relevance for vulnerable and experimenting youth are intensively discussed, for example in Austria, and are foreseen to attain an increasing geographical coverage (Haas et al., 2001, 2002).

Indicated prevention

There are some conditions that have been identified as potentially increasing the risk for intense cannabis use, such as attention deficit disorder (ADD) (Giedd, 2003), and affect dysregulation (Simons and Carey, 2002) in the sense of emotional instability and impulsivity. Children and adolescents with ADD might seek to relieve their state of anxiety, tension and dysphoric mood and the sensation of 'noise' in the brain (due to the low synaptic dopamine availability in the essential brain areas) through 'self-treatment' with cannabis. However, systematic early detection, treatment and follow-up involving general health services and paediatricians are reported only from Germany, Italy and Sweden in their national reports. An increase in cannabis-related psychoses is reported from psychiatric services (see Witton, this monograph, volume 2), and according to recent reviews there is evidence that cannabis is a risk factor for schizophrenia (Arseneault et al., 2004; Smit et al., 2004). There seems to be a strong case to pay increased attention to reducing the intensity of consumption in order to respond to cannabis-related public health problems. Motivational interviewing, for instance, has shown to reduce the intensity of consumption without formal treatment (McCambridge and Strang, 2004), although there is evidence to suggest that short-term gains are not maintained at 1-year follow-up (McCambridge and Strang, 2004).

Between prevention and treatment

While provision of drug treatment is often the most immediate reaction of policymakers to drug use, a strategy of expanding counselling or early intervention *offers* for cannabis users in cone structures may have difficulties in reaching the target population. These problems might be increased if the services for cannabis clients are offered in the same setting as for heroin users. There is a reluctance of cannabis users to consider themselves as drug users or as having a drug problem and to seek help and advice for themselves.

Member States are increasingly acknowledging this need to reach out to a wider vulnerable population. Approaches which are less treatment-focused stress the importance of literacy, academic capacities, employment, gender, social integration, body (self) perception, rationality, social networks, and the functionality of use (Boys

and Marsden, 2003). Some municipalities in Denmark have been successful in offering help to groups of young people with an emerging cannabis problem via day centres, where they gather in small groups (up to 10) and are supported by a therapist or social worker. They are offered space and time to talk about their life, problems and drug use. Supportive methods are favoured: offering help, for example, to plan for the future, to pursue their education or to get a job. Evaluation shows that the participants profit greatly from contact with adults who offer support, respect and who accept them on their own conditions. Results also suggest that the increasing but not yet full-blown drug problem 'solves itself' if help with other problems (school, family, friends) is offered (Danish national report, 2005). The specific support for integration into the educational system or the workplace has shown to be of great importance in preventing further social exclusion. Several Member States have similar projects. The German web-based counselling programme Quit the Shit[19] is another example of an innovative approach for cannabis users who want to reduce or stop using cannabis. It comprises a 50-day programme, based on cognitive–behavioural principles, including information and featuring a diary that is submitted to an intervention team for regular feedback. Those who made use of the online support to quit using cannabis had their average consumption quantity reduced by a third 3 months after the completion of the programme. The number of days on which cannabis was consumed went down by 50 % (Die Drogenbeauftragte der Bundesregierung, 2005).

Conclusions and challenges

Cannabis use prevalence is generally increasing among youth in the EU and the perception of its risks has generally decreased in recent years[20]. The large majority of European cannabis smokers have already smoked tobacco, and there is an association between a tolerant tobacco policy, smoking prevalence and cannabis consumption. This suggests that there is considerable scope of action for structural prevention, directed at attitudes and normative frameworks in respect to legal substances as well as cannabis. The effects of current public place smoking bans in Europe should be monitored to look specifically at knock-on effects on cannabis.

Cannabis use is mostly experimental, but compared with other illegal drugs, the number of regular and daily users is higher (EMCDDA, 2006a). About 9 out of 10 persons who have ever used cannabis began at around 14 and stopped before the age of 24. This implies that there is a 'vulnerability window' where prevention interventions should focus on preventing experimenters beginning to develop cannabis-related problems and where entering regular consumption patterns. Even if the majority will

[19] www.drugcom.de/
[20] See Hibell, this monograph.

never develop problematic use, the opportunity for selective and indicated prevention or early intervention to identify those at risk and to be able to assist them with targeted interventions is considerable. Appropriate offers of early intervention and support at the border between prevention and treatment might be more attractive to this group than traditional drug help facilities.

Even regular cannabis users rarely seek support, help or treatment on their own initiative. Counselling or early intervention services are not likely to be appropriate when there is no problem awareness among the users themselves. However, the illegal status of cannabis may sometimes be strategically helpful in the sense that cannabis users are being brought into contact with cannabis counselling or other interventions through contact with the criminal justice system for possession offences. Reports that very young people sometimes appear in treatment centres with advanced cannabis use patterns after only a short period of use indicates that some powerful personal and social risk factors can lead to rapid progression of cannabis-related problems. Supporting such children at an early stage is a challenge for indicated prevention.

The majority of available projects in the EU publicised through EDDRA do not have sufficient evaluation, which makes European intervention planning still largely dependent on US research and evaluation findings (Matthys et al., 2006). Consumption reduction is rarely assessed as an outcome, and the cost-effectiveness of programmes is difficult to calculate (Matthys et al., 2006). Moreover, while there has been a search for evidence-based universal intervention in the USA, the notion of what works is fraught with questions about the philosophy, objectives and measures of effectiveness (Cohen, 2001; Gorman, 2002; Ashton, 2003).

There is some cause for optimism: a recent Scottish literature review of school-based drug prevention programmes concluded that prevention, 'in general can be effective [and] that some types and features of drug education are more effective than others. In particular, drug education using highly interactive methods and social influences approaches, specifically including resistance skills and normative education elements, is consistently shown to be more effective' (Stead and Angus, 2007). Moreover, there is an increased understanding of common risk and protective factors and trajectories of drug use (e.g. Advisory Council on the Misuse of Drugs, 2006), and some of this has been translated into practical instruments and materials. A particularly prescriptive report is Australia's National Cannabis Strategy 2006–2009, albeit in a non-European context. Yet, there are also challenges to face. A Belgian study concludes that 'Researchers continue to come up against substantial methodological, practical and ethical problems if they want to put in place effectiveness evaluations relating to drug prevention' (Matthys et al., 2006).

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Chapter 12
Moving towards evidence-based practice: school-based prevention of substance use in the USA

Keywords: cannabis – prevention – schools – USA

Setting the context

As mentioned in the previous chapter, a significant amount of what we know about drugs prevention is based on research from the USA. This chapter — written by the former Director of the Division of Epidemiology and Prevention Research of the National Institute on Drug Abuse (NIDA) — provides a useful overview of recent experiences in school-based prevention in the USA, together with a presentation of a number of more prescriptive studies of 'what works' in the US context.

One of the questions that may arise from this chapter is the transferability of the US experiences within the European — or universal — context. We have seen in the first chapter of this volume (Vicente et al.) that the USA not only has relatively high cannabis prevalence in comparison with European countries. On a generational level, use of the drug became more widespread around 10 to 20 years earlier than in the majority of Western European countries.

To a considerable extent, we have also seen throughout this monograph that there remains the issue of diversity within Europe as regards cannabis and other drugs. A Europe approaching 500 million citizens is far from a monolithic society from most perspectives — economic, political, linguistic, sociocultural. European drug use patterns remain similarly heterogeneous. While there may be some approximation of US levels of cannabis prevalence among young adults in high-prevalence countries in Europe — such as the United Kingdom, Spain and Italy — many European countries report extremely low levels of cannabis use. Differences persist even among neighbours in Europe: one need only compare reported last month prevalence among 15- to 24-year-olds in the Czech Republic (15.4 %) and Slovakia (3.9 %), Spain (18.6 %) and Portugal (5.5 %), Denmark (8.2 %) and Sweden (1.6 %). If prevention is to be tailored to the needs

of a schools population, and given priority over other items within a school curriculum, it should reflect the likelihood of students to both experiment and progress to more intensive use of drugs.

Universalism should not, however, be dismissed. The promising early experiences of some transnational prevention projects across very different drug-using countries and cultures — such as EU-Dap — suggest that good practice can cross borders successfully. There are several early intervention initiatives — such as the *HIT* and Jellinek *knowcannabis* self-help site — that have resulted from international cooperation. Moreover, as we have seen, European knowledge of prevention practice is subjected to increasing study, data collection and cooperation. While, historically, prevention knowledge has benefited from much borrowing from the US literature, increasingly there is scope for transatlantic dialogue, with European studies contributing new experiences and ideas to the debate.

Further reading

EMCDDA, *Annual reports*, published each year in November.

Journals

Drugs: Education, Prevention and Policy
Journal of Alcohol and Drug Education

Websites

NIDA website on preventing drug abuse among children and adolescents
    www.nida.nih.gov/Prevention/Prevopen.html
EELDA website on School-based drug prevention
    http://en.eelda.org/index.aspx?o=1076

See also the grey literature list in the Appendix to Volume 1 of this monograph.

Moving towards evidence-based practice: school-based prevention of substance use in the USA

Zili Sloboda

Introduction

Prior to the 1970s there was little knowledge on which to base the development of prevention programming in the USA (Sloboda, 2003). As is the case today in much of Europe, efforts in schools to prevent or delay initiation of smoking, alcohol or drug use lacked any research basis. However, the creation of the National Institute on Drug Abuse (NIDA) in 1974 began a period of important research that served to move prevention from an art to a science (Bukoski, 2003). Longitudinal cohort studies that followed children and adolescents over time and national surveys that were administered at regular intervals were funded. These research efforts not only gave more accurate assessments of trends in substance use in the country but also specification of those biological, individual, family, school, peer and community factors that increased the susceptibility of some children and adolescents to the use of alcohol, tobacco, marijuana and other drugs (Kandel, 1975; Hawkins et al., 1992). In addition, the longitudinal cohort studies (e.g. Kandel, 1975; Newcomb and Bentler, 1986) showed a progression from 'legal' substances (tobacco and alcohol) to illicit drugs (marijuana and cocaine) (Kandel, 1988; Kandel and Yamaguchi, 1999). These epidemiological findings greatly influenced prevention programme developers and researchers. The vast predominance of substance abuse prevention programmes that were evaluated and found effective grew from the research on the initiation of use. As such, these programmes target all children and adolescents no matter their level of susceptibility and specifically address the use of tobacco and alcohol, as well as marijuana and other illicit drugs (to include inhalants).

Furthermore, as the research also indicated that the initiation of most substance use among adolescents takes place through peer influence, prevention researchers based their programmes on social learning incorporating the concept of self-efficacy (Bandura, 1977). These programmes are centred around social resistance skills training (Botvin and Griffin, 2003) as they increase students' resistance to those influences that encourage substance use and they focus on providing students with the skills they need to resist offers to use alcohol, tobacco or illicit drugs and to practise these

resistance skills in 'virtual' situations that are realistic to them. Most of these universal [1] programmes are delivered in schools as curricula. Other prevention programmes address the needs of more vulnerable children and adolescents and their families through counselling or more in-depth therapies.

Evidence-based school-based prevention programming

Meta-analyses and reviews of evaluation studies of prevention programmes had been conducted in the late 1980s and throughout the 1990s to identify the determinants of effectiveness. These analyses and reviews, however, were very much restricted by what reports were available at the time. For instance, Schaps and his colleagues (1981), Bangert-Drowns (1988) and Brunvold and Rundell (1988) found in their analyses that prevention programmes of the late 1970s and early 1980s were effective in providing knowledge to participants but impacting attitudes and drug-using behaviours were more difficult to address and that the use of peer facilitators, use of interactive instructional style and high 'doses' of exposure to prevention programming led to better outcomes.

Tobler's work, summarised in her 2000 article, 'Lessons learned', used meta-analytic approaches using data from studies of 207 school-based drug prevention programs with drug use measures that were reported in the literature (1992, 1997 and 2000). Each review had subsequently better data, reflecting improvements in measurements and in the quality of data collection efforts. Her analyses looked at content, delivery method, and programme size. Her findings indicate what works and what doesn't work. As can be seen in Table 1, programmes with content that covers both short- and long-term consequences of substance use, address misconceptions regarding the normative nature of adolescent substance use, and provide opportunities to learn and practice decision making/problem solving, assertiveness and resistance skills had larger effect sizes. In addition, delivery or instructional style was found to be important. Adolescents learn best when they are actively involved through small group discussions, role play, and given sufficient time to practise their new skills. These elements were also found by Tobler and her colleagues to be important specifically for the prevention of marijuana use (Tobler et al., 1999). Other reviewers of prevention programmes have had similar findings even when using other analytical techniques (e.g. Brunvold, 1993; Harachi et al., 1999; Cuijpers, 2002; Nation et al., 2003). Elements added through these reviews included having a theoretical framework and addressing commitment or intentions not to use.

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[1] In 1994, the mental health and substance abuse fields adopted a classification system for prevention programming depending on the level of risk of the targeted group. Universal programmes address general populations while selective programmes target those segments of the population that present greater than normal risk to develop a disorder and indicated programmes focus on those subgroups that exhibit signs or symptoms of developing a disorder.

Table 1: Tobler (2000) findings of what works and what doesn't work	
Works	**Doesn't work**
Content	**Content**
Short-term effects	Not including short-term consequences
Long-term health consequences	Not addressing perceptions of peer substance use
Feedback on peer use from school surveys	Not addressing media and social influences
Addressing media and social influences that promote pro-drug attitudes and behaviours	Allowing values or moral and ethical decision-making
Adjustment of perceptions regarding peer substance use	Not developing interpersonal skills or drug refusal skills
Provide/practise drug refusal skills, assertiveness skills, communication skills, safety skills, coping skills, goal-setting, decision-making/problem-solving skills	Focusing primarily on intrapersonal aspects
	Focusing only on self-esteem building
Delivery	**Delivery**
Active involvement of everyone in class	Allowing passive participation on the parts of the students
Active participation *between* peers	
Role plays around scenarios generated by students	Teacher-centred discussions and lecturing solely
	Dialogues without structure
Developmentally appropriate activities to promote bonding	Use of effective classroom management techniques without a drug programme
Eliciting positive/supportive comments from peers	
Rehearsal of resistance/refusal skills with modelling of appropriate behaviours	
Lots of practice time	

In another review of school-based prevention programmes conducted under the Cochrane Collaboration, only evaluations using randomised controlled trials (RCTs) or controlled prospective studies (CPSs) were reviewed. Of the 32 selected for review, 28 were from the USA. Most of the studies used post-test or intervention assessments and focused on students in the sixth and seventh grades, i.e. around 12–14 years of age. Separate reviews were made for RCT ($n = 29$) and CPS ($n = 3$) evaluations. No significant results were found among the CPS while the RCT programmes that offered skills training had the best outcomes (Faggiano et al., 2005).

The movement from examining the elements or principles of prevention to a focus on programmes and practices began when NIDA sponsored the first conference on drug abuse prevention in 1996 (Putting Research to Work for the Community). The goal of

the conference was to introduce the findings from prevention research in a user-friendly style to practitioners. The outcome of the conference was a booklet, *Preventing drug use among children and adolescents: a research-based guide* (Sloboda and David, 1997) written in a question–answer format that presented how research findings could be used to plan and develop prevention programming and practices for the community. The approach taken was to present 'principles' of prevention related to content, structure and delivery. The result was a list of 13 underlying principles drawn from commonalities found in both epidemiological and prevention research (an updated version of these principles is presented in Table 2).

In addition, however, the booklet summarised the findings from evaluations of prevention interventions funded through NIDA that had significant outcomes at least 1 year after the intervention. At the time, 10 programmes were described (six considered universal, two selected, one indicated and one addressing all three levels of risk). The publication of this booklet stimulated other groups to develop their own criteria for effectiveness and their own lists.

Most dominant of these groups are the federal funding agencies for school- and community-based prevention efforts, the Education Department's Safe and Drug-Free Schools and Communities programme (SDFSC) and the Center for Substance Abuse Prevention (CSAP). There are a number of interesting similarities and differences in how each of these agencies addresses the issue and as a result, the lists that have been compiled have very little overlap (Table 3 and Figure 1). Another important difference between these two listings is that while procedures are in place to update and add newly evaluated prevention strategies to the CSAP list, there are no such procedures in place for the SDFSC list. The fact that funding is tied to selecting only from these listings has both positive and negative effects. The positive impact of implementing strategies with demonstrated successful outcomes has made communities more accountable and, thus, more concerned about delivering prevention strategies that have demonstrated success. On the other hand, the lack of consistent criteria and listings both confuses and upsets community groups, particularly those that may have prevention programming already in place. Furthermore, not only is there a heavy emphasis on selecting 'evidence-based' strategies but funding is also dependent on demonstrating need or defining the community drug abuse problem. Often communities will identify their needs but find that there are no evidence-based strategies available on the lists to meet them.

Table 2: National Institute on Drug Abuse — principles of prevention

Prevention programmes should enhance protective factors and reverse or reduce risk factors

Prevention programmes should address all forms of drug abuse, alone or in combination, including the underage use of legal drugs (e.g. tobacco or alcohol); the use of illegal drugs (e.g. marijuana or heroin); and the inappropriate use of legally obtained substances (e.g. inhalants), prescription medicines or over-the-counter drugs

Family-based prevention programmes should enhance family bonding and relationships and include parenting skills; practice in developing, discussing and enforcing family policies on substance abuse; and training in drug education and information

Prevention programmes can be designed to intervene as early as pre-school to address risk factors for drug abuse, such as aggressive behaviour, poor social skills and academic difficulties

Prevention programmes for elementary school children should target improving academic and social–emotional learning to address risk factors for drug abuse, such as early aggression, academic failure and school drop-out

Prevention programmes for middle or junior high and high school students should increase academic and social competence

Prevention programmes aimed at general populations at key transition points, such as the transition to middle school, can produce beneficial effects even among high-risk families and children. Such interventions do not single out risk populations and, therefore, reduce labelling and promote bonding to school and community

Community prevention programmes that combine two or more effective programmes, such as family-based and school-based programmes, can be more effective than a single programme alone

Community prevention programmes reaching populations in multiple settings — for example, schools, clubs, faith-based organisations and the media — are most effective when they present consistent, community-wide messages in each setting

When communities adapt programmes to match their needs, community norms or different cultural requirements, they should retain core elements of the original research-based intervention

Prevention programmes should be long-term with repeated interventions (i.e. booster programmes) to reinforce the original prevention goals. Research shows that the benefits from middle-school prevention programmes diminish without follow-up programmes in high school

Prevention programmes should include teacher training on good classroom management practices, such as rewarding appropriate student behaviour. Such techniques help to foster students' positive behaviour, achievement, academic motivation and school bonding

Prevention programmes are most effective when they employ interactive techniques, such as peer discussion groups and parent role-playing, that allow for active involvement in learning about drug abuse and reinforcing skills

Table 3: United States Department of Education — safe, disciplined and drug-free schools: exemplary and promising programmes

Criterion	
Evidence of efficacy	The programme reports relevant evidence of efficacy/effectiveness based on a methodologically sound evaluation
Quality of programme	The programme's goal with respect to changing behaviour and/or risk and protective factors are clear and appropriate for the intended population and setting
	The rationale underlying the programme is clearly stated, and the programme's content and processes are aligned with its goals
	The programme's content takes into consideration the characteristics of the intended population and setting and the needs implied by these characteristics
	The programme implementation process effectively engages the intended population
Educational significance	The application describes how the programme is integrated into schools' educational missions
Usefulness to others	The programme provides necessary information and guidance for replication in other appropriate settings

Figure 1: Substance Abuse and Mental Health Services Administration (SAMHSA) national registry of evidence-based programmes
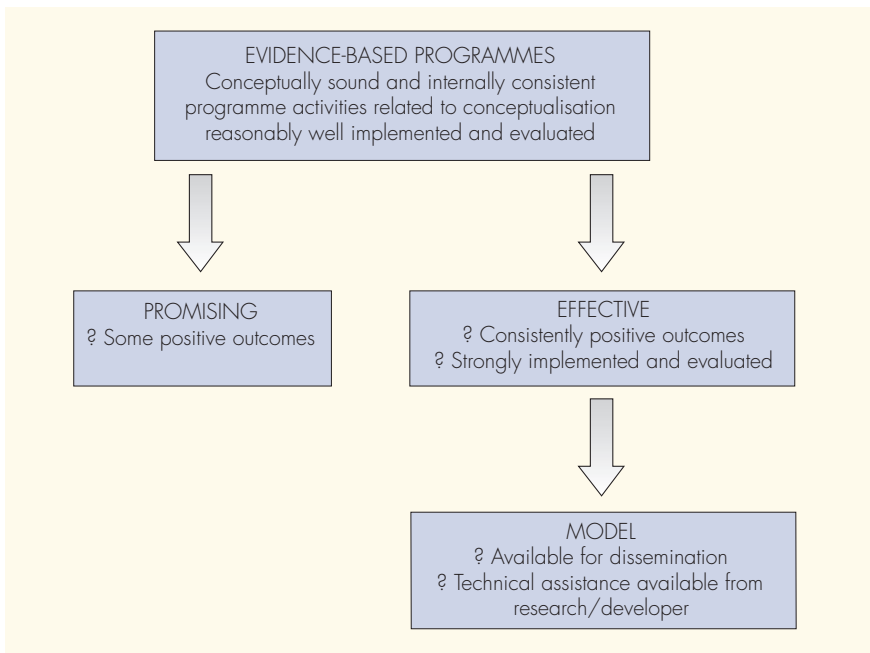
What types of prevention approaches are deemed effective?

The school-based programmes target children generally in middle school when they are around 8–10 years old and have booster sessions that are delivered over a number of years. Several include a homework component that allows students to involve their parents.

The school is an appropriate setting for prevention strategies for a number of reasons. The most obvious is that it is in the schools where children in the USA spend a great proportion of their time. In addition, the school remains a major socialisation institution to reinforce societal values, norms and acceptable behaviours. The school is a protective environment for children (Schaps and Solomon, 2003). Translating these aspects of the school for prevention suggests several approaches that can be taken. As a socialisation agent, the school provides children with knowledge and skills to become competent citizens and it reinforces pro-social attitudes and behaviours. As a protective environment, most schools are substance- or drug-free, provide supervised after-school programmes, and have activities to connect parents and families to school personnel. Of these aspects of the school environment that lend themselves specifically to substance use prevention, it is the cognitive approach to prevention that is the most common and, therefore, the most often evaluated. However, altering the school culture to create an environment that supports anti-drug use norms, beliefs and expectancies and school bonding, that is, connecting the individual to the school experience and community, and implementing appropriate school policy have not been as extensively assessed.

Prevention programmes that target the school culture intend to make the school environment more attractive to students and to help students succeed within the school setting to engage in more pro-social behaviours and in this indirect way reduce the likelihood that students will use alcohol, tobacco or other drugs. The common elements of strategies that attempt to take advantage of and/or impact school culture to provide a positive normative environment for children include: creating anti-/non-substance-using settings (including tobacco, alcohol and other drugs); dispelling misconceptions regarding expectancies (positive experiences) associated with the use of tobacco, alcohol and other drugs; and establishing comprehensive programmes that involve students, school administration and, when appropriate, parents/caregivers (e.g. the Caring School Community; Battistich et al., 2000).

In addition, programmes that address school-bonding share common elements or principles that include: focusing on early years, that is, pre-school to middle school; enhancing competency in reading and mathematics; providing interpersonal skills to relate positively with peers and adults; involving parents in communication and parenting skills and in school activities. Among school-bonding programmes that are

viewed as promising are the Skills, Opportunities and Recognition (SOAR) programme (Hawkins et al., 1999), Incredible Years (Webster-Stratton et al., 2001) and Early Risers Skills for Success (August et al., 2003).

An interesting new area for prevention examines policies related to substance use within the school building. There is a special appeal to developing policies that reach greater numbers of the target population and minimise costs. Common elements or principles of effective school policy approaches include: reducing or eliminating access to and availability of tobacco, alcohol or other drugs; addressing infractions of policies by providing counselling or treatment and special services to the students rather than punishing them through suspension or expulsion; selecting policies that do not disrupt normal school functioning and those that address the full range of drug-using behaviours, from initiation to progression to abuse and dependence and relapse; specification of the substances that are targeted; and reflect other community prevention efforts.

The challenge of disseminating effective prevention programming

A recent conference sponsored by NIDA and CSAP, 'What do schools really think about prevention research? Blending research and reality' (Kaftarian et al., 2004) brought both researchers and practitioners together to discuss the challenges of diffusing and disseminating effective prevention strategies. Among the greatest mentioned were implementation fidelity (or faithfulness of delivery) and adaptation (Botvin, 2004; Greenberg, 2004; Pentz, 2004).

These concerns arise from studies (Hallfors and Godette, 2002; Ennett et al., 2003) that found that evidence- or research-based programmes taken 'to scale' at the community level often are not implemented as they were designed and evaluated. Although fidelity of implementation is recognised as important, few studies have examined the relationship between level of fidelity and programme outcomes. Tobler and Stratton (1997) suggest that decreases in the effect sizes they found in their meta-analyses of school-based substance abuse prevention programmes taken to scale may be due to implementation issues. Pentz and Trebow (1991) found that children exposed to a programme delivered by instructors who maintained high implementation fidelity had better outcomes than those exposed to the programme delivered by instructors who implemented the programme with low fidelity. Furthermore, children exposed to the programme delivered by low implementers had better outcomes than children in the control condition.

As the field of prevention continues to develop theory- and research-based interventions, the combined issues of fidelity and reinvention will become increasingly important. However, as Dusenbury et al. (2003: 240) emphasise, although the field has fair agreement on the definition of fidelity ('… the degree to which teachers and other program providers implement programs as intended by the program developers'), there does not appear to be a consensus regarding the specific dimensions of fidelity nor on their measurements. Similarly, the degree of adaptation that may take place in the community has not been well studied.

Conclusions

So where does this leave us? Professionals in the field of substance abuse prevention in the USA have experienced a period of exciting new developments. After a long period of limited success, the 1990s brought the field to a new level of prominence that engaged researcher, practitioner and policymaker to strategically address substance use among our children and adolescents. After rapid dissemination and diffusion of evidence-based prevention strategies, the field has now entered a new period of deliberations and discussions around improving both the extent of prevention programming within the community and the specificity of this programming to meet each community's needs in terms of problem identification, available resources (i.e. social capital and funding), and priorities. Governmental demands for fiscal accountability pose both opportunities and challenges. On one hand, communities are required to deliver 'evidence-based' prevention programming, while on the other hand researchers and practitioners are not in agreement as to what that means. To further complicate the issue, the proposed federal budget for fiscal year 2006 shows reduced funding for demand reduction activities, particularly prevention, placing a greater load on states and local governments and the private sector for support. Funding for the much-needed research, now solely the responsibility of NIDA, will remain flat or will increase negligibly. Given the costs for conducting rigorous evaluation research studies, these potential obstacles portend that few, if any, much needed new prevention strategies will be forthcoming.

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Chapter 13
Cannabis users in drug treatment in Europe: an analysis from treatment demand data

Keywords: cannabis – EMCDDA – epidemiology – treatment – treatment demand

Setting the context

This chapter analyses the 2005 data on people entering drug treatment for primary cannabis use in the Member States. For several years, the EMCDDA has reported an increasing number of people reported as seeking treatment for cannabis use. Although definitive reasons for this are difficult to specify, it is clear that the explanation is multi-faceted and requires careful study before drawing firm conclusions (Simon, 2004).

Cannabis treatment, like cannabis use, is usually a young person's phenomenon. As with the use of other types of drugs, treatment for cannabis attracts more males than females. While most cannabis treatment clients begin use early in their lives, the spread of ages amongst those now entering treatment is much broader, and their drug use reaches beyond cannabis to include other illicit drugs also, such as cocaine, other stimulants and, occasionally, opiates (EMCDDA, 2003a).

Recent years have shown an increase in demand for cannabis treatment in most Member States, even though there are important differences between the countries. In particular, there has been an increase in the number of adolescents reporting social and psychological problems related to cannabis use, for which they themselves, their families or their school request specialised help (EMCDDA, 2003a). A number of factors may explain the reported increase, for example a simple improvement of data coverage in the EMCDDA reporting system, expansion of treatment availability, or an increased number of referrals to treatment by the criminal justice system and by the client's social networks. The reported pattern of use of cannabis in the period immediately prior to treatment has been changing, and this does not just mean an increase in the number of users reporting frequent use.

People seeking treatment specifically for cannabis use now represent a significant proportion of overall drug treatment requests across Europe, though differences between countries are substantial. Some countries, such as France, Germany, Hungary and Denmark, currently have very high percentages of cannabis clients among people in treatment. Other countries, such as Lithuania, Luxembourg, Romania and Portugal, report low percentages.

This chapter argues that further investigation of cannabis consumption patterns and related problems could identify areas where specialised drug services might provide interventions, targeted not only at regular cannabis users but also at any other adolescent cannabis users with social, behavioural or psychological problems.

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Cannabis users in drug treatment in Europe: an analysis from treatment demand data

Linda Montanari, Colin Taylor and Paul Griffiths

Introduction

Cannabis is the most widely used illicit drug in Europe and its use is one of the most frequent reasons cited for entering drug treatment. In 2005, 20 % of all drug clients and 29 % of new drug clients (EMCDDA, 2007a, b) ([1]) entered treatment for problems related to their primary cannabis use. In recent years, drug services in the European Union have reported a more or less steady increase in the number of people seeking treatment because of problems related to their cannabis use, making cannabis-related treatment an increasingly larger proportion of drug treatment demands. In terms of overall treatment demand, cannabis now lies behind only the main problem drug type, opiates, and is ahead of demands for cocaine-related treatment.

In this chapter, the increase in treatment demand and its implications are analysed through data collected under the treatment demand indicator (TDI), a pan-European instrument used to monitor data on people entering treatment for drug use (EMCDDA and Pompidou Group, 2000) ([2]).

This chapter highlights a number of key questions arising from the increase in the reported demand for cannabis treatment. To build a clear picture of the changing situation, it is fundamental to understand how each of these questions is driving the current changes in treatment demand.

- Does this increase in reported demand represent an increase in the number of people in need of help for cannabis use?

    - If so, to what extent does it result from an increase in use of cannabis in the general population — in particular, regular and intensive use?

([1]) See figure TDI-G02 in the Statistical bulletin 2007.
([2]) The TDI is called the treatment demand indicator protocol, but in fact it counts the number of people starting a drug treatment for their drug use, as written in the TDI definition. The people asking for, but not receiving treatment, are not recorded. People sent to treatment centres not on their own initiative are also included in the reported data.

- If so, to what extent is it related to other changing factors among drug users, such as their changing patterns of drug use? To what extent is it related to physical, social or psychological problems among cannabis users themselves?

- Can this increase be explained by factors independent of an increased need for help? Explanations might include:

  - improvements in the coverage of the treatment reporting system;
  - expansion of the types of treatment facilities available, and, in particular, specific treatment services targeting adolescents and young people, that reach out to and attract the cannabis user population more effectively than before;
  - an increase in referrals to treatment, affecting cannabis users who would not otherwise have sought help spontaneously; and
  - linked to the above, an increase resulting from changes in the way cannabis or other drug use is dealt with by the criminal justice system, within schools, or by agencies working with young people.

The analysis presented here is a broad one, describing trends across several countries in the EU. The chapter questions the extent to which the overall European picture is reflected in each of the individual countries, and whether some countries have a different pattern of change in treatment demand.

Method and sources for data collection

The data presented in this chapter are primarily obtained through a standard protocol used by all EU countries, the TDI, a joint EMCDDA–Pompidou Group Protocol (EMCDDA and Pompidou Group, 2000). The protocol establishes harmonised definitions across 20 questionnaire items. These items relate to drug-related information, socio-demographic data and use of services, and aim to obtain consistent information on the number, characteristics and patterns of use of people entering treatment for drug use. From 2000 onwards, European Member States have collected data using the TDI to provide information on trends in the treatment of problem drug use. The indicator serves several purposes: prevalence estimation; identification of patterns of drug use and use of services; service planning; and service evaluation.

TDI data can be regarded as providing a reasonably robust and useful representation of the characteristics of clients referred to specialised drug services within the EU. However, there are limitations that must be borne in mind, as achieving comparability in data from all EU Member States is not easy. While departures from EU comparability persist, they are believed not to distort the broader picture of drug treatment patterns.

One limitation of the EMCDDA's data is the extent of 'double-counting' of clients. The number of people entering treatment each year is defined so as to count only one episode — that is, a single treatment demand — each year. The task of excluding 'repeat' treatment episodes should therefore ideally be controlled centrally in each country, yet in practice some countries' collection procedures cannot use controls at a national level, resulting in a slightly higher count of people. A further potential lack of comparability is that treatment for cannabis as the primary drug of abuse is defined in the protocol as cannabis being 'the drug that causes the client the most problems'. Different treatment systems may interpret this differently. Reporting can be based on problems as defined by clients themselves, or on short diagnoses based on the ICD-10. When the primary drug is unclear, usually what is reported is the drug most frequently used, or the drug considered most important for the potential consequences on the health and social situation of the client.

A stronger caveat must be voiced on how far we can generalise from the consolidated European data set. The single factor that impacts most heavily on interpreting the findings is the potential for under-reporting, which arises from the varying extent to which the reporting system succeeds in covering, each year, all the relevant treatment facilities in each Member State. It must be remembered that treatment facilities are not fixed: new agencies might enter the reporting system and old ones leave it. Monitoring the effect of these changes is a continuing part of data collection, and is the subject of current work (see, for example, Simon, this monograph, on the German situation).

The EMCDDA's TDI data nonetheless remains the major pan-European body of data on treatment. The discussion based on this information source will focus on four main areas:

- profiling cannabis treatment clients — their socio-demographic characteristics (age, gender, living and social conditions);
- describing patterns of drug use amongst treatment clients (age at first use, frequency of use and combination with other drugs);
- incidence of client treatment in Europe, and a comparison with general population data on cannabis use; and
- referral routes into treatment for cannabis.

The TDI provides good short-term trend information in these four areas, although longer-term longitudinal data — 1999 to 2005 — on treatment demand in 20 European countries are available ([3]). For some socio-demographic characteristics (education, labour and living status) — and for information on source of referral — only two years

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([3]) See figure TDI-01 in the Statistical bulletin 2007, which provides methodological details on trends calculations.

of data (2001/2002) are available, for seven countries. In these seven countries, a specific exercise, not available for other years, was conducted.

Discussion of patterns of drug use, profile of clients and sources of referrals to treatment is restricted to outpatient clinics, since these data have the most consistent coverage of clinics and individuals.

Cannabis treatment clients

Overall, cannabis is the most used illicit drug in Europe and, over recent years, it has risen to become the second most frequently cited drug reported as the primary reason for entering specialised drug treatment, after opiates. According to the TDI data in 2005, around 20 % of all treatment clients and 29 % of first-time treatment clients were recorded as having a primary cannabis problem ([4]) (EMCDDA, 2007a, b).

Polydrug use is often reported among cannabis users. Among drug clients, cannabis can be registered as a primary drug, or a secondary drug used along with other substances. Among all drug clients entering treatment for primary cannabis use, alcohol (37 %) or amphetamines or ecstasy (28 %) were reported as the most frequent secondary drugs ([5]). However, a proportion of clients reported cocaine use (15 %) and/or other opioid use (7 %) as secondary drugs, with cannabis reported as the primary drug for treatment. Although few in number, these clients are an interesting group who could be more carefully examined to better understand patterns of drug use and related problems.

Among all outpatient treatment clients reported by a clinic's staff, cannabis may also be cited as a secondary problematic drug. After alcohol (38 %), cannabis is reported as the second most frequently cited secondary substance (17 %) by those receiving drug treatment ([6]). When treatment clients cite cannabis as a secondary drug, analysis shows that overall cannabis use is frequently reported as a secondary reason for entering treatment among primary cocaine users (28 %), primary users of other stimulants (26 %) and primary opiate users (17 %). Similar drug combinations are also found in the American treatment data. Analysis of American treatment data shows that marijuana appears to be the secondary reason for seeking treatment among clients using alcohol (56 %), cocaine (21 %), stimulants (11 %) and opiates (10 %) (DASIS, 2003).

Thus it seems that a group of primary cannabis clients exists which also uses other drugs in combination with cannabis. Cannabis can be combined with alcohol, amphetamines or ecstasy, but also with other, 'harder', drugs such as cocaine or heroin. Among

([4]) See figure TDI-02 in the Statistical bulletin 2007.
([5]) See table TDI-23 in the Statistical bulletin 2007.
([6]) See table TDI-22 in the Statistical bulletin 2007.

polydrug users including cannabis, and especially in those clients reporting use of the 'hard' drugs, it is not clear what the role of cannabis is in the request for treatment. Polydrug use has became more common in recent years and cannabis might be just one among other substances that gives rise to users entering treatment. Limitations in data recording, and the small number of absolute cases reported in some countries should be considered also.

For simplicity, to analyse changes and trends we have considered here only the group of clients reporting cannabis as the primary drug for the first time in their life. Nevertheless, this information must be seen in the context of a changing and expanding reporting system, the implications of which are discussed below.

When looking at socio-demographic characteristics of cannabis clients, the following picture emerges. Cannabis clients new to treatment are predominantly young males. The highest male to female ratio among all drugs clients is found among these new outpatient clients (6 males:1 female) ([7]). Higher male to female ratios are found in Italy, Portugal, Hungary, Germany, with lower ratios in the Czech Republic, Sweden, Finland and the United Kingdom. These differences in the male to female ratios among countries is quite similar across the other primary drugs of use. Almost all new clients entering treatment for primary cannabis use are younger than 30, and almost 40% are younger than 20. The mean age of cannabis clients is 24 years, whereas in the case of other drugs, this age is generally higher. Country differences are found in the age distribution of cannabis clients ([8]). Among the group of people under 20 years old receiving drug treatment, the vast majority reports using cannabis as the primary drug (80% among people under 15, 67% among those aged 15–19) ([9]).

The age of first cannabis use — onset — is important, since it has been reported that the younger the age at which users first consume cannabis, the higher the risk of developing drug problems in the future (Kraus et al., 2003). Compared with other drug types, which show considerable variation across countries, age of first cannabis use among clients requesting treatment for cannabis is quite similar across countries in Europe. In the TDI data for cannabis clients starting treatment for the first time, the mean age of starting cannabis use is 17 years. Virtually all new cannabis clients start their drug use before they are 20 and 33% before they are 15. The corresponding figures for opiates are 45% before 20 years old, and 5% before 15 years old, and for cocaine, 48% and 6%, respectively ([10]). A comparison of age of onset with age first treated shows that there is a time lag of around 7 years between first cannabis use

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([7]) See table TDI-22 in the Statistical bulletin 2007.
([8]) See tables TDI-10 and TDI-102 in the Statistical bulletin 2007.
([9]) See table TDI-10 in the Statistical bulletin 2007.
([10]) See table TDI-11 in the Statistical bulletin 2007.

and first drug treatment, regardless of where treatment is sought (that is, in different countries and in different types of treatment centre).

Finally, looking at available data on other social characteristics in 2002 ([11]), the relatively young age of cannabis clients means that a large proportion, 45%, are still in education, compared with only 8% amongst clients being treated for problems with other drugs. A further 24% of those being treated for cannabis problems are in regular employment, equal to the percentage who are unemployed. This is in stark contrast to clients using drugs such as heroin, among whom very few are employed. In addition, cannabis clients more often report living in stable accommodation than those being treated for problems with other drugs, reflecting the fact that many are young people, students, or living with their parents (Agosti and Levin, 2004). However, a few countries, such as Greece, also report a number of primary cannabis clients who are older, in more precarious social conditions and using other drugs together with cannabis (EMCDDA, 2004).

To conclude, the most common characteristics of cannabis clients are that they are young male, a student/school pupil and living with parents. However, there are also indications of cannabis clients who are older or less socially well-integrated. The same patterns were found in the recent review of cannabis specialised treatment reported by Rødner Sznitman (this monograph).

Incidence of demands for cannabis treatment

Based on data that were available in 19 EU countries, there are on average 41 persons per 100 000 young adults (aged 15–34) each year who enter treatment for cannabis use for the first time. Only a tiny proportion — 1 in 200 — last-month cannabis users in the young adult population (aged 15–34) report entering specialised drug treatment for cannabis use (Table 1). A 2004 detailed review of cannabis treatment demand, conducted by the Dutch National Alcohol and Drugs Information System (LADIS), confirms that only a small proportion of regular cannabis users in the Netherlands receives drug treatment.

Major differences are found between countries in the TDI data set in the proportion of clients seeking treatment for cannabis. This varies considerably, from 3% in Bulgaria to 48% in France and 36% in Hungary. In terms of new clients, there are also large differences between countries, with cannabis clients reaching an almost 70% share of new clients entering drug treatment in France ([12]). In general, a high prevalence of

([11]) An ad hoc data collection on social characteristics of cannabis clients was done in 2002, yet is not available for other years.
([12]) See tables TDI-04 and TDI-05 in the Statistical bulletin 2007.

Table 1: Treatment demand for cannabis as primary drug among new drug clients and last-month prevalence of cannabis use among young adults in 2005 or most recent year available: incidence per 100 000 young population at 1 January 2006

Country	% cannabis clients of last-month prevalence, young adults	New cannabis clients in 2005 of the total clients (%)	New cannabis clients 2005 (absolute numbers)	Cannabis clients per 100 000 young adult population	Last-month cannabis prevalence, young adults 2005 or most recent year available (%)	Last-month prevalence, young adults 2005 or most recent year available (absolute numbers)	General population, young adults (15–34) in 2006 (1 January)
Bulgaria	0.1	9.3	36	2	1.7	37 213	2 188 992
Czech Republic	0.3	20.5	896	29	9.8	301 960	3 081 224
Denmark	1.1	52.6	830	63	5.9	78 124	1 324 139
Germany	0.5	58.0	8 139	42	7.6	1 485 409	19 544 850
Ireland	1.4	40.2	807	60	4.3	58 055	1 350 110
Greece	0.5	10.1	225	7	1.5	45 573	3 038 209
Spain	0.3	20.3	5 312	42	15.5	1 971 238	12 717 663
France	0.2	67.3	2 804	17	9.8	1 608 241	16 410 618
Italy	0.7	24.1	8 477	58	8.8	1 290 733	14 667 416
Cyprus	1.7	40.2	84	35	2.1	5 025	239 305
Latvia	0.3	17.0	68	10	3.7	25 200	681 077
Lithuania	0.0	0.3	1	0	1.5	14 867	991 130
Hungary	4.0	52.0	3 286	113	2.8	81 440	2 908 578
Netherlands	0.8	41.8	1 797	44	5.6	228 066	4 072 607
Portugal	0.4	11.4	552	19	4.4	129 324	2 939 173
Slovakia	0.5	28.8	277	16	3.3	57 968	1 756 615
Finland	0.4	34.0	215	17	4.0	51 802	1 295 042
Sweden	1.2	31.6	422	19	1.5	34 200	2 279 985
United Kingdom	0.5	21.9	9 400	59	11.6	1 844 191	15 898 200
Total	0.5	29.0	43 628	41	8.7	9 348 627	107 384 933

Notes: only countries that sent information about first treatments are included.
Source: 2006 Reitox National reports, Standard Table 3. For total number of clients see table TDI-2. For population see Eurostat, demographic data 2006 (http://epp.eurostat.cec.eu.int).

cannabis use reported in the general population is associated with a high percentage of primary cannabis users among treatment clients. In particular, the available data show that countries with high or low last-month prevalence in the young adult population (15–34 years) have correspondingly high or low incidence of cannabis as a share of treatment demand. However, there are a few exceptions: in some countries, high levels of last-month cannabis prevalence in the young adult population contrast with low levels of treatment demand for cannabis and vice versa (Cyprus, Hungary, France, Portugal — see Table 1).

The reasons for discrepancies between use and treatment across countries are presumably historically rooted, in both the development of treatment centres and in attitudes to treatment, as well as prevalence and patterns of cannabis use. In cases where high levels of recent cannabis prevalence contrast with low proportions of treatment demand, this could imply that treatment availability for cannabis is insufficient or not appropriate. On the other hand, it could simply be because there is no perceived need for drug treatment. As shown elsewhere (Corrigan, Beck and Legleye, this monograph), it is uncertain to what extent cannabis use triggers a need for treatment. In other cases, where high demand for cannabis treatment contrasts with low recent cannabis prevalence, this might arise from more restrictive national legislation, or a widespread medical approach to dealing with cannabis problems.

Even if cannabis is the most used drug in Europe, only a minor part of the population uses it on a regular basis, and an even smaller proportion demands drug treatment (Agosti and Levin, 2004; Toxibase and Crips, 2004). One of the various observations that may be made from this is that demand for cannabis treatment does not always mirror, in a logical and straightforward way, the cannabis prevalence rates in the general population. Instead, it is clear that the extent of demand for cannabis treatment is a complex issue that is probably related to several factors which lie beyond variations in reporting coverage. Contenders for explaining this phenomenon include prevalence of intensive cannabis users in the general population, availability of treatment, patterns of referral to treatment and national legislation.

Trends in treatment incidence

Between 1999 and 2005, according to the TDI information from 20 countries, the number of new clients entering treatment for cannabis as a primary drug increased by 28 000, from around 15 000 to almost 44 000 reported cases. In 1999 the proportion of new cannabis clients represented around 12 % of the total of the new clients, while in 2005 it reached almost 28 % (Figure 1). In 11 countries there was an increase in the proportion of cannabis clients, and in 11 countries a stable or slightly decreasing trend was noted. The highest growth was reported in Hungary (+ 40 %) and France (+ 37 %), followed by Slovakia, Germany, Malta, Denmark and The Netherlands (around

Figure 1: Trends in new cannabis treatment demands from 1999 to 2005 (proportion of total clients and absolute numbers)

+ 20%) while the smallest growth was found in Poland, Portugal, the Czech Republic and Romania ([13]). An analysis carried out in England on cannabis treatment demand confirmed this upward trend (DMRD, 2004).

Compared with other substances, primary cannabis treatment demands increased faster than demands for treatment of other drugs. In the same time period, new heroin clients decreased by 32%, cocaine clients increased by 11% and other stimulant users increased by 4%. This reported increase in cannabis treatment demand is not restricted to Europe. In the USA, where a different drug treatment registration system is used ([14]),

[13] See table TDI-03 in the Statistical bulletin 2007.

[14] In the USA, admissions to treatment rather than individuals are registered. In addition, in contrast to Europe, alcohol is included among the substances of abuse. See the SAMHSA website (www.samhsa.gov); note that in the USA, Canada and Australia the term 'marijuana' is used because the term 'hashish' (cannabis resin) is not common.

treatment admissions for marijuana increased from around 20 000 in 1992 to nearly 90 000 in 2000 (SAMHSA, 2003; EMCDDA, 2003b).

Looking at the factors that might have influenced the reported trends, changes are seen in the following areas:

- reporting system and data coverage;
- drug services organisation;
- sources of referrals to treatment;
- socio-demographic characteristics; and
- patterns of drug use and, in particular, frequency of cannabis use.

The coverage of the European reporting system has expanded in recent years, with an increase in number of units and clients recorded by the system. It is unclear to what extent this represents a genuine expansion in treatment offering, as opposed to simply the coverage of the treatment reporting system. It is also unclear how treatment offering and reporting coverage may have affected the increase in cannabis treatment demands. Nevertheless, this growth is not sufficient to explain the increase in cannabis treatment demands (EMCDDA, 2003b) ([15]).

The organisation of drug treatment services has changed in recent years. Because of the decrease in proportion of heroin clients, centres have adapted treatment offerings to embrace a differentiated client population that includes cocaine and cannabis users. This shift in targeted clients might have influenced demand for treatment. In particular, countries such as France — where a high proportion of cannabis users is found among all treated clients — have created treatment centres for target groups, such as adolescents, and these have reported a substantial proportion of cannabis clients (EMCDDA, 2003b). Overall, such centres might have added 'weight' to the share of cannabis users among all treatment clients.

Referral routes into treatment

It is important to identify the channels through which people enter treatment. A number of standard options are available in the TDI schedule for recording the source of referral for drug users entering treatment. These distinguish (i) drug users who have referred themselves and (ii) those who have been referred through other agencies such as health, social or criminal justice agencies. Most cannabis clients are referred by family and friends, social services or the criminal justice system. In comparison with users of other drugs, a smaller proportion of cannabis clients are self-referrals (EMCDDA, 2004). A similar picture is also seen in the USA and Canada, where treatment demand for

([15]) See table TDI-02 in the Statistical bulletin 2007.

marijuana as a primary substance is largely found not to be self-initiated (EMCDDA, 2003b). In countries with significant percentages of primary cannabis clients, legal authorities and schools play an important role in referring cannabis clients (EMCDDA, 2003a). In an American analysis of marijuana admissions to treatment based on source of referral (DASIS, 2005), marijuana admissions referred by criminal justice were also reported to have a different profile from non-criminal justice referrals: they were younger, with a higher presence of males, and often occasional users of cannabis with no other additional drugs.

Some understanding of the reasons for increases in treatment uptake may be found in analysing the changes in the sources of referral to treatment. Between 2001 and 2002, in those countries reporting data ([16]), the total number of cannabis clients referred to treatment services by hospital/medical sources and by legal authorities increased by 79 % and 58 % respectively, while the known base of clients increased by 37 %. By comparison, from 1992 to 2002 the USA also reported increases in marijuana admissions referred by the criminal justice system (EMCDDA, 2004).

One of the more problematic measures in the EMCDDA's TDI is the frequency of use of the primary drug in the period immediately before entering treatment. Intended to give insight into, amongst other things, the severity of problem to be treated, in practice this measure can be strongly tied to the route of referral and how treatment entry comes about. Often this 'frequency of use' item records, strangely, no or little use of the primary drug in the period in question — a phenomenon that might be related to referrals from criminal justice, or from a health agency positioned earlier in a referral chain. As such, it is difficult to separate its interpretation from referral patterns. For example, among clients in treatment for a primary cannabis problem in 2005, 30 % of new cannabis clients use the drug occasionally or have not used in the month prior to treatment, while 40 % use it daily ([17]). There are again large differences between countries: the highest proportion of daily cannabis users is found in the Netherlands, Denmark and Spain, and the highest proportion of occasional users — including clients who may not have used in the past month — are found in Hungary, Germany and Italy. Compared with the other drugs, in the case of cannabis there is a higher polarisation of patterns of use between occasional users — including non-users — and daily users. The same patterns are also found in American analysis (NSDUH, 2004).

Among new cannabis users presenting to treatment between 2003 and 2005, the proportion of daily users increased by more than 10 % ([18]). A number of factors may be behind this increase, for example artefacts of reporting measures, polydrug use,

[16]   The countries reporting in these years were Finland, Germany, Greece, Norway, Sweden and the United Kingdom.
[17]   See table TDI-18 in the Statistical bulletin 2007.
[18]   See table TDI-18 in the Statistical bulletin 2007.

and mental health problems among cannabis clients. A number of countries report polydrug use where cannabis is reported as the primary substance, yet accompanied by the use of alcohol and other drugs. In these cases, it is not totally clear which drug precipitates treatment-seeking, even though cannabis might be declared as the primary problem. Some countries have examined a purported relationship between mental health problems and cannabis use, and specific research has been carried out to investigate this relation. The scientific literature indicates that it is not always clear whether problematic cannabis use comes before a mental health problem, contributing to its appearance or discovery, or whether cannabis is used as a kind of medication for pre-existing mental health problems (see Witton, this monograph). However, there is a group of people that regularly uses cannabis and seeks help for problems that may be related to their cannabis use. This should be seriously taken into consideration by the treatment system, and be better investigated by researchers.

Conclusions

The objective of this review has been to describe the observed increase in reported cannabis treatment demand, and to analyse the changing reporting environment to better understand the trend. In doing so, it has become apparent that many important questions that are fundamental to an informed policy debate on this controversial topic remain unanswered. What is also apparent is that the available evidence justifies neither an alarmist position nor complacency on cannabis treatment demand.

People with cannabis-related problems constitute a non-trivial proportion of treatment demands in specialised facilities in some countries, and form an important subgroup within the larger treatment population. Most are young males, typically around 20 years old, and most started using cannabis at around 17 years of age.

Cannabis clients have different patterns of drug use from those consuming other substances. Moreover, there are important differences between cannabis clients, and the profiles of different subgroups of cannabis users in treatment are likely to be directly relevant to understanding their needs and the provision of appropriate responses. Important dimensions for service provision include frequency of use, current and past use of other drugs, and referral source. In broad terms, summarising the available information at EU level, two client profiles can be postulated (EMCDDA, 2004):

- at one extreme, younger users, often students, referred to treatment services by family or school, and consuming only cannabis or sometimes together with alcohol or stimulants; and
- at the other extreme, polydrug users who are typically older and less socially well-integrated, and who are referred to treatment more often by legal authorities or health and social services, and who overlap with the chronic drug-using population.

In reflecting on changes in the characteristics of primary cannabis treatment demand over time, the available information suggests that there were increases in:

- numbers of clients referred from the criminal justice system;
- referrals from family and other social support networks (family, friends, social services, school);
- the proportion of people using cannabis intensively (daily cannabis use), although daily users remain in the minority; and
- levels of social and educational problems in some countries (although data in this area are still weak).

In considering the increase in treatment demand, it appears that changes in referral practice have an impact, and a substantial proportion of those referred appear not to be intensive drug users. Nonetheless, in some countries at least, a significant number of treatment demands come from individuals whose use of cannabis is intensive. The problems experienced by this group remain poorly understood, and research in this area is urgently needed. The observation that a majority of treatment demands made by the very young are for cannabis suggests that special consideration of the needs, referral pathways and responses of this group is required.

It is also important to recognise that treatment demand is not a direct indicator of the scale and nature of cannabis problems. General population survey data suggest that, compared with occasional use, intensive cannabis use is relatively uncommon. However, the widespread general use of cannabis means that considerable numbers of people may be using the drug intensively — at least for some part of their life (EMCDDA, 2004).

Although the effects of cannabis dependence or abuse are less severe than those of other drugs, this may, nevertheless, have a considerable public health impact. This is because of the scale of cannabis use, and the fact that many of those most affected are young and may be using the drug intensively during important developmental stages, or when they are particularly vulnerable. Among socially disadvantaged families or communities, cannabis dependence or abuse may compound individuals' problems by harming education or employment opportunities.

In summary, there remains a critical need for research to provide an understanding of the relationship between different patterns of cannabis use and the development of problems. The extent to which cannabis users experience problems and the nature of the problems that may be found still remain poorly understood. Methodological tools are required to assess problems at the population level. Such information is a prerequisite to the development, targeting and implementation of effective public health responses to cannabis use in Europe.

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Chapter 14
Cannabis treatment in Europe: a survey of services

Setting the context

Scientific literature on the treatment of cannabis-related disorders is scarce, particularly when compared with opioid treatment. While there have been some synthetic overviews (Hall et al., 2001; Steinberg et al., 2002; Loxley et al., 2004), analysis has generally been peripheral to wider works on cannabis or restricted to adolescents (e.g. SAMHSA's Cannabis Youth Treatment series in the USA; Elliott et al., 2002; Liddle et al., 2002).

Scarcity also seems to characterise research on the treatment of cannabis-related problems in the European Union. This could be explained by a common belief that cannabis problems are not a primary problem for people in drug treatment. Yet Europe, like the USA, is recording a trend in which cannabis is mentioned at an increasing rate in the context of treatment demand indicators (EMCDDA, 2004, 2006; UNODC, 2006). Another explanation is that cannabis does not produce the pharmacological dependence syndrome associated with alcohol, nicotine and opioid use. However, as the chapters by Witton and Hall in Volume 2 of this monograph indicate, somatic and mental problems related to cannabis use affect thousands of people.

Indications do, however, exist, which point towards new directions in regards to cannabis treatment. At the level of healthcare policy, domestic and international research, cannabis treatment has for some years been gaining a higher level of visibility and public funding. In July 2004, the European Council adopted a resolution on cannabis proposed by the *Horizontal Working Party on Drugs*, which called for the EMCDDA to continue to monitor 'conditions for effective prevention and treatment, and examples of best practice' and encourages Member States to 'promote networking'.

In many ways, EU-wide monitoring into cannabis treatment has already benefited from scientific collaboration, both in terms of defining a 'PCU' (problematic cannabis user) and establishing standard treatment indicators. In June 2003, EMCDDA hosted expert meetings on the 'Quality and coverage of TDI and analysis of cannabis client profiles' ([1]) and 'The profile of cannabis clients in different regions of the world'([2]). In parallel, the EMCDDA commissioned a report on 'Regular and intensive use of cannabis and related problems: conceptual framework and data analysis in the EU member states' (Simon, 2004). The Centre also published a selected issue, titled 'Cannabis problems in context: understanding the increase in European treatment demands' in its 2004 Annual Report (EMCDDA, 2004).

Supranational networking is taking place on a number of levels, and is increasingly crossing the linguistic barriers which have at times acted as an obstacle to collaboration. Cannabis is increasingly mentioned in EMCDDA's EDDRA ([3]) database, including specialised cannabis treatment in Lund, Sweden ([4]), and Berlin, Germany ([5]). A supranational project focused on adolescent therapy, INCANT (International Cannabis Need of Treatment Study) has completed pilot phases at centres in Belgium, Germany, France, the Netherlands and Switzerland, with the main phase being run from 2006 to 2009. Cannabis mental health issues and treatment options were covered in a 2006 Beckley Foundation report ([6]). Meanwhile, recent forums for international research have included the annual HIT *Perspectives on cannabis* conference in the United Kingdom, Therapieladen's Cannabis — Quo vadis ([7]) conference in 2005 in Germany, not to mention cannabis presentations within general drug treatment conferences, such as ICTAB (the International Conference on Treatment of Addictive Behaviors). In terms of best practice, Germany's CaRED ([8]) project, managed from 2002 to 2004, represents a thorough analysis of cannabis treatment, albeit with a domestic focus, and in turn has helped stimulate innovative cannabis treatment provision studies, such as CANDIS ([9]).

[1] www.emcdda.europa.eu/?nnodeid=1861
[2] www.emcdda.europa.eu/?nnodeid=1881
[3] www.emcdda.europa.eu/themes/best-practice
[4] EDDRA link:
www.emcdda.europa.eu/html.cfm/index52035EN.html?project_id=1293&tab=overview
Home page: www.droginfo.com/
[5] EDDRA link:
www.emcdda.europa.eu/html.cfm/index52035EN.html?project_id=2915&tab=overview
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[9] www.candis-projekt.de/

This chapter is based on a survey that answered the basic question: What type of treatment is available for cannabis use disorders in Europe today? While the results are not exhaustive, they help to inform the road ahead.

Further reading

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Cannabis treatment in Europe: a survey of services

Sharon Rödner Sznitman

Introduction

In response to an identified lack of data about cannabis treatment provision in Europe, the Centre for Social Research on Alcohol and Drugs (SoRAD), in cooperation with EMCDDA, conducted a survey on cannabis treatment provision in Europe in 2005. The study was designed to provide a base for a preliminary description of cannabis treatment in Europe, to examine the availability and nature of different specialist treatments for cannabis users, and to profile their clients' characteristics.

Research method and sample design

The study was conducted in two phases. In phase I, key informants were contacted through the EMCDDA's coordinating network of national focal points. This provided access to informants from the 25 Member States and Norway; Switzerland also participated. A questionnaire was emailed to these informants in which they were asked to provide contact information for key position holders in treatment centres which are likely to see cannabis cases. Informants for phase II were thus identified and these were contacted by email.

The criterion for including a key expert in the study was 'any person who is a holder of a key position at any centre offering treatment for patients with cannabis use as the primary problem'. Respondents were asked to indicate whether their service treated cannabis as the primary drug problem but also included other drugs, or solely treated cannabis-related problems. The questionnaire asked for information regarding the particular treatment offered to the cannabis clients and for summary data on agency's clients.

Problematic issues

Methodological limitations should be considered: since the survey was voluntary only some countries responded and they are not proportionately represented in the survey (e.g. Sweden returned eight questionnaires, Norway six, while some countries returned only one and others did not reply).

Over 100 questionnaires were sent out in Phase II of the survey, yet only 45 were returned. The results of the survey should, thus, be read with caution. They cannot claim to be representative of cannabis treatment in Europe overall. In the questionnaires, cannabis cases were defined as people who receive treatment mainly due to their cannabis use. This definition does not include polydrug users who use cannabis as a secondary drug together with other substances (e.g. heroin). The total number of people using cannabis is, therefore, underestimated.

Important definitions

For the purposes of the survey a treatment programme for cannabis cases is defined as any treatment at the agency for persons who are receiving treatment primarily for problems related to their cannabis consumption. Cannabis cases are defined as persons who are enrolled at the agencies mainly for their cannabis consumption and do not include patients with, for instance, heroin problems who also use cannabis.

Results

Responses were received from 45 individuals representing 45 different treatment agencies, from 19 EU Member States, Norway and Switzerland. Member States which did not respond and are hence not included in the study are: Estonia, Spain, Ireland, Slovenia, Luxembourg and the Netherlands. The respondents hold a wide range of positions in their treatment centres, including therapists, coordinators, heads of treatment centres, social workers, psychologists and nurses.

Description of the treatment centres

The majority of the responding treatment centres deal with a range of drug-related problems, and most of the treatment centres were fairly large. Six centres saw under 100 clients per year. Twenty-one centres saw between 100 and 500 patients per year, with the remainder treating over 500 patients per year. The majority, 72 % (31), of the centres treated all or many patients in outpatient ambulatory counselling settings. A total of 36 % of the centres treated all or some of their patients in long-term inpatient treatment. Short-term, inpatient treatment, treatment in a day clinic or in the community was less common.

Table 1 reports respondents' rating of the importance of modalities provided by their service. Short-term psychosocial interventions, long-term psychosocial interventions and long-term rehabilitative drug therapy were seen as the most important. In addition, on-the-spot psychosocial crisis intervention was rated as a very important or important

		n	1: very important task, % (n)	2: important task, % (n)	3: relatively unimportant task, % (n)	4: no task at all/not on offer, % (n)
a	On-the-spot psychosocial crisis intervention	(42)	24 (10)	38 (16)	31 (13)	7 (3)
b	Short-term psychosocial interventions: short-term counselling	(43)	41 (18)	52 (23)	7 (3)	0
c	Long-term psychosocial interventions: long-term counselling	(45)	49 (22)	45 (20)	5 (2)	2 (1)
d	Long-term rehabilitative drug therapy: long-term psychotherapy	(43)	40 (17)	42 (18)	7 (3)	12 (5)
e	Medical intervention for somatic problems	(42)	12 (5)	26 (11)	29 (12)	33 (14)
f	Detoxification	(42)	24 (10)	26 (11)	21 (9)	29 (12)
g	Harm reduction (e.g. syringe exchange, educating safer-use strategies, etc.)	(42)	31 (13)	17 (7)	24 (10)	29 (12)
h	Methadone or buprenorphine substitution	(43)	30 (13)	19 (8)	9 (4)	42 (18)
i	Heroin prescription	(42)	2 (1)	0	0	98 (41)
j	Naltrexone prescription	(41)	5 (2)	11 (5)	17 (7)	66 (27)

Table 1: Key informant rating of the importance of the different tasks at the agencies

task by many informants. Fewer identified detoxification, harm reduction, medical intervention for somatic problems, methadone or buprenorphine substitution, heroin and naltrexone prescription as very important or important tasks of their agencies.

Description of cannabis treatment

Although the recruitment strategy of the study attempted to ensure that questionnaires were sent to treatment agencies that include cannabis cases, four of the centres included in the study did not currently have any cannabis cases. Thus, the following results are based on only 41 treatment centres.

It is evident from the survey results that cannabis cases for the most part represented a minority of the overall clientele in the agencies. In 63 % (25) of the centres cannabis cases represented 0–25 % of the entire patient case load. Some centres did, however, seem to exclusively treat cannabis cases. In six centres (15 %) — from Belgium, Denmark, Sweden, Cyprus and Germany — cannabis cases represented 75–100 % of the patient case load.

Out of all the treatment centres, nine (23 %) treated at least some of the cannabis cases in a programme within a unit not exclusively for cannabis cases. Fourteen centres (35 %) treated the cannabis cases as individual cases among drug users of all sorts. Thus, it is evident that a substantial proportion of the agencies do not have a specific cannabis treatment programme. It is, however, also evident that treatment programmes exist which have an exclusive focus on cannabis cases. Six of the centres (15 %) treated the cannabis cases in a unit exclusively for cannabis cases. Three of these were located in Sweden, and there was one such unit in each of Belgium, Germany and Italy.

Evidently, units exclusively for cannabis clients exist in Europe, but these must be regarded as a scarce phenomenon. This claim is further evidenced by the fact that only 10 of the respondents knew of only one treatment unit exclusively for cannabis in their city while three respondents reported that there were two such units in their city. One respondent reported that there were none and 14 respondents did not know how many there were.

Treatment

Most of the treatment provided to cannabis cases lasts no longer than 20 sessions. Fifteen of the treatment centres treated cannabis cases on average in 1 to 10 treatment sessions. Fifteen centres treated the clients in 11 to 20 treatment sessions. Treatment over 20 sessions was rare. As such, current treatment seems to correspond well with the literature on evidence-based cannabis treatment. Although the literature is scarce, the few existing studies mainly indicate that the most useful treatment for cannabis users is brief intervention (Stephens et al., 2000; Babor et al., 2004).

The aims of cannabis treatment reported as very important by most of the agencies were abstinence (20 agencies, 50 %) and reduction of cannabis use (19 agencies, 48 %). Seven agencies (18 %) reported harm reduction (e.g. solving practical life problems and no attempt to change cannabis consumption) as a very important aim. Quite a few agencies (15), however, reported that harm reduction was an important, but not a very important, aim of the cannabis treatment.

In terms of what type of treatment is offered to cannabis cases, there seems to be a wide range of interventions available. As Table 2 shows, the main treatments reported by most of the agencies were: individual counselling, talk therapy/counselling about cannabis, relapse and treatment, and talk therapy/counselling about conditions of life. Also a regular part of treatment in many agencies were detox ([10]) from cannabis, family therapy, therapeutic community ([11]) and mutual help groups.

Table 2: Content breakdown of cannabis interventions, based on number of respondents reporting specific treatment types

	n	1: main part of treatment, % (n)	2: regular part of treatment, % (n)	3: not a part of treatment, % (n)
a Detox from cannabis	(41)	24 (10)	42 (17)	34 (14)
b Peer group counselling	(40)	13 (5)	24 (11)	77 (24)
c Individual counselling	(41)	78 (32)	22 (9)	0
d Family therapy/ counselling	(41)	22 (9)	71 (29)	7 (3)
e Milieu therapy/ therapeutic community	(37)	0	24 (9)	76 (28)
f Talk therapy/counselling about cannabis, relapse and treatment	(41)	73 (30)	24 (10)	2 (1)
g Talk therapy/counselling about conditions of life (relationship problems, aggression training, etc.)	(41)	63 (26)	37 (15)	0
h Practical help with daily life (to get social allowances, clothes, housing, education, job)	(40)	13 (5)	48 (19)	40 (16)
i In-patient treatment	(39)	8 (3)	21 (8)	72 (28)
j Mutual help group (e.g. Narcotics Anonymous)	(41)	0	15 (6)	85 (35)

([10]) Detox refers to the process of abstinence to clear cannabis from the body, accompanied by social and environmental support during the associated physiological and psychological changes.
([11]) Therapeutic community is a term applied to a participative, group-based approach to drug treatment that includes group psychotherapy and practical activities, and which may or may not be residential.

Characteristics of cannabis cases

Gender

As in drug treatment in general, cannabis cases are predominantly male. Only one treatment agency reported having less than 50 % males. Four agencies reported only a slight male dominance (51–59 % of all cannabis cases). Nine agencies reported that 60–69 % were male, 13 agencies reported that 70–79 % were male, 10 agencies reported that 80–89 % were male and six agencies reported that 90–99 % were male.

Age

The majority of cannabis cases are fairly young. Sixteen agencies (39 %) reported that all or the majority of their cannabis cases were 20 years old or younger. Thirteen agencies (32 %) reported that all or the majority of their cannabis cases were between 21 and 30 years old. Only four (8 %) of the agencies reported that the majority of their cannabis cases were over 30 years old.

Referral channels

Worries have been expressed concerning increasing demand for cannabis treatment evident in many parts of the EU. It has, however, been pointed out that the rise might not be due to an increase in cannabis problems or dependence in the population. Instead, the rise might, among other things, be due to policy changes, which in turn lead to more referrals to treatment by police and school systems. While this study is unable to measure any trends over time, it provides indications of which are the most common referral channels to treatment for cannabis cases (Table 3).

The most common source of referrals reported was the client's family and friends. Many agencies also reported that self-referrals were most common. However, more agencies than not reported that cannabis clients do not enter treatment on their own initiative. Other referral sources were also reported; among them the most common were the criminal justice system, schools, psychiatrists, psychologists, social workers and general practitioners. It must, however, be noted that the separation between self-referrals and external referral channels is far from clear-cut. Research from Sweden, for instance, has shown that there is a large overlap between reporting self-motivation to treatment and reporting pressure from unofficial or official sources to enter treatment (Storbjörk, 2004).

	n	1: most common, % (*n*)	2: common, % (*n*)	3: not at all common, % (*n*)
Table 3: Reported common referral channels for cannabis cases				
a Self-referrals	(39)	31 (12)	33 (13)	36 (14)
b Client's/patient's family/ friends	(39)	38 (15)	53 (21)	8 (3)
c School	(40)	8 (3)	40 (16)	52 (21)
d Work	(38)	3 (1)	18 (7)	80 (31)
e General practitioner (family doctors)	(41)	12 (5)	32 (13)	56 (23)
f Psychiatrist/psychologist/ social worker (out-patient or private practice)	(39)	8 (3)	67 (26)	26 (10)
g Courts, probation, parole, police	(39)	18 (7)	41 (16)	41 (16)
h Drug counselling agency or drug treatment units	(40)	5 (2)	24 (11)	68 (27)

Twenty-eight respondents reported that 50 % or more of the cannabis clients received treatment for their substance abuse for the first time in their life when they came into contact with the agency. In fact, as many as 12 respondents reported that 90 % or more of their cannabis cases received help for their substance abuse for the first time.

Lifestyles

Most cannabis cases in treatment had a socially well-integrated life before entering treatment. A large majority of the agencies reported that it was not at all common that the cannabis cases had been homeless or lived in a sheltered environment before entering treatment. The most common living conditions among the cannabis cases were living with parents or living alone.

A majority of the agencies reported that it was common that the cannabis cases had attended school or university or had been employed before entering treatment. There were, however, slightly more agencies that reported that it was common that cannabis cases were school drop-outs or unemployed prior to treatment.

In terms of mental well-being, less than a majority (30 %) (Table 4) of the respondents reported that it was common that cannabis cases had psychiatric problems (based on

Table 4: Reported situations for cannabis treatment before entry to treatment

		n	1: most common, % (n)	2: common, % (n)	3: not at all common, % (n)
a	Were homeless	(41)	0	7 (3)	93 (38)
b	Lived in a sheltered environment (e.g. home for psychiatric cases)	(41)	0	7 (3)	93 (38)
c	Lived with their parent(s) or guardian(s)	(41)	46 (19)	46 (19)	7 (3)
d	Lived alone	(40)	30 (12)	48 (19)	23 (9)
e	Lived with friends	(40)	3 (1)	28 (11)	70 (28)
f	Lived with their own family	(41)	10 (4)	49 (20)	42 (17)
g	Went to school/ university	(41)	15 (6)	63 (26)	22 (9)
h	Dropped out of school	(41)	7 (3)	73 (30)	20 (8)
i	Worked	(41)	7 (3)	61 (25)	32 (13)
j	Were unemployed	(41)	15 (6)	66 (27)	20 (8)
k	Had psychiatric problems	(40)	23 (9)	30 (20)	28 (11)
l	Had health problems	(41)	5 (2)	29 (12)	66 (27)
m	Had problems with the criminal justice system	(40)	23 (9)	65 (26)	13 (5)
n	Had family problems	(41)	42 (17)	59 (24)	0
o	Had financial problems	(40)	15 (6)	58 (23)	28 (11)

an affirmative response 'had psychiatric problems' to the question 'According to your experience, how common are the following situations for cannabis cases before they enter treatment at your agency?'). Many agencies, but less than the majority, also reported that it was common for cannabis cases to have problems with the criminal justice system prior to treatment entry. Family problems were rated as common for cannabis clients by slightly more than half of the respondents. Lastly, most agencies (66 %, see Table 4) reported that it was not at all common that the cannabis clients had health problems ([12]).

([12]) The questionnaire is annexed to this chapter.

Cannabis use and polydrug use

The study shows that cannabis cases for the most part have been using cannabis for more than 5 years before entering treatment. Fifteen respondents (37 %) reported that all or the majority of the cannabis cases had been using for 5 years or more before entering treatment. Nevertheless, cannabis use for less than 5 years was also reported. Two respondents reported that the majority of their cannabis cases had used cannabis for less than a year and seven respondents (22 %) reported that half of their cannabis cases had used cannabis for this period.

In this study the respondents were asked to report on cannabis cases, meaning people in their agencies who received treatment mainly for their cannabis consumption. This does, however, not exclude the possibility that the cannabis cases also use other drugs. Indeed, as shown in the epidemiological section of this issue, polydrug use is far from the exception in regards to cannabis consumption (Table 5).

In terms of substance use other than cannabis, the majority of the respondents reported that heavy use of cigarettes (more than 20 per day) occurred very often among their cannabis cases. Heavy use of alcohol was reported very often by slightly fewer agencies. Only one respondent reported that heavy use of cigarettes never occurred, and no agency reported that heavy use of alcohol never occurred among their clients.

All other substances were reported as less often used. Cocaine, for instance, was reported as very often used by only two of the agencies. This substance was, however, reported as sometimes used by the majority of the agencies. Nine agencies also reported that cocaine was never used by the cannabis clients.

Table 5: Reported level of other substance use than cannabis among the cannabis cases

		n	1: very often used, % (n)	2: sometimes used, % (n)	3: never used, % (n)
a	Heavy use of alcohol	(38)	45 (18)	55 (20)	0
b	Heavy use of cigarettes (more than 20 cigarettes per day)	(40)	63 (25)	35 (14)	3 (1)
c	Cocaine	(40)	5 (2)	73 (29)	23 (9)
d	Amphetamines	(40)	20 (8)	68 (27)	13 (5)
e	Ecstasy/hallucinogens	(40)	15 (6)	80 (32)	5 (2)
f	Heroin	(40)	8 (3)	50 (20)	43 (17)
g	More than three different substances	(39)	8 (3)	64 (25)	28 (11)

Use of amphetamines, hallucinogens and ecstasy were also more often reported as sometimes used than very often used. A majority reported that amphetamines were sometimes used by the cannabis clients and almost all the agencies reported that hallucinogens and ecstasy were sometimes used by the cannabis clients. Also important to note is that five agencies reported that amphetamines were never used, and two agencies reported that hallucinogens and ecstasy were never used by the cannabis cases.

Heroin use seems to be less prevalent among the cannabis cases, but still a substantial part of cannabis users seems to use heroin sometimes. Half of the respondents reported that the substance was sometimes used by cannabis clients. Nevertheless, also a substantial amount reported that heroin was never used by the cannabis clients.

Evidently, cannabis users in treatment tend to be polydrug users, although 11 informants indicated that three or more different substances were never used at the same time.

General trends in cannabis cases

According to the informants' evaluation, there has not been a decrease in cannabis cases in the agencies. Twenty-nine respondents (67 %) reported that there had been an increase the last 5 years, and 14 respondents (33 %) reported that there had been a stable number of cannabis cases in their agencies.

Thirty respondents (67 %) reported that there had been policy changes in their country towards cannabis use during the previous 5 years. These changes were overall reported as an increasing treatment emphasis and less emphasis on punitive approaches to cannabis users. Eighteen respondents reported that there had been more emphasis on treatment for cannabis users. Sixteen respondents reported there had been more attention to cannabis in treatment agencies, while 14 respondents reported that there had been emphasis on less punitive approaches. The policy changes do not, however, seem to follow a clear-cut unidirectional trend across Europe. Nine of the respondents described the policy changes in terms of more emphasis on punitive approaches (including respondents from Belgium, the Czech Republic, Denmark, France, Latvia, Austria, Poland and Switzerland).

Summary and conclusion

In this report, various themes in connection with cannabis treatment and cases in Europe have been discussed. Based on a small sample of treatment centres, this study is only meant to provide a few indicators concerning the current state of cannabis treatment in Europe, and the material is not suited for generalisations or comprehensive in-depth analysis.

Overall, it seems that specialised cannabis treatment is a rare phenomenon in Europe today. Of the 41 centres which had cannabis cases, 23 had no programme exclusively for them. Thus, it can be concluded that many cannabis cases across Europe are treated within the same setting as persons with other drug problems. This may be regarded as problematic, especially in view of the above findings which indicate that cannabis cases are relatively young. Research shows that much drug treatment is built for the adult population and does not thereby fit younger ages, and supporting material is often based on adult patterns of substance use (regular alcohol use, heroin, cocaine) rather than adolescent patterns (primary use of cannabis and alcohol bingeing). It is also based on adult experiences (parenting, health problems and adult dialogue examples) rather than adolescent experiences (peer pressure and adolescent dialogue examples) (Dennis et al., 2002a,b). Another problem which may arise when cannabis cases are placed in the same setting as other drug users is stigmatisation and exclusion (Sloboda, 1999).

While most people who use cannabis do not end up in treatment, there are those who do. Furthermore, it is evident that the demand for cannabis treatment is increasing. This may be due to any number of reasons: increased availability of treatment; an increased pressure to seek treatment; increased cannabis-related problems in the general population. Indeed, for the people who do end up in treatment it is not totally evident whether or not they actually have a cannabis problem. People might enter treatment due to pressures from friends, family or the criminal justice system. These complex issues are addressed in more detail by Simon (this monograph) but are also shortly touched upon in this study as the above findings indicate that there are many different referral channels of cannabis cases. Although there may be many cannabis cases that require treatment after awareness of personal cannabis problems, self-referral is not necessarily easily interpreted as such, as a person might seek treatment by himself after receiving demands from family, friends or the criminal justice system to do so.

Furthermore, it cannot be disregarded that increased cannabis treatment demand is an artefact of reporting measures. From this study, it is evident that polydrug use is common among cannabis cases, which is important in terms of how cannabis cases are registered. Indeed, since cannabis users also use other drugs, it cannot be discounted that the cannabis cases may have a complex substance use problem not derived solely from one substance. Many might be registered as cannabis cases, based on the criteria that cannabis is the drug used most frequently and most heavily. This criterion does, however, not exclude the possibility that they also receive or should receive treatment for other drug use.

According to the above results, cannabis treatment in Europe focuses on counselling about conditions in life in addition to counselling about cannabis use and relapse. Furthermore, a substantial proportion of the agencies reported that family therapy was

an important part of the treatment offered. In view of the heterogeneous make-up of cannabis cases, a variety of treatment offers is probably a useful approach, particularly as cannabis cases may have problems which are not directly related to cannabis use. Nevertheless, the effect of type of treatment offered should not be overemphasised. Indeed, as Bergmark (this monograph) highlights, there is no conclusive evidence for any specific treatment intervention for cannabis cases.

There are indications, on the other hand, that anything works, that the context of treatment and the individual's choice to enter treatment is important to treatment outcome. A summary of cannabis treatment studies by the Beckley Foundation notes that the effectiveness of cannabis treatment is not yet clear, but that there is growing evidence that it may fulfil a useful role (Hunt et al., 2006). The report further remarks that there is evidence which notes that there may be reason to move towards individual and targeted treatment through focusing on 'high risk' groups and even genetic screening. Indeed, it is a seductive idea that screening and targeting individuals may create cannabis treatment effectiveness. In light of the above result, and in light of the scarce available information, it does, however, seem that individualised solutions is a simplistic way forward that overlooks the complicated horizon related to cannabis treatment indicators, embedded in societal disapproval, in criminalisation of cannabis use, polydrug use and the highly heterogeneous make-up of the relevant clientele. In sum, this report, together with other evidence, suggests that our current understanding of and available cannabis treatment is scarce and a much more in-depth understanding of the relevant issues is needed.

Acknowledgement

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Questionnaire

Section A: Information on the agency and key-informant

In this section we would like to ask you some questions about your agency, and yourself and your position in the agency.

A1 Please give your agency's name and address.

A2 Please give your position in the agency.

A3 What is your profession?

    a   Nurse

    b   Social worker/youth worker

    c   Clinical psychologist

    d   Psychiatrist

    e   Other medical doctor

    f   Other (please specify): _____

Section B: Information on the treatment programmes

In this section we would like to get information on the structure and the type of treatment agency you are working in.

B1 How many patients/clients does your agency treat? You can answer this in whichever way you have the data:

    a   Number of 'active' patients/clients (currently in a treatment episode)

    b   Number of patients/clients seen in a week

    c   Number of patients/clients seen in a 12-month period

B2 How many of the patients/clients at your agency do you treat in one of the following settings? *Please tick off for each setting.*

	1: All	2: Many but not all	3: Approximately half	4: A few	5: None
a In the field (e.g. street work, prison work)					
b Ambulatory (e.g. outpatient, ambulatory counselling)					
c Day clinic (at least 3 hours per visit)					
d Short-term inpatient (≤1 month)					
e Long-term inpatient (> 1 month)					
f Other (please specify)_____					

B3 Please specify the importance of the different tasks at your agency. *Please tick off for each task.*

	1: Very important task	2: Important task	3: Relatively unimportant task	4: No task at all/not on offer
a On-the-spot psychosocial crisis intervention				
b Short-term psychosocial interventions: short-term counselling				
c Long-term psychosocial interventions: long-term counselling				
d Long-term rehabilitative drug therapy: long-term psychotherapy				
e Medical intervention for somatic problems				
f Detoxification				
g Harm reduction (e.g. syringe exchange, educating safer-use strategies, etc.)				
h Methadone or buprenorphine substitution				
i Heroin prescription				
j Naltrexone prescription				
k Other (please specify)_____				

Section C: Information on cannabis treatment

In this section we would like to get information on treatment programmes for cannabis cases at your treatment centre. *A treatment programme for cannabis cases* is defined as any treatment at your agency directed towards persons who are receiving treatment first of all for their cannabis consumption. By *cannabis cases* we mean persons who are enrolled at your agency mainly for their cannabis consumption. Hence, we do not want you to include patients with, for instance, heroin abuse problems who also use cannabis.

C1a At your treatment centre, are there currently any cannabis cases?

Yes

No

C1b *If no,* please jump to section E of the questionnaire. *If yes*, please proceed to the next question.

C2 Approximately what proportion of the patient case load at your agency are cannabis cases?

a   0–10%
b   11–25%
c   26–50%
d   51–75%
e   76–100%

C3 In which setting(s) are cannabis cases at your agency treated? *More than one option is possible.*

a   In a unit/service exclusively for cannabis cases
b   In a programme within a unit not exclusively for cannabis cases
c   As individual cases among drug users of all sorts
d   Other (please specify)   _____

C4 What is the average number of treatment sessions that cannabis cases at your treatment centre attend in the course of a treatment episode?
_____sessions per client/patient

C5 What are the aims for treatment of cannabis cases at your agency? *Please tick off one box for each aim.*

	1: very important aim	2: important aim	3: relatively unimportant aim	4: no aim at all
a Abstinence				
b Reduction of cannabis use				
c Harm reduction or solving practical life problems (no attempt to change cannabis consumption)				
d Other (please specify) _____				

C6 To what extent does the treatment centre emphasise the following interventions for cannabis cases? *Please tick off for each intervention.*

	1: Main part of treatment	2: Regular part of treatment	3: Not a part of treatment
a Detox from cannabis			
b Peer group counselling			
c Individual counselling			
d Family therapy/counselling			
e Milieu therapy/therapeutic community			
f Talk therapy/counselling about cannabis, relapse and treatment			
g Talk therapy/counselling about conditions of life (relationship problems, aggression training, etc.)			
h Practical help with daily life (to get social allowances, clothes, housing, education, job)			
i In-patient treatment			
j Mutual help group (e.g. Narcotics Anonymous)			
k Other (please specify) _____			

Section D: Information on the 'typical' cannabis case

In this section we wish to obtain information about how your typical cannabis cases can be characterised.

D1 What is typically the percentage of males among cannabis cases at your agency?

Male: _____ %

D2 According to your experience, how many cannabis cases are receiving help for their substance use for the first time in their life when they come in contact with your agency?

_____ % of cannabis cases treated in our agency.

D3 How many of the cannabis cases at your agency…

	1: All	2: Majority	3: Half	4: Minority	5: None
a Are 20 years old or younger?					
b Are between 21 and 30 years old?					
c Are 31 years old or older?					
d Have been using cannabis for less than a year?					
e Have been using cannabis for 5 years or longer?					

D4 Typically, how common is it that the cannabis cases are referred from the following sources? *Please tick off for each source.*

	1: Most common	2: Common	3: Not at all common
a Self-referral			
b Client's/patient's family/friend			
c School			
d Work			
e General practitioner (family doctor)			
f Psychiatrist/psychologist/social worker (out-patient or private practice)			
g Courts, probation, parole, police			
h Drug counselling agency or drug treatment unit			
i Other (please specify)_____			

D5   According to your experience, how common are the following situations for cannabis cases before they enter treatment at your agency? *Please tick off for each situation.*

	1: Most common	2: Common	3: Not at all common
a Were homeless			
b Lived in a sheltered environment (e.g. home for psychiatric cases)			
c Lived with their parent(s) or guardian(s)			
d Lived alone			
e Lived with friends			
f Lived with their own family			
g Went to school/university			
h Dropped out of school			
i Worked			
j Were unemployed			
k Had psychiatric problems			
l Had health problems			
m Had problems with the criminal justice system			
n Had family problems			
o Had financial problems			

D6   Apart from cannabis, what are the most often used substances by cannabis cases? *Please tick off for each substance.*

	1: Very often used	2: Sometimes used	3: Never used
a Heavy use of alcohol			
b Heavy use of cigarettes (more than 20 cigarettes per day)			
c Cocaine			
d Amphetamines			
e Ecstasy/hallucinogens			
f Heroin			
g More than three different substances			
h Other substances			

Section E: Information on general cannabis-related trends

In this section we would like to obtain more general information related to cannabis than the above sections.

E1a According to your knowledge, how many units exclusively for cannabis cases are there in your city?

_____(enter number)

E1b Please guess how many cannabis cases they treat altogether at one time.

_____ per week

I cannot even guess

E2 Please provide contact information for one or two other centres in your country that treat cannabis cases.

E3 Please evaluate the trend over the last 5 years. In regard to your agency, has there been:

a An increase in numbers of cannabis cases
b Stable numbers of cannabis cases
c A decrease in numbers of cannabis cases

E4a Please evaluate the trend over the last 5 years. In your country, has there been any policy change towards cannabis use?

Yes
No

E4b *If yes,* which of the following options best describe the change? *More than one option is possible.*

a More emphasis on treatment for cannabis users
b Less emphasis on treatment for cannabis users
c More emphasis on punitive approaches towards cannabis users
d Less emphasis on punitive approaches towards cannabis users
e More attention to cannabis in treatment agencies
f Less attention to cannabis in treatment agencies

E5 In your opinion, which alterations or developments would be desirable for a better treatment of your cannabis cases?

E6 We would be grateful for any further comments or observations. If you have any please indicate them below.

Chapter 15
Has treatment demand for cannabis-related disorders increased in Germany?

Keywords: cannabis – epidemiology – Germany – treatment – treatment demand

Setting the context

In Europe around 65 000 treatment demands were reported in 2005 where cannabis was cited as the primary reason for entering treatment ([1]). Cannabis use is the primary reason for entering drug treatment in about 20 % of all cases and 29 % of new treatment demands, making it the next most commonly reported drug in European treatment centres, after heroin. There are interesting variations between countries, with cannabis being cited by less than 5 % of all clients reported as entering treatment in Bulgaria, Lithuania, Poland and Romania and by more than 30 % in Hungary and France. For the remaining countries, in 12 European countries, the proportion of cannabis clients is between 5 and 20 % and in seven it is between 21 and 29 % (EMCDDA, 2007).

What has fuelled anxiety among policymakers is not that treatment demands are unmanageable. A figure of 65 000 treatment demands is a relatively small proportion of current cannabis users (13.4 million last month cannabis users in Europe), amounting to less than one in every 200 last month cannabis users. Moreover, the risk of entering treatment would seem to increase as cannabis use becomes more intensive. Cannabis clients in treatment in Europe can be divided into three groups: those who use it occasionally (34 %), those using it once to several times a week (27 %) and those using it daily (39 %). On a more general level, the 65 000 cannabis treatment demands may be compared with the 130 000 treatment demands for opioid use, from an estimated population of 1.3–1.7 million problem drug users in Europe: a demand rate of approximately 1 in 10. Additionally, given the resource-intensive treatment required by opioid clients, as opposed to the outpatient/short intervention norm for cannabis (see Rödner Sznitman, this monograph), it is clear that drug treatment should reflect the proportional risks of different licit and illicit substances.

([1]) Source: EMCDDA Statistical Bulletin 2007. Data available from 21 countries.

That said, a worrying trend is that, between 1999 and 2005, the total numbers of both new and all reported cannabis treatment demands in Europe have approximately trebled. And while the most recent data suggest that this trend may be stabilising in some countries, the fact remains that an increasing number of cannabis clients are entering drug treatment services. While cannabis-specific treatment options are available in Europe today, many drug treatment services have been developed to target 'problem drug users'; that is, those injecting opioids or reporting long-term dependence with amphetamines, crack and cocaine. The surge in demand for cannabis treatment thus implies a need to develop or adapt existing services towards cannabis client profiles (see Montanari, Griffiths and Taylor, this monograph).

The rise in treatment demands is not easy to explain on a European level. Nonetheless, some countries have sought to examine, and re-examine, the nature of cannabis treatment demand in more detail. One of these countries is Germany. This chapter suggests that the reported 500 % increase in cannabis treatment demand between 1992 and 2003 in Germany reflects a genuine increase in clinically diagnosable cases of cannabis use disorders. Alternative hypotheses to explain a rise in treatment demand — which might have included changing drug policy priorities, misdiagnosis, 'coercion' into treatment via referrals, new reporting mechanisms and data collection — were not considered significant. The chapter also reveals the type of problems experienced by those in treatment for cannabis problems in Germany.

Such a far-reaching 'revisit' of treatment demand data is useful for building a clearer picture of treatment populations, for validating results, for challenging assumptions and for checking the quality of data. One cause for optimism is that such 'deep', secondary analyses of treatment demand are increasingly common across Europe, enabling higher responsiveness to changing drug consumption patterns, both for cannabis and other drugs.

Further reading

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See also the grey literature list in the Appendix to Volume 1 of this monograph.

Has treatment demand for cannabis-related disorders increased in Germany?

Roland Simon and Ludwig Kraus

Summary

First indications in Germany suggested an increase in treatment demand for primary cannabis-related problems. These led the German National Addiction Aid Statistics (DSHS) and a research study (CARED) to analyse treatment demands. The results showed an increase of roughly 500 % in treatment admissions in outpatient treatment for this group in Germany between 1992 and 2003. Three-quarters of these cases fulfilled the clinical criteria of a cannabis-related disorder as defined by ICD-10 (F12.1, F12.2x). The remaining cases did not reach this level of clinical significance, but might indicate minor cannabis-related problems. Where multiple diagnoses exist, no indication was found that cannabis was assigned as primary drug incorrectly. As the increase in treatment admissions was similar for most types of referrals, changes in treatment admissions were very likely not caused by changing treatment availability or external pressure but by a genuine increase in treatment need. While last year prevalence of cannabis use increased considerably in the population between 1992 and 2003, treatment admissions in outpatient centres grew even faster, and it will be necessary to adapt the treatment system in Germany to this increasing group of clients.

Introduction

While for decades cannabis use has not been perceived as a problem by many addiction therapists and researchers, recent results from basic research as well as from clinical and social epidemiology support a more cautious position, which assumes a higher risk potential of cannabis, at least for some subgroups of users (Hall and Solowij, 1997; INSERM 2001; Witton, this monograph, vol. 2). Hall, Degenhardt and Teesson (2004), for example, reported that while there is no support for the hypothesis that cannabis causes psychotic disorders, there is evidence that cannabis use can precipitate schizophrenia and that cannabis use exacerbates psychoses. Patton et al. (2002) found a fourfold increase in the risk of depression and anxiety disorders among girls using cannabis on a daily basis.

First indications that outpatient treatment demands for primary cannabis-related problems might increase were reported by the German National Addiction Aid Statistics

(DSHS) in 2000 (Welsch, 2001). An increase in treatment demand could reflect the parallel rise in treatment need resulting from an increase in cannabis use as reported by population surveys (Kraus, Augustin and Orth, 2005). It is well known that drug treatment in Germany primarily focuses on injecting heroin users. Changes in treatment needs for cannabis-related problems would, therefore, require modifications in the type and organisation of treatment services provided. Increases in treatment demands within this group would also have implications for cannabis policy.

A number of possible factors that may have influenced treatment statistics were analysed to validate the assumption of a genuine and not artificial increase in treatment demand for cannabis-related disorders in outpatient care. The data analysed were derived from the DSHS, results from a recent epidemiological survey (Kraus and Augustin, 2005) and from a study on cannabis-related disorders (CARED), conducted between 2001 and 2004 (Simon et al., 2004). Artificial effects might have arisen from invalid diagnoses assigned by therapists in their daily work. As most of the staff have social work or psychology as a professional background, but no medical training, incorrect diagnoses might be assigned to clients. Other external factors might have explained the increase in treatment demand, such as increases in availability or accessibility of treatment, or increased judicial referrals into treatment. The main questions to be addressed were:

- Had there been an increase in treatment demand for primary cannabis-related problems?
- Were diagnoses for cannabis-related problems valid?
- Were there other external or confounding factors that could have caused the observed increase?
- How was the increase in treatment demand related to drug use trends in the population?

Methodology

German Addiction Aid Statistics (DSHS)

In Germany, national monitoring of drug treatment is based on the German core item set (Kerndatensatz, referred to below as 'KDS'). Within the 'client and treatment' module, the complete set of items from the EMCDDA's treatment demand indicator (TDI) protocol are used (EMCDDA, 2000). Drug use is assessed on the basis of ICD-10 criteria (WHO, 1994). Under the KDS, diagnoses can be made for each psychoactive substance (ICD-10, F10–F18), provided the criteria of harmful use or dependence syndrome are fulfilled. In case of multiple diagnoses the diagnosis related to the drug that causes the most severe problems ('primary drug') is selected as the 'main diagnosis'. The choice of diagnosis must be based on the intensity and frequency of use of the drug as well as on its negative consequences. Full operationalisation of such classifications, however, is

not part of the KDS standards. In addition, for the classification of clients the code F19.x (multiple drug use) was generally avoided in the German monitoring system when the study took place.

Aggregate data from the treatment centres are collected on an annual basis and were reported by the German Addiction Aid Statistics (DSHS) for the years 2001 to 2003 (Welsch, 2002; Welsch and Sonntag, 2003, 2004), while EBIS statistics were reported for the years before 1999 (e.g. Türk and Welsch, 2000). Analysis started in 1992 because changes in classification of disorders and substances were introduced in that year. In addition, data from the new Länder [2] of the former German Democratic Republic were included in the common statistics from 1992 onwards, making comparisons with data from earlier years impossible.

The CARED study

The study on cannabis-related disorders (CARED) was conducted in a random sample of 52 outpatient treatment centres participating in the DSHS. All of them used a common technical system for data collection (EBIS). All clients ($n = 223$), who had been treated in these centres during the year 2001 and who fulfilled the criteria of a 'cannabis client' (referred to below as 'CC'), were included in a paper-based retrospective survey. Inclusion criteria were:

1 A diagnosis of 'harmful use' or 'dependence syndrome' related to cannabis (ICD-10, F12.1 or F12.2) provided by the DSHS
2 Cannabis being the only or the primary drug ('main diagnosis').

A second group ($n = 51$) of 'cannabis clients' (CCs), who had been in treatment between December 2002 and October 2003 in the same units, was assessed during treatment using a computer-based clinical interview. Diagnoses were based on ICD-10 and DSM-IV as assessed by DIA-X (Wittchen and Pfister, 1997). The participation rate in the first group was 40 %. For the second group a rate could not be calculated as the total number of cannabis clients in treatment during this time period had not been reported by the treatment facilities. As part of the CARED study, therapists ($n = 183$) from the participating centres were also asked in a questionnaire about details of the process of assigning diagnoses and their experience with cannabis clients.

[2] Germany is divided into 16 federal states, or *Bundesländer*. The six Länder of the former East Germany that joined in 1990 are Berlin, Brandenburg, Mecklenburg-Vorpommern, Sachsen, Sachsen-Anhalt and Thüringen.

Results

Increase in treatment admissions

The absolute number of clients starting outpatient treatment with a primary cannabis-related problem (CCs) was examined for the years 1992–2003, as well as the proportion of this group among the total group of clients. In 2003, 699 treatment centres reported main diagnoses for 106 816 clients to the national treatment monitoring system (DSHS), of whom 10 169 or 9.5 % were diagnosed as CCs. This group comes third behind alcohol (59.6 %) and opiates (19.8 %). The absolute number of CCs increased over this 12-year period and the proportion within the treated clients reached 9.5 %, starting at only 2.1 % in 1992 (Table 1).

Participation in the DSHS being voluntary, the number of reporting facilities varied over time, ranging from 170 in 1992 to 699 in 2003. In order to make absolute numbers of cases comparable between reporting years, the number of clients reported was extrapolated to the total number of 1 049 outpatient treatment centres in Germany as reported for 2001 (Bundesministerium für Gesundheit, 2002) ([3]).

The estimated total numbers of admissions for all outpatient treatment centres in Germany show an increase in CCs of nearly 600 % between 1992 ($n = 2\,561$) and 2003 ($n = 15\,261$). A breakdown by gender, which was possible for the years 1999–2003, indicates similar developments for male and female clients. The proportion of women among CCs increased slightly from 16.8 % in 1999 to 18 % in 2003 (Figure 1). Thus, between 1992 and 2003 a clear increase in total treatment admissions was found in Germany for clients with a primary cannabis-related problem.

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[3] Two limitations need to be mentioned with regard to the calculations. The total number of facilities only includes units which are financially supported by the Länder, which results in an underestimation of total demand for Germany as a whole. The majority of units in Germany, however, are funded by the Länder (Welsch and Sonntag, 2004) and, thus, the resulting total should not be significantly below the real number of CCs. In the same way, using the number of units for 2001 as an estimated total, as opposed to the annual figures, might cause errors. Exact data were available only for the years 1996–2003. Inspection of this period shows no major trend in number of reporting units and, apart from the year 2002, the totals range between 951 and 1 049 units. No general legal or financial changes took place during this period that might have changed the number of treatment units. Given all these facts, the number of facilities in 2001 may serve as a proxy for this calculation.

Table 1: Number and proportion of cannabis clients within outpatient treatment: admissions 1992–2003 reported by participating centres

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total number	19980	34344	49577	57712	57252	58642	64201	65910	57621	51842	73897	106816
Cannabis clients												
Number	415	709	1028	1368	1281	1977	2623	3343	3625	3700	6368	10169
%	2.1	2.1	2.1	2.4	2.2	3.4	4.1	5.1	6.3	7.1	8.6	9,5
Number of reporting centres	170	282	396	459	432	435	461	446	401	368	454	699

Sources: EBIS reports 1994–2001 (Türk and Welsch, 2000); German Addiction Aid Statistics (Welsch, 2001, 2002; Welsch and Sonntag, 2003, 2004).

Figure 1: Admissions of clients with primary cannabis-related problems in German outpatient treatment centres, 1992 to 2003
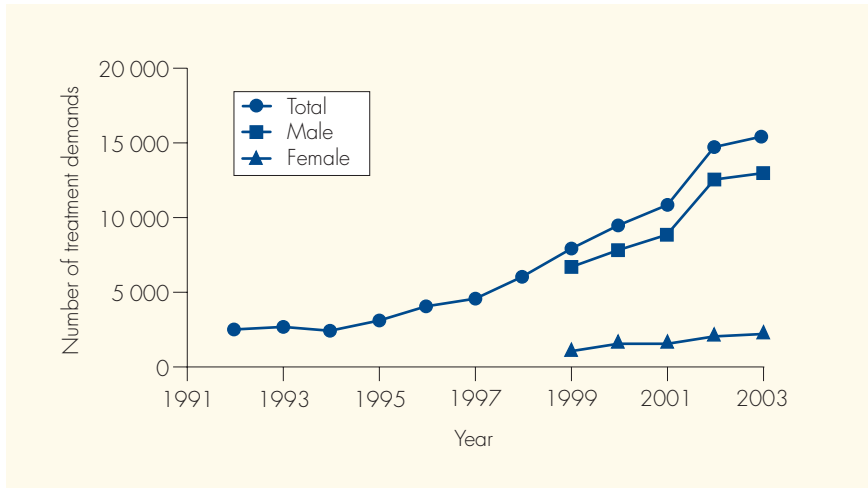
Validity of diagnoses

Diagnosis according to ICD-10

The validity of the observed trend in treatment admissions strongly depends on the quality of diagnoses based on the DSHS. This system requires an ICD-10-based classification of substance-related disorders. As part of the CARED study the diagnoses assigned by the treatment centres' staff were validated by comparing them to diagnoses reassessed by standard instruments (CIDI, DIA-X). For this purpose, questionnaires ($n = 223$) and clinical computerised interviews ($n = 51$) were conducted and diagnoses assigned in compliance with the ICD-10 criteria.

In validation studies the results of a diagnostic instrument (test) are generally compared with an observed outcome (e.g. disease). Presented in a two-by-two table, results can be assessed for (i) correct classifications, that is, cases that were correctly identified to have or not to have the disease, and (ii) incorrect classifications, that is, cases that were incorrectly classified by the test instrument as having the disease (false positives) and those cases that were incorrectly classified as not having the disease (false negatives). In this validation, the test instrument was defined as the 'gold standard' (i.e. for ascertaining the presence or absence of cannabis-related disorders) and the diagnoses selected by the treatment centres as the instrument to be validated. Since the monitoring

system only reports positive cases of CCs, the resulting validation is incomplete: only those cases can be observed that were correctly or incorrectly (false positives) classified by therapists as having the disease (cannabis-related disorder). Self-evidently, the cases that were correctly or incorrectly (false negatives) classified by the therapists as not having a cannabis-related disorder were not observable.

Table 2 shows the results of the validation analysis. Overall, 25.6 % of the clients were classified as not having a diagnosis of either harmful use or dependence if assessed by interview. Looking at the results from the opposite direction, 74.4 % of the cases were found to fulfil criteria of a clinical diagnosis.

Compared with the original diagnoses of dependence, where 62.5 % of the diagnoses were consistent, assessments were less in accordance with ICD-10 criteria if the client had received the diagnosis 'harmful use' (14.3 %). Clients with an original diagnosis of 'harmful use' received more frequently a diagnosis of 'dependence' than a diagnosis of 'harmful use' (42.9 %). Overall, distinguishing between 'dependence' and 'harmful use' in standard diagnostics is much less reliable than the general decision, whether CCs meet clinical criteria or not. On the whole, this might partly be a result of problems with the two-dimensional concept of 'abuse' or 'harmful use' and 'dependence' (Fulkerson et al., 1999).

For more than 74 % of the CCs, validation showed that clinical criteria with respect to cannabis were fulfilled, and either 'harmful use' (F12.1) or 'dependence syndrome' (F12.2x) was the resulting diagnosis. Up to one-quarter of the CCs reported by outpatient treatment centres might have cannabis-related problems that are below clinical relevance. Discriminating between 'harmful use' and 'dependence', however, does not work well in practice, a problem that can be attributed, at least to some degree, to the intrinsic weakness of the concepts themselves.

Table 2: Diagnoses in standard monitoring of treatment centres compared to diagnoses based on questionnaires or clinical interviews (ICD-10)			
	No diagnoses (%)	Harmful use ICD-10 (%)	Dependence ICD-10 (%)
Validation diagnoses based on			
Questionnaire (n = 136)	14.1	17.0	69.6
Interview (n = 39)	25.6	15.4	59.0

Source: Simon et al. (2004).

Main diagnosis and other psychoactive substances

CCs classified with a cannabis-related diagnosis need not only fulfil ICD-10 criteria. Cannabis should also be the *main* substance in cases where other substance-related diagnoses are present, and the possibility that cannabis is used as a 'label' for clients with other problems should be ruled out. In order to examine this question, the validation analysed the prevalence of other substance-related diagnoses in the group of CCs, and the criteria used to determine the main diagnosis.

This analysis of multiple diagnoses of primary cannabis clients revealed that no other substance-related disorders were found in almost two-thirds of the clients. A combination of cannabis- and alcohol-related disorders was found in 21.2 % of clients. While in most cases alcohol was involved, disorders related to stimulants without alcohol problems accounted for roughly 16 % of multiple diagnoses (Table 3).

Therapists reported that the decision about the main diagnosis was based on the consequences (65.7 %), patterns (59.3 %) and frequency of cannabis use (41.3 %). This is in line with the criteria that are also defined in the KDS for this classification. As no exact algorithm has been defined by the standards, validation cannot go beyond this basic check.

A considerable number of CCs (nearly two out of three) showed an exclusive cannabis-related diagnosis. The substance which plays the most important role after cannabis in the group of CCs is alcohol. It is not very likely that a cannabis-related diagnosis is used to hide alcohol problems. In the diagnostic process, therapists apply criteria as defined by ICD-10 and the national KDS. Thus, the classification of cannabis as a

Table 3: Multiple diagnoses amongst cannabis clients (tobacco-related diagnoses excluded)		
	Questionnaire based (n = 184)	Interview based (n = 33)
Substance-related diagnoses	%	%
Cannabis only	33.7	63.6
+ alcohol	15.2	21.2
+ amphetamines/ecstasy	12.0	6.1
+ cocaine	3.8	0.0
+ alcohol + amphetamines/ecstasy	7.6	6.1
+ alcohol + cocaine	2.2	3.0
+ alcohol + amphetamines/ecstasy + cocaine	8.2	0.0
Other combinations	17.4	0.0

Source: Simon et al. (2004).

main substance seems to be based on empirical evidence and appropriate procedures. While single cases of misclassifications may be possible, CCs may not be judged as mislabelled in relation to other psychoactive substances.

Main diagnosis and other mental disorders

The same type of misclassification as discussed for substance-related diagnoses could also take place in relation to non substance-related mental disorders. In such cases, the main problem of the clients in treatment might for example be psychosis, while cannabis problems might be only marginal. In order to analyse this question, prevalence of such diagnoses amongst CCs, as well as the correlation between disorders and the severity of cannabis-related disorders was analysed. Data are sourced from the clinical interviews of the CARED study which assessed a number of mental disorders (last 12 months) which are well known to be correlated with cannabis consumption (Hall and Solowij, 1997).

For CCs a number of such disorders was found. Close to 40% showed mood disorders, most often dysthymia (17.3%). More than one-third of the clients showed phobic disorders, and one out of eight showed anxiety disorders. There was a high rate of social phobia (17.3%) and nearly 11% of the clients suffered from psychotic disorders. Diagnoses F06.X were exclusively based on organic factors, including acute effects of drugs (Wittchen and Pfister, 1997). The majority of psychotic disorders and about one-third of the anxiety disorders and affective disorders were, therefore, more closely linked to drug use and may have been only of a short-term nature (Table 4).

Besides psychotic disorders, all diagnoses showed a high correlation with the severity of the cannabis diagnosis. Only a few cases of 'phobia' and 'mood disorder' were found where a cannabis-related diagnosis could not be validated. For these cases the basic problem might not be a cannabis-related disorder but another psychiatric problem (Table 5).

There is considerable prevalence of other psychiatric disorders amongst clients, which reflects a close relationship between cannabis use and psychiatric comorbidity found elsewhere (Hall and Solowij, 1997). As the majority of cases are linked to a validated classification of 'cannabis dependence', no misclassification arises from this, but rather these cases show additional problems which need to be taken into account and treated for this group of clients.

Table 4: Other mental disorders according to DSM-IV (clinical interview, $n = 51$)

Group of disorders	DSM-IV code	Diagnoses	%
Psychotic disorders			10.9
	F06.0	Psychotic disorder with hallucination	4.3
	F06.2	Psychotic disorders with delusion	7.8
	F23	Short psychotic disorders	2.2
Mood disorders/depression			39.1
	F06.32	Affective disorders with characteristics of depression	10.9
	F32.x	MDD, single episode	4.4
	F33.x	MDD, multiple episodes	13.0
	F34.1	Dysthymia	17.3
Anxiety disorders			15.2
	F06.4	Anxiety disorder	4.3
	F06.42	Panic attacks	10.9
	F41.0	Panic attacks without agoraphobia	2.2
	F41.1	Generalised anxiety disorder	0.0
Phobia			37.0
	F40.0	Agoraphobia without panic attacks	10.9
	F40.01	Panic disorders with agoraphobia	13.0
	F40.1	Social phobia	17.3
	F40.21	Animal phobia	6.5
	F40.22	Environmental phobia	6.5
	F40.23	Blood phobia	6.5
	F40.24	Specific phobia	4.3

Source: Simon et al., 2004.

Table 5: Groups of other mental disorders (DSM-IV) and cannabis diagnosis (ICD-10) (clinical interview, $n = 46$)

Disorders (DSM-IV)	Total (%)	Cannabis-related diagnoses		
		None (%)	Harmful use (%)	Dependence (%)
Psychotic disorders	10.9		16.7	14.8
Mood disorders	39.1	7.7	33.3	55.6
Anxiety disorders	15.2			25.9
Phobia	37.0	23.1		51.9

Source: Simon et al. (2004).

Other factors

Two external factors were discussed, which might have influenced the increase in CCs: one relates to a general increase in treatment admissions, the other to changes in referral procedures.

Overall increases in treatment admissions

Possible explanations for the increase in cannabis-related treatment admissions could be an overall improvement in (i) treatment availability; (ii) accessibility; or (iii) quality of services provided. For the years under inspection no general changes in drug policy, treatment standards or funding conditions could be observed in Germany, which may have increased the availability of or accessibility to treatment for drug users. So, the increase in cannabis-related treatment admissions cannot be attributed to these external factors.

This position is supported by data on treatment admissions for other substance-related disorders involving other drugs. A general positive shift in treatment quality or availability would most likely have increased the number of clients for all different substances alike. However, as shown in Figure 2, relative to the year 1992, the number of cannabis clients in 2003 increased sixfold, the number of clients with stimulants-related problems more than fourfold, while the number of clients with alcohol- and opioid-related problems — the main focus of treatment services up to that time — only showed a slight increase.

Figure 2: Client admissions in outpatient treatment by main drug, 1992 to 2003 (1992 = 100%)
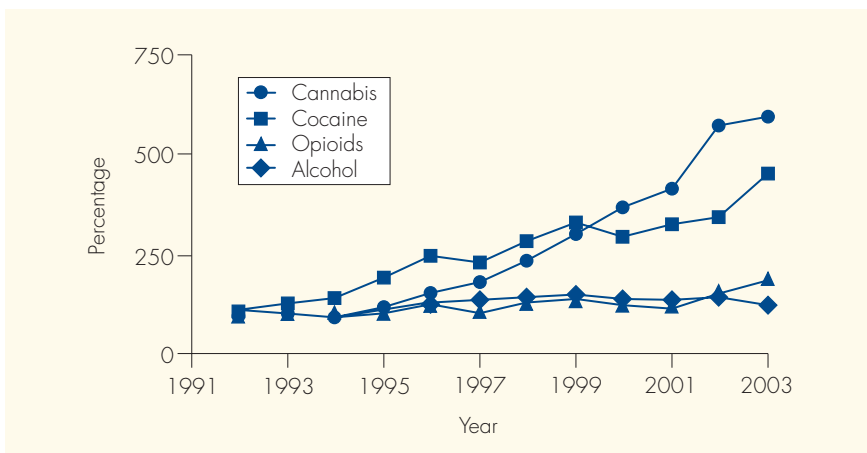
Source: EBIS reports 1994–2001 (Türk and Welsch, 2000); German Addiction Aid Statistics (Welsch, 2001, 2002; Welsch and Sonntag, 2003, 2004).

This clear increase found for CCs clearly exceeds the general trend for total treatment admissions and exceeds all other substances besides ecstasy. Apart from the fact that the absolute numbers of ecstasy-related disorders are still small, ecstasy was frequently miscoded by the treatment centres under 'other substances', which might have inflated the rates artificially. This means that there is no indication of a general increase in treatment availability. Staff measured in full-time staff member equivalents between 1996 and 2003 only increased by 1.2%, which also makes it clear that treatment availability did not change dramatically during the reporting period.

Changes in referral procedures

An increase in treatment admissions might also be the consequence of changes in referral procedures. If, for example, the Narcotic Drugs Act was enforced more rigorously than before, treatment admissions would rise without any changes taking place in the underlying medical or psychological treatment needs in the population. In order to examine this type of effect, data on treatment referrals from the years 1998 to 2003 were examined.

In 2003 more than 70% of all clients entered treatment through three main pathways: 20% were 'internally motivated' (self-motivated) and came directly to the treatment facilities; 25% were motivated by family or friends and 27% were referred through judicial or police authorities. While compared with 1998 the total number of cannabis clients in 2003 increased by 118%, the number of clients who came directly into treatment increased by 96%, referrals through justice or police by 109%. The biggest increase was due to referrals through other counselling services (Table 6).

Table 6: Access to outpatient treatment for cannabis clients					
	Compared with 1998 (= 100%)				
Referrals into treatment	2000	2001	2002	2003	Referrals in 2003 (%)
No referrals/direct access	129	141	161	196	21.5
Relatives/friends	141	153	178	195	24.5
Job/school	118	151	175	214	6.4
GP/psychotherapist	127	158	195	195	3.4
Hospital	158	182	240	236	1.7
Inpatient addiction facility	141	86	166	244	1.9
Drug counselling	149	137	239	338	1.5
Other counselling services	296	412	514	514	8.8
Justice/social administration	105	114	196	209	26.3
Others	161	207	275	286	4.1

Sources: EBIS reports 1994–2001 (Türk and Welsch, 2000); German Addiction Aid Statistics (Welsch, 2001, 2002; Welsch and Sonntag, 2003, 2004).

The hypothesis that the increase in treatment admissions of CCs was caused to a large extent by increasing pressure from law enforcement and social administration is not supported by these data. Instead, treatment admissions have increased more or less at the same extent for a number of types of referring institutions. The biggest increase was found for referrals by other counselling services, which might indicate better networking that facilitated access to drug treatment for cannabis users though these channels.

Trends in treatment demand and prevalence of cannabis use in the population

Survey data indicate that the observed increase in treatment admissions for cannabis-related disorders was accompanied by a constant increase in the prevalence of cannabis use in the general population. Between 1992 (15%) and 2003 (33%), lifetime prevalence of cannabis use was found to have significantly increased by a factor of two. In the same time, last year prevalence (4% in 1992, 12% in 2003) increased by a factor of three (Kraus, Augustin and Orth, 2005).

Population estimates of recent users (last 12 months) aged 18–29 years derived from cross-sectional surveys in 1990/92, 1995/97, 2000 and 2003 were compared with the estimated number of cannabis clients for the respective years. Survey data for 1990 were taken as proxy for 1992. The number of recent cannabis users increased from 935 000 in 1992 up to 2 105 000 in 2003. In the same period the number of clients treated for cannabis-related problems within a 1-year reporting period (admissions plus takeover from the year before) increased from 4 353 to 25 485 cases. The ratio of recent users in contact with outpatient treatment did not remain constant but increased at a disproportional rate. While, in 1992, 4.7 clients per 1 000 recent users were admitted for treatment, in 2003 12.1 users had entered treatment (Table 7).

Another way of comparing trends of recent cannabis use and treatment admissions is shown in Figure 2. Normalising the numbers of cannabis users and treatment

Table 7: Estimated number of annual cannabis users and clients				
	1992	1995	2000	2003
Cannabis users (12-month prevalence, 18–29 years)[a]	935 000[b]	1 590 000	1 918 000	2 105 000
Cannabis clients[c]	4 353	5 246	16 112	25 485
Number of clients per 1 000 users	4.7	3.3	8.4	12.1

[a]*Source*: Kraus, Augustin and Orth, 2005.
[b]1990 survey.
[c]*Source*: EBIS reports 1994–2001 (Türk and Welsch, 2000); German Addiction Aid Statistics (Welsch, 2001, 2002; Welsch and Sonntag, 2003, 2004).

Figure 3: Prevalence of last year cannabis use and cannabis clients since 1992
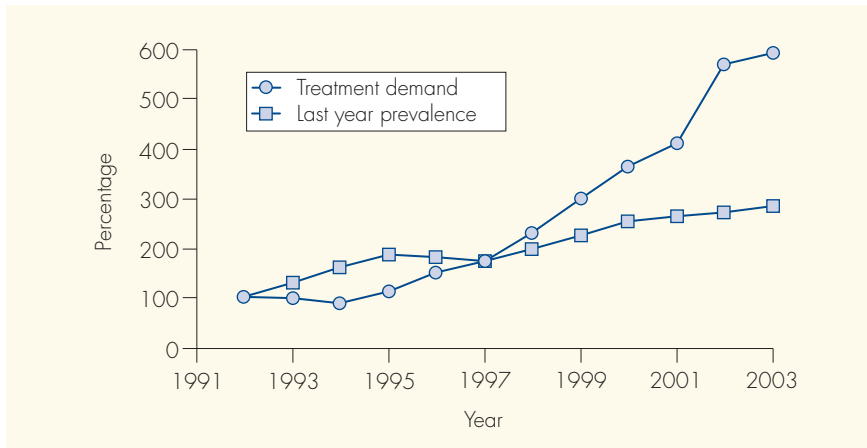
admissions for the year 1992 to an index value of 100, the changes for the consecutive years can be presented as percentages relative to the year 1992. While treatment admissions increased by 500 %, the prevalence of recent use increased by only 190 % (Figure 3).

Both analyses show that the number of clients with primary cannabis-related problems in treatment (CCs) grew faster than the prevalence of recent cannabis use in the population. A direct comparison, however, is too simple a model, since a delay of 8 years on average between start of use and entering treatment needs to be considered (Strobl et al., 2007).

Conclusions

A clear increase in treatment admissions for primary cannabis-related disorders in outpatient treatment was found in Germany between 1992 and 2003. The number of cases increased roughly by 500 %. Three-quarters of persons with cannabis-related diagnoses in the treatment statistics were diagnosed appropriately as cannabis-related disorders fulfilling clinical criteria. The remaining cases may have had cannabis-related problems, but did not reach the level of clinical significance. In cases where multiple diagnoses exist, information on the diagnostic process as well as prevalence of such diagnoses showed no indication that cannabis was assigned as main drug incorrectly. For logical reasons there is also no reason to call into question cannabis as main diagnosis for the majority of cases.

Other factors which might have influenced treatment admissions have not been analysed here. In particular, a change in the perception of risks linked to cannabis might have increased cannabis users' willingness to enrol in treatment. This, and other, hypotheses might be evaluated by future research. While in Germany and other countries cannabis-related problems were historically seen as minor and of limited relevance for public health, public debate in recent years has begun to take this topic more seriously. It will be necessary to find a new balance for a treatment system that was tailored in the past mainly to serve the needs of injecting users of heroin. In this respect, the outcome of the CARED study is in line with the results of a city-based evaluation of treatment services in Hamburg (FOGS, 2006) as well as a regional study on treatment provision in Munich (Perkonigg et al., 2004). Given the high and partly still rising prevalence of cannabis use in many European countries, this might become a problem for other countries as well (EMCDDA, 2005, 2007).

Acknowledgement

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Chapter 16
Risk factors for cannabis use

Setting the context

Lists of risk factors and protective factors are common features in the prevention and treatment literature on cannabis and other illicit drugs. Both groups of factors could relate to an individual's genetic make-up and personality, or to their familial, social and physical environment. It is beneficial to understand the range of factors that have been identified for cannabis. Moreover, it is not always easy to judge which factors carry more weight for cannabis, or to exclude factors that may not be relevant to a specific group of users' context. The diagram below (Figure 1), adapted from a UK Home Office report, offers a simplified overview of risk and protective factors.

This chapter explores the risk factors associated with cannabis use. In doing so, a distinction is drawn between cannabis use *per se* and the development of problematic cannabis use. The chapter reveals that many factors are linked with problematic cannabis use, including genetic vulnerability to certain psychological conditions, early use of tobacco and alcohol, dysfunctional family relationships, behavioural problems, peer associations, family substance use and early initiation.

Further reading

UK Home Office (2007), *Identifying and exploring young people's experiences of risk, protective factors and resilience to drug use*, Home Office Development and Practice Report, Stationery Office, London.

Figure 1: Overview of risk and protective factors

Motivations not to use		Other people's motivations to use	
Other people's disapproval	Role as a parent	Following example of others	Peer pressure
Legal consequences	Fear of addiction		Alleviate boredom
Alternative source of 'buzz'	Financial cost	'The buzz'	'To look hard'
Personal experiences with drugs		To fit in	
Fear of losing control	Role as a parent		Feel more confident
Fear of affect on health	Career aspirations	Ease physical pain	
Alternative sources of support/coping mechanisms	Financial cost	Escape	Curiosity about the effects

Factors making it easier/more difficult to refuse		Contextual risk	
Reputation as resilient to drug use	With friends who (don't) use when offered	In trouble with the police/school	Familial substance use
Type of drug offered		Boredom	Alcohol use
	Reputation as a smoker/drinker	Problematic family relationships	Mental health issues
Being 'drunk'	Age		Frequenter of recreational settings where drugs are sold
Offered by a friend/stranger		Unemployment	Member of subgroup/ youth 'tribe' (e.g. clubber)
	'Happy to be the odd one out'		

Risk factors for cannabis use

Niall Coggans

Introduction

Much effort has gone into researching the factors that increase the likelihood of using drugs (risk factors) and the factors that decrease the likelihood (protective factors) (e.g. Hawkins et al., 1992; Lloyd, 1998; Rhodes et al., 2003). The factors that influence individuals and groups to use cannabis are numerous and operate at all levels, from the individual to the social. Greater awareness of these various factors should lead to more effective and more precisely targeted educational and health promotion interventions. The purpose of this chapter is to highlight the risk factors for cannabis use.

There are two issues in relation to the title of this chapter, *risk factors for cannabis use*, that require clarification: (i) what is a risk factor and (ii) in what way or to what extent is cannabis use a problem? First, the nature of risk factors. The term risk factor is widely used in public health to identify and describe individual or social predictors of disease or undesirable conditions/behaviour. Of particular interest from a public health perspective are those factors which it is possible to reduce through prevention interventions. This is also true for drug-related health problems, including cannabis-related problems. However, do risk factors *cause* drug use and/or drug-related problems, or are risk factors predictive in that they are statistically *associated* with the behaviour in question?

A cause of a drug-related problem is something that exists prior to the drug-related problem (the effect) and the occurrence of a prior event or state of affairs would ensure, or increase the likelihood, of the drug-related problem happening. An association, on the other hand, is where there is a relationship between a drug-related problem and some other event or state of affairs. The key distinction between cause and association is that an association does not imply causation. It may be that there is a causal relationship between two associated phenomena or that the association is due to a third factor. Where an association between a risk factor and a drug-related problem has been found, a number of issues need to be investigated to assess the relationship for causality, including consistency with other studies, plausibility, temporal sequence, dose–response and strength of association (Campbell and Machin, 1999).

Taken individually, risk factors are unlikely to be causal in a direct 'if A then B' manner. Moreover, individual risk factors for drug use are unlikely to be either necessary or sufficient for the emergence of drug use and/or drug-related problems. Many of the risk factors for drug problems are mediated through individual development and social interaction. Problematic drug use is therefore the result of a complex of different risk

factors which cumulatively increase the likelihood of drug use and/or problems. In other words, risk factors do not cause, but are associated with problematic cannabis use.

Second, to what extent is cannabis use a problem? In this discussion of risk factors related to cannabis use a distinction is made between experimental or recreational use of cannabis and cannabis use that is problematic. Problematic cannabis use is usually defined in terms of diagnosed cannabis dependence or substance use disorders using standard diagnostic criteria (for more detail see Beck and Legleye, this monograph), and often includes people in treatment programmes for their cannabis-related problems. Experimental or recreational cannabis use, on the other hand, is often understood as use which is not bound up in adverse social, mental or physical health effects for the user (Coggans et al., 2004).

The extent to which drug use is actually or potentially harmful to individuals will depend on the nature and purity of the drug concerned, mode of ingestion, and the pattern of its use by the individual. Cannabis use will not necessarily continue once started, as many will stop after a period of recreational use. For example, in a longitudinal study of a sample of German cannabis users, half stopped of their own accord in their 20s (von Sydow et al., 2001). Moreover, the majority of young people who smoke cannabis do not experience cannabis-related problems (see Witton, this monograph, vol. 2). It could be argued that the term 'risk factor' is inappropriate in relation to this apparently non-problematic form of cannabis use. While it might devalue the concept of risk factors by referring to risk factors in relation to behaviour that is seen as undesirable by some people, rather than behaviour with clearly manifested problems, there remains the need to recognise that those who do develop cannabis-related problems will emerge from the wider population of cannabis users. From a prevention perspective, there is, therefore, a need to work with existing cannabis users who may not have developed cannabis-related problems in order to reduce the likelihood of their doing so. It is important to distinguish between predictive factors related to cannabis use that is non-problematic and factors that predict cannabis-related problems.

Those who use cannabis heavily and for a substantial period of their lives are considerably fewer than those who have ever used cannabis (House of Lords Select Committee on Science and Technology, 1998). While those who do use cannabis heavily over long periods of time in adulthood may develop cannabis-related problems, such as dependence, it is not the case that such use will necessarily be perceived as problematic by the users concerned (Coggans et al., 2004). Although it is a truism that there is no such thing as a safe drug, occasional 'light' use of cannabis will carry little risk for large numbers of people. Nonetheless, some people do experience problems with cannabis. Moreover, there is also concern over the potential for cannabis use among young people to compromise healthy development.

This chapter is not intended to be an exhaustive review of the field, but to provide an overview of the nature and scope of the risk factors that predispose people to problematic cannabis use, including routes to cannabis use, early initiation, social environment (family and peers), psychological risk factors, and the growing evidence of genetic risk factors. When reviewing the relevant literature, however, a problem arises, as much research on risk factors shows little concern for distinguishing harmful drug use from drug use in its own right. Moreover, it is argued here that there is a need for a coherent view of the difference between risky or non-risky cannabis use, or what constitutes problematic or non-problematic cannabis use. Thus, this chapter includes risk factors for different types of cannabis use, and this is a limitation to which more attention should be paid in future research.

The term 'problematic cannabis use' is employed here to mean cannabis use that gives rise to psychological, physiological or behavioural problems. It is not meant here to reflect only specific diagnostic criteria such as ICD-10 or DSM-IV. Nor is the term used here to reflect frequency and intensity of use beyond arbitrary cut-off points. Here, problematic cannabis use refers to cannabis use which results in health problems with substantive impacts on the individual's functioning. Potential problems include, for example, early school leaving (Lynskey et al., 2003a), mental health (Henquet et al., 2004), depression (Bovasso, 2001), dependence (Swift et al., 1998), impairment of memory and attention (Solowij et al., 2002), and respiratory functioning (Taylor et al., 2000).

Routes to cannabis use and cannabis dependence

Cannabis is often described as a 'gateway' drug to the use of other, more harmful drugs such as heroin and cocaine. While there is considerable debate over the nature of this gateway effect, if any (e.g. Morral et al., 2002), there are discernible associations between early use of tobacco, alcohol and cannabis.

Patterns of drug use progression

Kandel's stage theory of drug use — that substance use initiation and progression, in those cases where progression occurs, follows predictable stages — has informed prevention efforts (Kandel and Faust, 1975; Kandel et al., 1992). However, such predictable progression, and with it the possibility of preventive interventions, may not be the case for those more at risk of developing problematic patterns of drug use. Contrary to the Kandel model, in some cases those at risk of developing problematic drug use are more likely to have used cannabis before using alcohol and more likely to have used other illicit drugs before using cannabis (Mackesy-Amiti et al., 1997). The

point here is that the typical pattern of progression described by Kandel and others may relate more to those for whom progression to problematic use is less likely. Moreover, routes into drug use may not be as one-way as per Kandel's stage theory. For example, there is evidence that cannabis can lead to nicotine dependence (Patton et al., 2005; Amos et al., 2004).

The nature of the relationships between use of alcohol, tobacco and cannabis is the subject of ongoing debate. The Kandel stage model can be interpreted as implying a sequence of causal relationships, such that use of a prior substance is (somehow) causally related to the next substance in the sequence. More plausibly, the model is more of a description than an explanation of stages of drug use, with no implication of causality intended in its original formulation. What is less in doubt is that there are correlations between the use of cannabis and drug use progression (e.g. Blaze-Temple and Lo, 1992; Fergusson and Horwood, 2000; Lynskey et al., 2003b), and between the use of alcohol, tobacco and cannabis in adolescent populations (see also Monshouwer, Smit and Verdurmen, this monograph). Nonetheless, Lynskey et al. (2003b) noted that while there were associations between cannabis use and progression to other drugs and drug dependence, it was not possible to draw strong causal inferences about the role of cannabis.

What might explain these associations between cannabis use and use of other drugs? Lynskey et al. (1998) reported that the correlations between alcohol, tobacco and cannabis use could be explained by a general 'vulnerability to substance use' factor, based on connections with delinquent or substance-user peers, novelty seeking and parents' drug use. More recently, Morral et al. (2002) concluded that users of any drug have a greater inclination to use other drugs and argued that this general propensity theory could adequately explain apparent gateway effects.

Alcohol and tobacco

In addition to correlations between use of cannabis and more harmful drugs, there are also associations between adolescent alcohol and tobacco use, on the one hand, and cannabis use on the other. In a sample of 11- to 16-year-olds, illicit drug use (primarily cannabis for the majority of regular users of drugs) and cigarette smoking were related to alcohol use. Those who had been drunk more often were more likely to smoke cigarettes and to use other drugs (Sutherland and Willner, 1998). The associations between number of episodes of drunkenness and either cigarette use or other drug use were not age dependent. Of those who had been drunk less often, from one to five times, 13 % reported other drug use, while of those who had been drunk more than 20 times 58 % reported other drug use. Adolescents who drank more than three times in the previous week and who drank five or more units of alcohol were more likely to begin

cannabis use (Coffey et al., 2000). But another study found that there was no statistically significant relationship between drinking in adolescence and cannabis dependence in early adulthood, after possible confounding factors had been taken into account (Wells et al., 2004).

Adolescents who smoke tobacco are at greater risk of developing cannabis dependence by their mid-20s (Lewinsohn et al., 1999; Coffey et al., 2000). A recent longitudinal study in which data were gathered from participants at 11 years and 20 years of age reported that 'persistent' tobacco smokers were more likely to use cannabis and to develop dependence on cannabis, as well as to use other drugs and develop dependence on other drugs (Vega and Gil, 2005). Coffey et al. (2000) also demonstrated that tobacco smoking and not alcohol was a risk factor for the transition from experimental cannabis use to a more established cannabis habit, with greater degree of tobacco smoking being predictive of subsequent greater cannabis use.

A fundamental issue with cannabis, alcohol and tobacco is whether the gateway theory is anything other than an artefact of patterns of typical drug use initiation and progression. It has been argued that the overriding trend in drug use over time is for young people to reduce their illicit drug use and that problematic drug use is best predicted by family, social and psychological deficits (Peele and Brodsky, 1997).

In many ways the numerous studies of drug initiation and progression provide descriptions of routes to drug use. For the more fundamental issue of explanation there is a need to consider the individual and social context in which these routes are recorded.

Age of initiation

Social, childhood and behavioural problems are associated with early onset of cannabis use, which in turn can lead to later association with substance users and educational disengagement. In turn, these latter risk factors can lead to development of a range of psychosocial risk factors that increase the likelihood of substance-related problems (Fergusson and Horwood, 1997). Comparison of recent-cannabis-onset adolescents and adults found that those who start to use cannabis in adolescence are more likely to develop cannabis dependence than adults who initiate cannabis use (Chen and Anthony, 2003). Children who manifest behavioural disinhibition are at elevated risk of starting to drink alcohol at an early age (King et al., 2004). Moreover, early initiation of alcohol use is associated with increased risk of substance use disorders (McGue et al., 2001). Cannabis users who began using cannabis before late adolescence, and had used three or more other drugs before starting cannabis, were at higher risk of developing cannabis dependence within 2 years of onset (Chen et al., 2005).

An investigation of the early onset cannabis users, who started using before they were 17 years old, revealed an association with reduced measures of verbal IQ. One possible explanation for this is that cannabis adversely, and durably, affects cognitive faculties in younger people whose brains are still developing (Pope et al., 2003). It is also possible, however, that poorer verbal IQ is a consequence of disengagement from mainstream education, which is a risk factor for early cannabis use. Such disengagement from the educational mainstream may be reinforced by cannabis use. Indeed, Pope et al. (2003) speculate that the early onset users in this study had lower verbal IQs because they were less motivated to engage with education. Although far from conclusive, these data are consistent with other studies that show an association between poor educational status and early onset of cannabis use (Lynskey et al., 2003b).

Adolescents with substance use disorders and adults with substance use disorders who had initiated cannabis use in adolescence were quicker to develop dependence, have behavioural problems and major depression, than comparison groups who started cannabis use in early or later adulthood (Clark et al., 1998b).

Young people who are exposed to drug use may be more likely to initiate drug use themselves, at least on the basis of the argument that exposure provides both drug-using models (parents, siblings, peers) and availability of drugs. The younger children are when they experience such models and availability, the greater the risk of initiation at an early age, with a consequent elevated risk of developing problematic use in later years. One study of Scottish pre-adolescents (10–12 years of age) found that over a third had been exposed to drug use and one in seven had been offered drugs (McIntosh et al., 2003). McKeganey et al. (2004) found that those 10- to 12-year-olds who had initiated drug use (in most cases cannabis) were more likely to use tobacco and alcohol, and have problem behaviour and family difficulties. Pre-adolescents (defined as 10–12 years of age) who used tobacco and had behavioural problems were at risk of early adolescent cannabis use (Clark et al., 1998a).

Evident from the research findings, which show an association between early onset and later problematic cannabis use, is that the association may not be causative. Indeed, as highlighted by Lloyd (1998), early onset use may only be an indicator of other risk factors that predict later problematic drug use. Thus, age itself might be less the issue than the interplay of other risk factors.

Other risk factors that have to be taken into account are the influences of family and peers, psychological risk factors and genetic factors.

Social environment: family

The family and peer networks have received great attention in risk factor research (Rhodes et al., 2003). A study of 14- to 15-year-olds across five European cities concluded that 'attachment to mothers' inhibited drug use, an aspect of family relationships that appears to be more important for boys than girls. This protective factor was more important than living with both parents. However, this protective factor does not extend to antisocial young people (McArdle et al., 2002).

Kosterman et al. (2000) studied initiation of alcohol and cannabis use among adolescents and found that exposure to others who use drugs increases the risk of early initiation of cannabis use; as do parents who are not 'proactive' and/or parents who fail to set clear 'family standards'. Chen et al. (2004) make the point that initiation to tobacco use is more likely to occur in a social environment that is tolerant of smoking.

Foxcroft and Lowe (1995) found relationships between adolescents' perceptions of parent-centred authoritarian or neglectful family life and use of alcohol, tobacco and some illicit drugs. However, this was not observed for cannabis use. In other words, cannabis use *per se* was not related to pathological family relations in the way that other drug use was. In light of what is known about the risks of dysfunctional family relationships for elevation of risk for problematic use, it may be that cannabis use in this sample was non-problematic.

Young people exposed to stressors in the family, such as disrupted family structure and poor quality of family relationships, are more likely to use cannabis and to develop problematic patterns of cannabis use (Butters, 2002). Moreover, a compounding effect in terms of school problems was found in this study: family disruption elevated the likelihood of school problems, which in turn increased the chances of developing problematic cannabis use. The confounding nature of the risk factors delinquency and school problems with cannabis use was also highlighted in an American study of nearly 14 000 11- to 21-year-olds (van den Bree and Pickworth, 2005). Children with social disadvantage, dysfunctional family life and behavioural problems are more likely to become adolescents who associate with delinquent or drug-using peers (Fergusson and Horwood, 2000). A recent study of a sample of adolescents in Turkey noted the significant statistical association between cannabis use and cannabis-using peers (Tot et al., 2004).

The extent of parental monitoring of children's activities may influence likelihood of substance use, such that lower levels of monitoring increased the risk of initiation of drug use (Chilcoat et al., 1995; Bukstein, 1995; Kandel, 1996). Lack of closeness in parents' relationships with their children, and inadequate time spent by parents with their children are risk factors (Bukstein, 1995; Hawkins et al., 1992; Kandel, 1996). To

some extent, this implies that the causal direction is one-way. It is likely that the process is more complex, with some degree of influence of children's behaviour on their parents or carers.

There is much about the precise nature of the relationships within high-risk families that is not known, such as the characteristics of the parents and the ways in which they interact with their children. A study of the comorbidity of drug misuse and anxiety disorders in families found that young adolescents' drug use was more strongly associated with parental drug misuse (diagnosed as having alcohol or drug disorders) than with diagnosed parental anxiety disorders. Children of drug misusers were, along with controls, less likely to manifest anxiety disorders than children of parents with anxiety disorders. Children of drug misusers were more likely to have behavioural problems, itself a risk factor for drug use and drug problems (Merikangas et al., 1998).

It is evident that the quality of relationships within the family is important in terms of emotional support, parenting style, control and family disruption. However, the relationship between these factors and cannabis use or problematic cannabis use is probably indirect in the sense that the presence of such factors increase the likelihood of young people developing emotional and behavioural problems in general. And it is the development of these problems that increase the chances of developing problematic patterns of drugs use.

As young people grow and develop, the influence of the family wanes in many cases as the influence of peers increases.

Social environment: peers

That cannabis users' peers are more likely to smoke cannabis than the peers of non-users is a commonplace of the literature. There is a need for considerable caution in going beyond the data when interpreting statistical associations between cannabis users and their peers' cannabis use. In many cases it is not possible to specify the nature of the association: that is, does A cause B, vice versa, or neither? Yet, on the basis of such data it has often been asserted that drug-using peers somehow pressure or encourage drug use in their non-drug-using peers. Peer preference is a more plausible interpretation, such that those inclined to the use of cannabis deliberately associate with others who do so (Coggans and McKellar, 1994). For example, peers may in some instances encourage or even coerce others to take drugs, but there is a need to recognise that peer influences can take different forms, ranging from tolerance of drug use, through support of drug use to active encouragement of drug use. Often young people actively assort themselves to form groups which share similar interests and aspirations, which do not fit with (bad) pusher and (innocent) victim stereotypes.

Changes of frequency in adolescent drug use have been found to precede changes in peer variables (Farrell and Danish, 1993). These researchers also analysed their data in different ways in order to compare three different hypothetical models, namely, a) drug use was a consequence of emotional restraint (ability to deal with negative affect) and peer variables (drug using peers and peer pressure); b) drug use was a cause of changes in emotional restraint and peer variables; and c) a reciprocal model that included both causes and consequences of drug use. While all three models 'fit the data fairly well', the reciprocal model was the best fit. Of particular note was their conclusion that 'peer drug models and peer pressure were not related to subsequent changes in gateway drug use' and 'changes in peer drug models were … predicted by previous levels of gateway drug use' (Farrell and Danish, 1993: 327). The authors also drew attention to the need for caution with data of this kind and emphasised the importance of studying dynamic models that address both the causes and the consequences of drug use.

Dobkin et al. (1995) examined the antecedents of early onset substance use in male adolescents and reported that individual characteristics were better predictors than association with deviant friends. They concluded that the argument that deviant youth seek out like-minded friends was plausible. Kandel (1996) suggested that the influence of peers on adolescent substance use has generally been overestimated, that this overestimate has tended to be at least double the actual effect, and that selection is at least as important as influence, if not more. Other researchers concluded from their review of the literature that selection 'may make a substantial contribution to the association between drug behaviors of friends, and that failure to control for selection may overestimate the contribution of influence' (Bauman and Ennett, 1996: 188). All of which emphasises the need to understand the factors that predispose young people to select drug-using associates.

A risk factor for cannabis users' transition to problematic cannabis use is having more friends who use drugs and less perceived parental disapproval of cannabis, with the effects found to be greater for adolescent females than males (Butters, 2004). Not all cannabis users with cannabis-using peers will progress to problematic cannabis use. Progression to problematic cannabis use will depend on other risk factors and how these interact with the risks associated with cannabis-using peers.

Interactions within the school environment have been identified as important, although it can be difficult to disentangle the relative contribution of social relationships and educational experience as potential risk factors. For example, poor academic performance and classroom behaviour were found to be important risk factors for boys in particular (Hops et al., 1999). Lower attachment to school has been associated with higher levels of substance use (Ennett et al., 1997) and academic performance linked with subsequent academic and home self-esteem (Filozof et al., 1998). However, others

have cautioned against too great an emphasis on self-esteem in prevention initiatives, due to uncertainty over the relationship between (low) self-esteem and substance use (Schroeder et al., 1993). Nonetheless, academic failure is a risk factor for adolescent drug use, as is low commitment to school (Hawkins et al., 1992).

The influence of peer pressure, especially when perceived as some form of coercion, has been overstated. More subtle forms of peer influence, such as attractive role models, are likely to have an influence. When young people with emotional or behavioural problems perceive cannabis-using others as attractive role models then they may be more likely to adopt similar behaviours. The difference between a young person who, with cannabis-using role models, becomes a cannabis user, on the one hand, and a problematic cannabis user, on the other hand, is explicable by presence of other risk factors described in earlier sections.

Psychological risk factors

Rhodes et al. (2003) point out that within the European literature, there is considerable agreement that there are correlations between problematic drug use and a variety of problematic behaviours. Conduct problems precede and influence early initiation of cannabis, the onset of which is greater where there is also early tobacco use (Pederson et al., 2001). There are also gender-specific influences of different aspects of problem behaviour prior to cannabis initiation. More serious conduct problems were an important predictor of cannabis initiation in boys, while aggressive and covert conduct problems predicted cannabis initiation in girls.

In a study of 15- to 16-year-olds, the heavier users of cannabis were characterised in three groups, according to a range of behavioural, relationship and psychological measures: namely, 'antisocial', 'unhappy' or 'ordinary' (Miller and Plant, 2002). While the antisocial and unhappy groups of young heavy cannabis users had already exhibited negative behaviours, including other substance use, the ordinary group were less likely to be heavy users of other substances. All of which is a reminder that cannabis use and even heavy cannabis use is not in itself sufficient to lead to problematic use of other drugs.

In a sample of 12- to 18-year-olds in treatment for cannabis abuse or dependence, most had a range of psychological and behavioural problems (Tims et al., 2002). Those with higher levels of drug misuse had problems with relationships, and with their psychological and physical health. The extent to which cannabis use, on the one hand, and individual and social circumstance (historical or present) on the other, are causal is difficult to specify. There is every likelihood that those with personal difficulties who subsequently use cannabis will exacerbate these problems.

In a study of French 15- to 22-year-olds, 'borderline symptomatology' for a range of personality problems appeared to influence motivations for cannabis use, in particular expansion of awareness. However, mood enhancement for boys and expansion of awareness for girls were better predictors of cannabis use than psychological problems. While cannabis dependence in boys was related to psychological problems, it was related to motivation for expanded awareness in girls (Chabrol et al., 2005). 'Permissive' beliefs about the nature and utility of cannabis is associated with cannabis use but not dependence, while beliefs that cannabis would ameliorate anxiety, boredom and 'suffering', and improve mood, were the only predictors of cannabis dependence (Chabrol et al., 2004).

In a similar vein, a study that related perceived functions of cannabis to cannabis use and to amount of use found that those who used for respite from negative moods were at risk of developing problems with cannabis. This contrasts with those who used cannabis for social functions, which was not related to degree of cannabis use (Boys and Marsden, 2003).

There is much current debate about the potential for cannabis to exacerbate or precipitate psychosis (see Witton, this monograph, vol. 2). However, psychotic symptoms can also precede cannabis use. While the debate over common vulnerability versus bidirectional causal pathways between cannabis and psychosis continues, psychotic symptoms were found to be a risk factor for subsequent cannabis use in a recent 14-year follow-up study in the Netherlands (Ferdinand et al., 2005).

A recent study in Germany found that, in a sample of mid- to late adolescents, use of cannabis was predicted by a personality construct defined as 'addiction'. However, cannabis use was more likely among young people who scored low on a measure of anxiety–depression and that those who had a positive self-image were more likely to use cannabis (Kirkcaldy et al., 2004). The cannabis use measure in these analyses was lifetime use.

Investigation of 13- to 19-year-olds with diagnosed major depression, conduct disorder and substance dependence found that adolescents with major depression were more likely to develop cannabis dependence than adolescents whose depression manifested at the same time as substance dependence or whose depression developed subsequent to cannabis substance use disorder (Libby et al., 2005).

There are associations between various psychological and behavioural problems and problematic drug use including problematic cannabis use. In such cases, problematic cannabis use is in part symptomatic of psychological and behavioural problems and in part likely to exacerbate psychological and behavioural problems.

Genetic factors

The epidemiology of drug use is increasingly informed by research into genetic influences and it appears that the role of genetic influences is greater for drug problems than for drug use (Kendler et al., 2003). But this is a complex issue and the specific genes involved and the nature of their interactions with environmental factors are issues for further research. Nonetheless, the distinction between drug use and escalation to drug problems appears to be in terms of the relative influence of genetic and environmental factors. Genetic risk factors are vulnerabilities for conditions that in turn increase the likelihood of developing drug problems (Moss et al., 2002). Both genetic and environmental influences are non-specific in their influence in terms of drugs that are used or with which users develop problems (Kendler et al., 2003).

Genetic factors interacted with family environmental factors in the origins of disruptive behaviour in a study of sons of substance and non-substance misusing families (Majumnder et al., 1998). In substance-misusing families, sons with disruptive behaviour were influenced by parental dysfunction and family environment, while in non-substance-misusing families sons with disruptive behaviour were influenced by family environment. Family and social factors were related to cannabis initiation, while genetic factors influenced progression to problematic cannabis use in a study of twin girls (Kendler and Prescott, 1998).

Genetic influences account more for cannabis dependence than they do for cannabis use, while common environmental influences explained more cannabis use than cannabis dependence, supporting an individual vulnerability perspective on development of cannabis problems (van den Bree et al., 1998). Miles et al. (2001) found broadly equivalent genetic and environmental influences on cannabis use.

The genetic influence on cannabis use may be in terms of a genetic basis for sensation-seeking or problem behaviour, while genetic influence on problematic cannabis use may be in terms of a genetic basis for drug sensitivity and/or subjective reactions to cannabis (Agrawal and Lynskey, 2006). Genetic factors may explain in part why many cannabis users develop problematic cannabis use or escalation to drug problems of other kinds. While there will also be people with problematic cannabis use who are not at elevated genetic risk of substance-related problems, better understanding of how genetic factors are expressed and how they interact with environmental factors is a potentially valuable area of future research.

Implications for prevention

In order to be successful, prevention interventions should address risk factors, taking into account the distinctions between cannabis use and problematic cannabis use, with

recognition that different kinds of prevention interventions will be required depending on the risk factors being tackled. Universal (primary prevention) programmes will in all likelihood not work with young people whose risk factor load is greater. Such young people, whose backgrounds include family strife, behavioural difficulties, and so on, will not only be less likely to gain from universal programmes due to their nature, they will be less likely to participate in them by, for example, being less likely to attend school.

Prevention of cannabis initiation has been attempted for many years in the context of universal drug education programmes with little or no success. These universal prevention interventions typically target entire populations of school pupils of specific ages, usually in early adolescence and more recently in pre-adolescence. Evaluation of the success of such programmes is usually defined as prevention of onset (primary prevention). Even the most successful of universal primary prevention drug education programmes have notably poor outcomes, with, at best, small-scale success (Coggans and Watson, 1995; Coggans et al., 2002; Tobler and Stratton, 1997; Advisory Council on the Misuse of Drugs, 2006). The more successful of these interventions attempt to influence aspects of social competence and self-esteem as well as drug-related knowledge and attitudes. Such attempts to promote social competence (life skills) could, in theory, ameliorate the risks of cannabis and other drug use by equipping young people with the skills to cope with a social environment that facilitates drug use. However, this type of primary prevention may work best with those young people who are less likely to escalate cannabis use to problematic levels. Moreover, at least one such programme does not impact on mediating life skills as expected (Coggans et al., 2002).

Given that the risk factors for experimental and recreational cannabis use are in many ways qualitatively different from the risk factors for problematic cannabis use, this lack of impact on cannabis initiation and on putative mediating factors is perhaps to be expected. However, those at risk of progression to problematic use may well benefit from interventions that aim to prevent escalation by addressing the psychological and behavioural factors that are risk factors for problematic use. However, such interventions require approaches targeted precisely at the individuals and groups at risk.

The recent report from the Advisory Council on the Misuse of Drugs (ACMD) (2006) concluded that the risk factors for hazardous drug use are early life experiences, family relationships and circumstances, and parental attitudes and behaviour. The ACMD also noted that it is not easy to predict who will develop serious problems. The role of parents is important, and many will not realise the extent of their potential role in the prevention of drug use problems and, most importantly, how to relate to their children in ways that maximise the influence of this central protective factor. While there is a growing awareness of the need for parent-oriented interventions, there have been few evaluations of drug education interventions aimed at parents. Positive impact

on mediating variables such as parent–child communication, normative beliefs and intentions to use has been reported, but there are also problems of low uptake and potential stigmatisation of higher-risk parents (Allot et al., 1999).

Summary and conclusions

There is a complex of potential risk factors that interact with each other to compound and increase the risk of cannabis- and other drug-related problems. The weight of evidence is that risk factors for problematic cannabis use are, in large part, to be found in the interactions between genetic factors, the early nurturing of people and their circumstances. In many ways these are risk factors for substance-related problems generally. The evidence is accumulating for individual vulnerability to drug-related problems. While most cannabis users restrict their preferred drug use and can do so presumably on the basis of the absence of risk factors/presence of protective factors, others develop problematic relationships with drugs. Such problematic relationships with drugs include drug effects as risk factors for intensifying or precipitating psychological or social problems in turn.

The influence of risk factors is cumulative, both in terms of interaction with each other and in terms of time. The more that multiple risk factors accumulate over time the more likely that developmental and behavioural problems will become evident (Loxley et al., 2004). Behavioural problems, association with delinquent or deviant drug-using peers, dysfunctional family relationships, exposure to family substance misuse and genetic vulnerability to psychological conditions that increase the likelihood of drug problems all contribute to this complex of risk factors for problematic cannabis use. In the light of the varied, interactive and potentially confounding nature of risk factors for cannabis-related problems, prevention efforts need to be diverse. Universal programmes have a role to play in communicating key information and raising awareness of risks, but are unlikely to have any substantial impact on problematic cannabis users. Vulnerable groups and individuals require more precise targeting and delivery of programmes that will address their specific needs (see Burkhart, this monograph).

This chapter has drawn on a wide range of research literature assessing the role of various factors from the genetic to the social. Full justice will not have been done to the social and cultural differences across all the different settings in which the data were gathered for these research reports. To what extent are the conclusions justified without exploring these social and cultural contexts further? This is an empirical question. However, given the need to distinguish between recreational and problematic cannabis use in relation to the utility of the risk factors approach, it may be that there is a need to make the same distinction for other drugs as well. The potential for the risk factors approach to inform prevention efforts will depend in many respects on greater

understanding of the social norms and cultural factors related to recreational and problematic patterns of drug use.

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Appendix: approaching cannabis research — a quick guide

Approaching cannabis research — a quick guide

During the editing of this monograph, the EMCDDA soon realised that the publication was entering a crowded arena. Cannabis monographs appear several times a year in different languages. The core information they contain is being continuously revamped, revised, reworked, remixed or just repeated.

A concern for the Centre was to avoid the near-instant obsolescence of many cannabis monographs. This is why the publication takes a 'reader' approach, mapping current publication flows; sketching the history of cannabis monographs and identifying key sources for information. This appendix aims to (i) identify the main producers of literature on cannabis and (ii) illustrate the range in thematic focus of publications. In particular, it will help researchers who are new to the area or who are entering cannabis research from other disciplines (law, medicine, politics, sociology, etc.).

Information overload on cannabis, and the need for a trusted guide

Any researcher requiring definitive, accurate information on cannabis needs to be forearmed. In the age of the Internet, any taboos that may previously have hushed discussion on illicit drugs have vanished. On the contrary, researchers are overwhelmed with data (Table 1). Like drinking water from a firehose, it becomes impossible to manage the sheer volume of insider guides, reports and general punditry on cannabis. Cannabis has even evolved to have its own portal on Wikipedia, alongside such all-encompassing subjects as science, history and medicine. A recent Spanish study on the use of the Internet for finding drugs over several months found that Spanish search engine registered 31 800 000 searches for the word 'cannabis', 481 000 for 'marihuana efectos' and 358 000 for 'cultivo de marihuana'.

Table 1: Basic internet search results (October 2006)		
Internet search used	Search terms	Hits
Google	'cannabis', 'marihuana', 'marijuana'	18 400 000; 7 030 000; 26 900 000
Google Books	'Cannabis', 'marihuana', 'marijuana'	66 000; 46 400; 148 000
Google Books	'Cannabis 2006'	1 140
Google Scholar	'Cannabis', 'marihuana', 'marijuana'	94 500; 9 570; 112 000
PubMed	'Cannabis', 'marihuana', 'marijuana'	9 099; 6 000; 10 812
Bireme	'Cannabis'	3 723 (Medline); 462 (Cochrane); 270 (LILACS); 23 (SciELO)
Amazon.com books	'Cannabis', 'marihuana', 'marijuana'	8 539
Yahoo	'Cannabis', 'marihuana/marijuana' ([1])	14 400 000; 30 500 000

([1]) Yahoo tracks 'marihuana' and 'marijuana' as a single search term.

Information exchange among cannabis experts: journals, conferences and community

Faced with such a huge amount of information, where does one begin? The first step is to be able to identify the producers of quality scientific information. Scientific publications on cannabis are by-and-large the product of constant information exchange among academics and governments. In addition to standard forums for research (e.g. PubMed- and Medline-listed journals ([1]), HON-accredited websites) and annual cyclical publications ([2]), there exists a well-attended circuit of face-to-face meetings with a domestic, regional and international scope ([3]). An overview of websites focusing on drugs issues (NGOs, government campaigns) in Europe is provided by the Elisad Gateway. Some of these events focus purely on cannabis, but the majority discuss cannabis together with other illicit drugs, legal or healthcare topics. These cyclical meetings are increasingly bolstered by one-off conferences focusing on selected cannabis issues (legislation, treatment, medicinal cannabis, cannabinoid research). The result is a sizeable, yet close-knit network of global cannabis experts.

([1]) An invaluable tool for the preparation of this monograph has been the open source referencing tool, *Jabref*, which offers fast searches and abstracts of *Medline* literature.
([2]) Annual publications include: the UNODC's World Drugs Report, EMCDDA's Annual Report and Reitox national focal point reports, the ONDCP *Annual report*, SAMSHA's National Survey on Drug Use and Health and the NDIC's annual National Drug Threat Assessment in the USA.
([3]) A useful information source for meetings with a European focus is the events section of EMCDDA's quarterly newsletter, *DrugNet Europe*.

A hierarchy in expertise: the 'cannabis research pyramid'

A three-tier pyramid can be created in terms of global expertise on the subject. On the bottom tier there are tens of thousands of practitioners: various healthcare and drugs professionals, together with employees of think tanks, charities and governments. To some extent, established lobbyist groups, for example NORML and EURAD, can be included in this tier. In the middle tier, there are some 2000 to 3000 cannabis experts working in research institutions. The majority of these are working directly with drugs issues. The top tier comprises around 200 to 300 leading authorities who are generally working at centres of excellence in cannabis research and playing an active role in informing government policy. The middle and top tiers are the typical publishers of general monographs on cannabis.

Top tier: several hundred experts

Centres of excellence in cannabis research.

National and international drugs coordination centres.

International cannabis research societies, e.g. National Drug and Alcohol Research Centre, Australia; National Addiction Centre, UK; Trimbos Institute, the Netherlands; National Institute of Drugs Dependence, China; Centre for Addictions Research, Canada; Addiction Research Centre, Canada; The Institute for Clinical Research, Germany; Sociedad Española De Investigación Sobre Cannaboides, Spain; International Association for Cannabis as Medicine; European Association of Addiction Therapy; National Institute on Drug Abuse, USA.

Middle tier: several thousand people worldwide

Drugs professionals specialising in cannabis: predominantly at national treatment centres and domestic centres of excellence.

Educational institutions involved in cannabis RCTs and testing.

Psychiatrists/treatment professionals working in a national advisory role on cannabis issues.

Commercial research laboratories involved in cannabis therapeutics.

Government policymakers working specifically on drugs control and legislation.

Law enforcement professionals with experience in cannabis control, arrests and seizures.

Bottom tier: tens of thousands of people worldwide

Drugs professionals: local and regional treatment centres and clinics, prevention campaigns, drugs charities.

Healthcare practitioners: general practitioners, psychiatrists, psychologists.

Civil servants: working at government ministries, international organisations (UNODC, EMCDDA, WHO), healthcare providers.

Law enforcement: police, customs, international police organisations (Interpol, Europol), drug enforcement units (DEA).

Educational institutions: teaching centres, postgraduate and postdoctoral researchers.

Commercial research: medicinal cannabis and hemp industries.

Lobbyists: international think tanks (e.g. Pompidou Group, Senlis Council, RAND), domestic think tanks (e.g. Rowntree Foundation), legalisation lobbyists (NORML) and anti-legalisation lobbyists.

Core outputs of the pyramid: journals, commercial publishing, grey literature

Outputs from this research pyramid are dominated by the so-called 'grey literature' — that is, publications by government departments, NGOs and international organisations (this monograph being no exception). Other publications include special issues in academic journals, publications by lobbyists, as well as commercially oriented books. On a more passive level, the pyramid also helps to inform the several hundred journalistic articles on cannabis published each day in the world's media by providing expert opinions, background information and quotes to the press. As such, the cannabis experts in the pyramid provide a useful calmative influence on a subject that is often discussed in alarmist, confrontational or heavily politicised tones. The outputs can

broadly be categorised into academic journals, commercial publications and grey literature.

Journals

Scholarly research into cannabis appears many times per month across a variety of academic journals, in particular journals focused on drugs, psychiatry, public health, science and medicine, and increasingly those focusing on sociology, law and media studies (Table 2). There occasionally appear 'special focus' editions on cannabis in journals. Examples include *SWAPS — Spéciale Cannabis* (Pialoux (ed.), 2003), *Monográfico Cannabis — Revista Española de Drogodependencias Vol. 30* (AESED, 2003). A useful list of scientific journals publishing on drugs issues can be found using the members list of the International Society of Addiction Journal Editors (http://www.parint.org/isajewebsite/).

Table 2: A selection of academic journals regularly covering cannabis	
Subject area	**Journal titles**
Drugs and addiction	*Addiction, Addictive Behaviours, American Journal of Addictions, British Journal of Addiction, Bulletin on Narcotics, Drug and Alcohol Dependence, Drug and Alcohol Review, Drugs: education, prevention and policy; European Addiction Research, Harm Reduction Journal, International Journal of Drug Policy, Italian Journal on Drug Addiction and Alcoholism (Bollettino per le Farmacodipendenze e L'alcoolismo), The International Journal of the Addictions, International Journal of Mental Health & Addiction, Journal of Drug Issues, Prevention & Policy, Journal of Substance Abuse Treatment, SWAPS, Revista Española de Drogodependencias, Substance Use and Misuse, THS — La revue des addictions, The Cannabis Health Journal, Wiener Zeitschrift für Suchtforschung*
Psychiatry	*British Journal of Psychiatry, The American Journal of Psychiatry, Psychotropes*
Neurology	*Brain, Neurology, Neuropharmacology, Psychopharmacology*
Science	*Nature, New Scientist*
Medicine and pharmacology	*Annales de toxicologie analytique, Annales pharmaceutiques françaises, Clinical Pharmacology and Therapeutics, Journal of the American Medical Association, Journal of Cannabis Therapeutics, Cannabinoids: The Journal of the International Association for Cannabis as Medicine (2001–2004), Journal of Pharmacy and Pharmacology, The Lancet, British Medical Journal, European Journal of Clinical Pharmacology*
Sociology	*The Humanist, Journal of Sociology and Social Welfare*
Law and criminology	*The Cambridge Law Journal, European Journal on Criminal Policy and Research, Forensic Science International, International Journal of Drug Testing, Journal of Police Science and Management, European Review, Policy Review, Vanderbilt Journal of Transnational Law*

Commercial publishing

Outside academia, cannabis has sparked what can only be termed a publishing phenomenon in the past two decades, embracing all bookselling genres (Table 3). There have been novels and literary anthologies, political tracts, dedicated magazines such as *The High Times,* connoisseurship columns in mainstream magazines and newspapers, product and cultural histories, biographies (by traffickers, drugs detectives, musicians, actors), practical growguides, cannabis-oriented travel guides and cookbooks, not to mention a wealth of educational and harm reduction materials. While some of these are found only at headshops and specialised booksellers, others have entered bestseller lists. Cannabis, it seems, is a mainstream topic that attracts a commercially viable readership.

Grey literature

As mentioned above, grey literature producers, such as NGOs and government agencies, are significant publishers of information on cannabis. The appendix to Volume 1 of this monograph provides a selection of key grey literature publications on cannabis published in recent years. Naturally, this list is non-exhaustive, yet it remains valuable for researchers. Just as this monograph is unlikely to be the last specialised publication on cannabis for the EMCDDA, so will peer organisations revisit the topic as issues of science, data and policy evolve.

Table 3: A selection of recent books published on cannabis in three genres and three languages (genres: history, society/politics, health/medicine; languages: English (EN), French (FR), German (DE))	
History	*Cannabis: a history* (Booth, 2003) (EN)
	Cannabis: from pariah to prescription (Russo (ed), 2003) (EN)
	Cannabis. Hanf, Hemp, Chanvre, Canamo (Bröckers, 2002) (DE)
	Cannabis Britannica: empire, trade, and prohibition (Mills, 2003) (EN)
	Cannabis on the brain (Smith, 2002) (EN)
	Marijuana for dopes: a pop culture history of cannabis (Romain, 2001) (EN)
Society/politics	*Cannabis* (Green, 2002) (EN)
	Cannabis: le dossier (Chollet-Przednowed, 2003) (FR)
	Cannabis. Neue beiträge zu einer alten diskussion (Gaßmann, 2004) (EN)
	Cannabis, ecstasy: du stigmate au déni. Les deux morales des usages récréatifs de drogues illicites (Peretti-Watel, 2005) (FR)
	Cannabis ist immer anders (Kuntz, 2005) (DE)
	Cannabis use and dependence: public health and public policy (Hall and Pacula, 2002) (EN)
	Le cannabis en question (Palazzolo, 2006) (FR)
	Orgies of the hemp eaters: cuisine, slang, literature and ritual of cannabis culture (Bey and Zug (ed.), 2005) (EN)
	Spliffs: a celebration of cannabis culture (Jones, 2004) (EN)
	Spliffs 2: further adventures in cannabis culture (Pilcher, 2005) (EN)
	The cannabis debate (Donnellan (ed.), 2004) (EN)
	The complete illustrated guide to cannabis (Brownlee, 2003) (EN)
	Un écran de fumée: le cannabis dans la famille (Bantman and Hefez, 2005) (FR)
	Understanding marijuana: a new look at the scientific evidence (Earlywine, 2005) (EN)
Health/ medicine	*Cannabinoids as therapeutics* (Mechoulam (ed.), 2005) (EN)
	Cannabis et santé (Raynaud, 2004) (FR)
	Cannabis und cannabinoide. pharmakologie, toxikologie und therapeutisches potenzial (Grotenhermen, 2005) (DE)
	Halte au cannabis (Costentin, 2006) (FR)
	Le cannabis: et les autres drogues (Benyamina and de Paillette, 2005) (FR)
	Management of alcohol and drug problems (Hulse, White and Cape, 2002) (EN)
	Marijuana and madness (Castle and Murray (eds), 2004) (EN)
	Wenn cannabis der seele schadet: Hilfe bei Sucht und psychischen Störungen (Lindberg and Haasen, 2005) (DE)

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About the EMCDDA

The European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) is one of the European Union's decentralised agencies. Established in 1993 and based in Lisbon, it is the central source of comprehensive information on drugs and drug addiction in Europe.

The EMCDDA collects, analyses and disseminates factual, objective, reliable and comparable information on drugs and drug addiction. In doing so, it provides its audiences with an evidence-based picture of the drug phenomenon at European level.

The Centre's publications are a prime source of information for a wide range of audiences including policy-makers and their advisers; professionals and researchers working in the drugs field; and, more broadly, the media and general public.

EMCDDA monographs are comprehensive scientific publications containing thematic papers prepared in the context of the Centre's activities. Topics cover a wide range of issues relating to science, policy, epidemiology and best practice.

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