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Families Created by the New Reproductive Technologies: Quality of Parenting and Social and Emotional Development of the Children

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GOLOMBOK, SUSAN; COOK, RACHEL; BISH, ALISON; and MURRAY, CLARE. *Families Created by the New Reproductive Technologies: Quality of Parenting and Social and Emotional Development of the Children*. CHILD DEVELOPMENT, 1995, 66, 285-298. The creation of families by means of the new reproductive technologies has raised important questions about the psychological consequences for children, particularly where gamete donation has been used in the child's conception. Findings are presented of a study of family relationships and the social and emotional development of children in families created as a result of the 2 most widely used reproductive technologies, in vitro fertilization (IVF) and donor insemination (DI), in comparison with control groups of families with a naturally conceived child and adoptive families. The quality of parenting was assessed using a standardized interview with the mother, and mothers and fathers completed questionnaire measures of stress associated with parenting, marital satisfaction, and emotional state. Data on children's psychiatric state were also obtained by standardized interview with the mother, and by questionnaires completed by the mothers and the children's teachers. The children were administered the Separation Anxiety Test, the Family Relations Test, and the Pictorial Scale of Perceived Competence and Social Acceptance. The results showed that the quality of parenting in families with a child conceived by assisted conception is superior to that shown by families with a naturally conceived child. No group differences were found for any of the measures of children's emotions, behavior, or relationships with parents. The findings are discussed in terms of their implications for understanding the role of genetic ties in family functioning and child development.

In recent years a rapidly increasing number of children have been conceived by the new reproductive technologies. These include in vitro fertilization (IVF) in which the child is genetically related to both parents, donor insemination (DI) in which the child is genetically related to the mother but not the father, and egg donation in which the child is genetically related to the father but not the mother. When both egg and sperm are donated, the child is not genetically related to either parent. This latter group of children are similar to adopted children in that they are genetically unrelated

to both parents, but differ in that the parents experience a pregnancy and develop a relationship with the child from birth. In the case of surrogacy, the child may be genetically related to neither, one, or both parents depending on the use of a donated egg and/or sperm. As Einwohner (1989) points out, it is possible for a child to have five parents—the egg donor, the sperm donor, the birth mother, and the two social parents whom the child knows as mother and father.

A major concern arising from the creation of these new types of family has been

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the psychological consequences for children of originating from donated gametes and thus being genetically unrelated to one or both social parents. It has been suggested that a missing genetic link between the child and a parent may pose a threat to the relationship between the nongenetic parent and the child (Warnock, 1984). More specifically, it has been argued that it is the secrecy surrounding donor insemination and egg donation that may undermine family relationships, and that children conceived by gamete donation may feel confused about their identity (Clamar, 1989; Daniels & Taylor, 1993; Snowden, 1990; Snowden, Mitchell, & Snowden, 1983). Children may also feel deceived by their parents if they eventually discover the facts about their conception.

As the majority of children conceived by gamete donation are not told about their origins (Amuzu, Laxova, & Shapiro, 1990; Klock & Maier, 1991), any difficulties they may experience cannot be attributed to the overt knowledge that they are genetically unrelated to one or both parents. Instead, conception by gamete donation would only be expected to have negative consequences for the resulting child to the extent that the lack of genetic ties interferes with parent-child relationships. It is well established that children's social and emotional development is fostered within the context of parent-child relationships (Darling & Steinberg, 1993; Maccoby, 1992). Interactions characterized by parental warmth, responsiveness, and sensitivity to the child's needs (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969, 1988), in combination with firm control (Baumrind, 1989), are generally believed to promote positive development in the child. It seems, therefore, that difficulties in the social and emotional development of children created by gamete donation are most likely to arise where this method of conception interferes with the process of interaction between the parents and the child.

More general concerns that are related to the use of the new reproductive technologies, but not to gamete donation per se, have also been raised. For example, it has been suggested that couples who have not come to terms with their infertility may experience difficulties in relating to their children (Burns, 1990). This has been reported to be a problem for some adoptive parents (Brodzinsky, 1987; Humphrey & Humphrey, 1988). It may be expected, therefore, that

family relationships may be disrupted where one or both partners continue to feel distressed about their own or their partner's infertility after the birth of the child. In addition, while some couples find that the experience of infertility has no deleterious effect on their marriage, for others the stress of infertility as well as the stressful nature of the procedures involved in infertility treatment result in marital difficulties (Cook, Parsons, Mason, & Colombok, 1989). A common feature of the new reproductive technologies is the alienation of the father from the process of conception, which in itself may put a strain on the marriage. For couples whose relationship difficulties persist, problems are likely to develop for the child (Cox, Owen, Lewis, & Henderson, 1989; Howes & Markman, 1989).

The aim of the present study was to examine the quality of parent-child relationships and the social and emotional development of children in families created as a result of the two most common new reproductive methods, IVF and DI, and to compare these families with two control groups: a group of families with a naturally conceived child and a group of adoptive families, the alternative option for infertile couples who wish to become parents. Studying these families provides an opportunity to examine the role of genetic ties in family functioning and child development. Families with a child conceived by egg donation were not included, as only a small number of very young children had been born as a result of this technique when the investigation began.

Method

Subjects

Forty-one families with a child conceived by IVF and 45 families with a child conceived by DI were obtained through infertility clinics throughout the United Kingdom. The control groups of 43 families with a naturally conceived child and 55 families with a child adopted at birth were recruited through the records of maternity wards and adoption agencies, respectively. All of the children were between 4 and 8 years of age. Children with major congenital abnormalities, children who had experienced obstetric or perinatal complications that were thought likely to involve brain damage or risk of persisting disability, and children of a multiple birth were not included in the study.

As the total UK population of IVF chil-

dren in this age range at the time of study was estimated to be less than 200, all IVF families with a child of 4 years or older at each of the four participating clinics who met the inclusion criteria were asked to take part. The response rate was 95%. The other groups of families were matched as closely as possible for the age and sex of the child and the age and social class of the parents. The response rates for DI, adoptive, and naturally conceived families were 62%, 76%, and 62%, respectively.

There was a similar proportion of boys and girls in each group of families. A significant difference between groups was found for age of the child, $F(3, 180) = 9.82$, $p < .001$. The adopted children were oldest, aged 6 years on average, and the youngest were the DI children, with a mean age of 5½ years. Similarly, a significant group difference was found for the age of the mothers, $F(3, 180) = 8.45$, $p < .001$, but not fathers. In line with their children, the adoptive mothers were the oldest (mean age 40 years) and the DI mothers were the youngest (mean age 36 years). The average age of the fathers was 41 years. There was also a significant difference between groups for social class as measured by the father's occupation, $\chi^2 = 18.56$, $p < .05$, with the naturally conceived families receiving the highest ratings and the DI families the lowest. The large majority of families in each group were middle class. The groups did not differ significantly in family size, although there was a trend toward fewer children in the assisted reproduction families, $\chi^2 = 20.98$, $p < .06$. For children who had siblings, there was a significant group difference for birth order of the target child, $\chi^2 = 19.46$, $p < .01$, reflecting a greater number of eldest children in the donor insemination families. Although complete matching was not achieved, the group differences that were identified for age of the child and the mother, and for social class, were not large. Where a significant relationship was identified between any of these three demographic measures and a dependent variable, analysis of covariance was used.

All of the parents were contacted in the first instance by a letter from the clinic or adoption agency. Those who agreed to participate were visited at home on two occasions by a researcher trained in the study techniques. On the first visit, data were collected from the mother by interview, and from both parents by questionnaire. Most of the fathers and some of the mothers returned

their questionnaires by post, and completed questionnaires were obtained from 95% of mothers and 76% of fathers. Eighty-six percent of parents whose child was at school gave permission for the teacher to receive a questionnaire, and 86% of these were returned. In order to maintain confidentiality and minimize bias, the teachers were not informed about the precise nature of the research. Instead, they were told that the child was participating in a general study of child development. On the second visit, data were collected from the child using a battery of standardized tests. Assessments were carried out with 85% of the children.

Measures

Parents' marital and psychiatric state.—A standardized interview was administered to the mother to obtain systematic information relating to the psychiatric state of the parents. Both the mother and the father completed the Golombok Rust Inventory of Marital State (Rust, Bennun, Crowe, & Golombok, 1988; Rust, Bennun, & Golombok, 1990), a questionnaire measure of the quality of the marital relationship for which a score of around 30 represents an average marriage, and a score of greater than 40 indicates severe marital difficulties. The Trait Anxiety Inventory (Spielberger, 1983) and the Beck Depression Inventory (Beck & Steer, 1987) were also completed by both parents to assess anxiety and depression, respectively. All three of these instruments have been shown to have good reliability and to discriminate well between clinical and nonclinical groups.

Quality of parenting.—The quality of parenting was assessed by standardized interview with the mother using an adaptation of the technique developed by Quinton and Rutter (1988). This procedure has been validated against observational ratings of mother-child relationships in the home, demonstrating a high level of agreement between global ratings of the quality of parenting by interviewers and observers (concurrent validity, $r = 0.63$). The interview, which was tape-recorded, lasted for around 1½ hours and was conducted with the mother alone. Detailed accounts were obtained of the child's behavior and the parents' response to it. The mothers were asked to describe the child's daily routine, focusing on waking, meal times, leaving for school/day-care, returning home, mother's and father's play activities with the child, and bedtime. Information was obtained on the parents' handling of any problems asso-

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ciated with these areas, and particular attention was paid to parent-child interactions relating to issues of control and the child's fears and anxieties. Four overall ratings of the quality of parenting were made taking into account information obtained from the entire interview: (1) *warmth* was rated on a 6-point scale ranging from 0 ("none") to 5 ("high"). This rating of the mother's warmth toward the child was based on the mother's tone of voice and facial expression when talking about the child, spontaneous expressions of warmth, sympathy and concern about any difficulties experienced by the child, and enthusiasm and interest in the child as a person. (2) *Emotional involvement* was rated on a 5-point scale from 0 ("little or none") to 4 ("extreme"). This rating took account of the extent to which the family day was organized around the child; the extent to which the needs or interests of the child were placed before those of other family members; the extent to which the mother was overconcerned, overprotective, or inhibited the child from age-appropriate independent activities; the extent to which the mother was willing to leave the child with other caretakers; and the extent to which the mother had interests or engaged in activities apart from those relating to the child. (3) *Mother-child interaction* and (4) *father-child interaction* were each rated on a 5-point scale ranging from 0 ("very poor") to 4 ("very good"). These ratings of the quality of interaction between the parent and the child were based on mothers' reports of the extent to which the parent and the child enjoyed each other's company, wanted to be with each other, spent time together, enjoyed joint play activities, and showed physical affection to one another, as well as the extent to which the parent took responsibility for caregiving and disciplining the child. While the validity of mothers' reports of father-child interaction has not been established using observational ratings of father-child relationships, a correlation of 0.4 was found between mothers' reports of father-child interaction and fathers' reports of the child being difficult to manage as measured by the *difficult child* subscale of the Parenting Stress Index (Short Form). This gives some evidence for the validity of the mothers' reports of father-child interaction, particularly in view of the differences between these two constructs. Twenty-seven randomly selected interviews were coded by a second interviewer who was "blind" to family type in order to calculate interrater reliabilities. Pearson product-moment coeffi-

cients for warmth, emotional involvement, mother-child interaction, and father-child interaction were found to be 0.75, 0.63, 0.72, and 0.69, respectively.

The short form of the Parenting Stress Index (PSI/SF) (Abidin, 1990) was administered to both parents to provide a standardized assessment of stress associated with parenting for mothers and fathers. This measure produces a total score of the overall level of parenting stress an individual is experiencing, as well as the three subscale scores of *parental distress* (feelings of parental incompetence, stresses associated with restrictions on life-style, conflict with the child's other parent, lack of social support, and depression), *parent-child dysfunctional interaction* (the parent's perception that the child does not measure up to expectations and that interactions with the child are not reinforcing), and *difficult child* (the behavioral characteristics of children that make them easy or difficult to manage). Test-retest reliability for this instrument has been shown to be high over a 6-month period. Concurrent and predictive validity has been demonstrated for the full-length questionnaire, and the short form has been reported to correlate very highly with the full-length version.

Children's emotions, behavior, and relationships.—The child's psychiatric state was assessed using a standardized interview with the mother with well-established reliability and validity (Graham & Rutter, 1968). Detailed descriptions were obtained of any behavioral or emotional problems shown by the child. These descriptions of actual behavior, which included information about where the behavior was shown, severity of the behavior, frequency, precipitants, and course of the behavior over the past year, were transcribed and rated "blind" to the knowledge of family type by an experienced child psychiatrist. Psychiatric disorder, when identified, was rated according to severity and type. The presence of behavioral or emotional problems in the children was also assessed using the Rutter "A" scale, which is completed by the child's mother, and the Rutter "B" scale, which is completed by the child's teacher. An overall score of psychiatric state is obtained from each scale. Both questionnaires have been shown to have good interrater and test-retest reliability, and to discriminate well between children with and without psychiatric disorder (Rutter, Cox, Tupling, Berger, & Yule, 1975; Rutter, Tizard, & Whitmore, 1970).

An adaptation of the Separation Anxiety Test (Klagsbrun & Bowlby, 1976) was administered to the children to assess their internal representations of their attachment relationships with parents. The test consists of a series of six photographs of a same-sex child experiencing separation from the parents. Three photographs depict mild separations (i.e., saying goodnight) and three depict severe separations (i.e., parents go on vacation for 2 weeks). The child is asked what the child in the picture would feel and what the child in the picture would do on separation. A coding scheme for these data has been developed by Grossmann and Grossmann (1991). Each child obtains a total score of security of attachment representation that takes account of affectivity (the degree to which the child attributes negative emotions, such as sadness or anger, to the child in the picture), coping (the degree to which the child attributes a coping response, such as an action that will help master the situation, to the child in the picture), and expression (the degree to which the child shows a facial expression and tone of voice that are appropriate to the verbal response). Ratings of affectivity and coping are each made on a 5-point scale according to standard criteria, with a high score representing high affectivity and high coping, respectively. Expression is rated on a 3-point scale, with a high score representing an appropriate expression. An overall score is then calculated for each picture that takes account of the appropriateness of the affectivity and coping according to the type of separation depicted (i.e., mild vs. severe), as well as the expression rating. Finally, a total score is obtained for each child that incorporates the responses to all six pictures. This coding scheme has been validated for 6-year-olds against these children's attachment to the mother and the father in the laboratory at 1 year of age. Significantly more children who had been classified as securely attached at 1 year responded appropriately to at least one picture in terms of affectivity, coping, and expression than children who had been classified as insecurely attached at 1 year (Grossmann & Grossmann, 1991). This was true of 100% of securely attached children, compared with 40% of insecurely attached children. In the present investigation, the testing session was not videotaped, so that ratings of expression could not be made. For this reason, the coding scheme was modified to include only the ratings of affectivity and coping. A total score was obtained for each child ranging from 0 (representing very inse-

ure attachment) to 12 (representing very secure attachment). To calculate interrater reliability, data from 60 randomly selected children were coded by a second interviewer who was "blind" to family type. A Pearson product-moment coefficient of 0.76 was obtained.

A modified version of the Family Relations Test (Bene & Anthony, 1985) was also administered to obtain a standardized assessment of the children's feelings about their parents. The child chose an imaginary mother and father from a set of cut-out figures, and these were placed in front of the child, together with a neutral figure, "Mr. Nobody." The child was then given a set of cards with an emotional message printed on each (e.g., "[child] thinks you are nice"), and was asked to give each card to the person for whom they felt it was most appropriate. The test was scored to produce a measure of positive feelings and a measure of negative feelings from the child to each parent, and a measure of positive feelings and a measure of negative feelings from each parent to the child. Acceptable test-retest reliability has been demonstrated, and validation studies have shown the test to discriminate between clinical and nonclinical groups of children (Bean, 1976; Kaufman, Weaver, & Weaver, 1972; Philip & Orr, 1978). Children's responses to the test have also been shown to reflect independent assessments of both mothers' and fathers' feelings toward them (Bene & Anthony, 1985). Significantly more children whose mother had been categorized as "accepting" (according to data obtained from interviews with the mother by a rater who was "blind" to the child's test responses) attributed predominantly positive feelings to their mother than children whose mother had been categorized as "neglecting." Similarly, a small group of children whose fathers had been described by social workers or by the mother as hostile, punitive, or disliking of them were found to attribute predominantly negative feelings to their father when administered the test. In the present investigation, the scores were combined to give two global ratings for each child: (1) *positive feelings between child and mother* [(positive feelings to mother + positive feelings from mother) - (negative feelings to mother + negative feelings from mother)], and (2) *positive feelings between child and father* [(positive feelings to father + positive feelings from father) - (negative feelings to father + negative feelings from father)]. The higher the score, the more positive the feelings.

Each child was administered the Pictorial Scale of Perceived Competence and Social Acceptance for Young Children (Harter & Pike, 1984). This is a measure of children's perceptions of their cognitive and physical competencies, and of their perceptions of acceptance by their mother and by peers, all of which have been shown to be associated with the development of self-esteem in later childhood. A score is obtained for each of the following subscales: (1) *cognitive competence*, (2) *physical competence*, (3) *maternal acceptance*, and (4) *peer acceptance*. The higher the score, the more positive the child's feelings of competence and social acceptance. Satisfactory internal consistency has been demonstrated, with coefficient α values ranging from 0.85 to 0.89 for the different age groups of children studied. The scale has been shown to discriminate between groups of children in predicted ways, for example, between peer acceptance and length of time at a school, and between perceived cognitive competence and academic achievement at school, indicating that it is a valid measure.

Results

Parents' marital and psychiatric state.—Almost all of the parents were married (four couples with a naturally conceived child were cohabiting). Only two sets of parents in the IVF, DI, and naturally conceived groups, and one set of adoptive parents, had separated. With respect to the quality of the parents' marital relationship, group differences in GRIMS scores were found for mothers, $F(3, 160) = 3.25, p < .05$, and fathers, $F(3, 136) = 3.12, p < .05$, indicating a greater incidence of marital difficulties among couples with a naturally conceived child. A significant difference in anxiety level as assessed by the Trait Anxiety Inventory was found for mothers, $F(3, 170) = 3.92, p < .01$, and fathers, $F(3, 135) = 4.46, p < .01$. Depression, as assessed by the Beck Depression Inventory, also differed between groups for mothers, $F(3, 168) = 4.06, p < .01$, but not for fathers. These group differences reflect higher levels of anxiety and depression among parents with a normally conceived child (see Table 1). Few mothers had received treatment for psychiatric disorder, or had been prescribed psychotropic medication. While this was also true for fathers, a group difference in the proportion who had received psychiatric treatment was shown, $\chi^2 = 18.87, p < .05$. Five fathers with a naturally conceived child had received psychiat-

ric treatment, whereas none of the other fathers had ever sought psychiatric help.

Quality of parenting.—Group comparisons of the global ratings of quality of parenting (warmth, emotional involvement, mother-child interaction, and father-child interaction) and the Parenting Stress Index (Short Form) scores for mothers and fathers were conducted using MANOVA. Wilks's lambda was significant, $F(18, 365) = 2.35, p < .002$, showing an overall difference in quality of parenting between groups. The following contrast analyses were then carried out using one-way ANOVAs to address specific questions (see Table 2; Fig. 1): (1) *Assisted Reproduction versus Naturally Conceived (AR vs. NC)*. This contrast examines whether families with a child conceived by assisted reproduction (IVF and DI) are different from families with a naturally conceived child. (2) *Assisted Reproduction versus Adoptive (AR vs. A)*. This contrast examines whether families with a child conceived by assisted reproduction (IVF and DI) are different from families with an adopted child. (3) *In Vitro Fertilization versus Donor Insemination (IVF vs. DI)*. This contrast determines whether IVF and DI families differ from each other, and thus examines the consequences of one parent being genetically unrelated to the child. (4) *In Vitro Fertilization versus Adoptive (IVF vs. A)*. This contrast between IVF and adoptive families also has implications for understanding the importance of genetic relationships. It addresses the question of whether families matched for the desire to have children differ according to whether or not the children are genetically related to their parents. (5) *Donor Insemination versus Adoptive (DI vs. A)*. This contrast examines whether DI families with a child who is genetically unrelated to one parent (the father) are different from families where the child is adopted and thus genetically unrelated to both parents. It addresses the question of whether it is better for children to be genetically related to at least one parent than none, or better for them to be genetically unrelated to both parents than just one to prevent an imbalance in the relationship between each parent and the child. As no significant relationships were found between age of the child, age of the mother, or social class on any of the measures of quality of parenting, these demographic variables were not entered into the analyses as covariates.

A significant difference was found between groups for warmth, $F(3, 179) = 2.91$,

TABLE 1
COMPARISON BETWEEN IVF, DI, ADOPTIVE, AND NATURALLY CONCEIVED FAMILIES ON MOTHERS' AND FATHERS' TEST SCORES

	IVF			DI			ADOPTIVE			NATURALLY CONCEIVED			F	p
	N	\bar{X}	SE	N	\bar{X}	SE	N	\bar{X}	SE	N	\bar{X}	SE		
Marital state, mothers	35	25.9	1.9	40	26.6	1.8	53	22.1	1.6	36	29.8	1.9	3.25	<.05
Marital state, fathers	30	25.9	1.7	35	24.7	1.6	50	22.9	1.3	25	30.2	1.9	3.12	<.05
Trait anxiety, mothers	38	36.7	1.3	42	35.1	1.3	55	37.5	1.1	39	41.4	1.3	3.92	<.01
Trait anxiety, fathers	30	35.9	1.4	35	36.7	1.3	49	35.2	1.1	25	42.2	1.6	4.46	<.01
Depression, mothers	37	5.5	.8	42	4.4	.7	55	4.4	.6	38	7.8	.8	4.06	<.0
Depression, fathers	30	5.0	.7	35	4.6	.6	51	4.5	.5	25	6.8	.8	1.96	N.S.

NOTE.—Table shows sample size, mean, standard error, F, and significance levels of one-way ANOVAs for mothers' and fathers' scores on the Golombok Rust Inventory of Marital State, the Spielberger Trait Anxiety Inventory, and the Beck Depression Inventory.

TABLE 2
COMPARISON BETWEEN IVF, DI, ADOPTIVE, AND NATURALLY CONCEIVED FAMILIES ON PARENTING MEASURES

	IVF			DI			ADOPTIVE			NATURALLY CONCEIVED			CONTRASTS						
	N	\bar{X}	SE	N	\bar{X}	SE	N	\bar{X}	SE	N	\bar{X}	SE	F	p	AR vs. NC ^a	AR vs. A ^a	IVF vs. DI ^b	IVF vs. A ^b	DI vs. A ^b
Mother's warmth to child	41	4.0	.16	45	3.8	.15	54	3.6	.14	43	3.4	.15	2.91	<.05	N.S.	N.S.	N.S.	p < .05	N.S.
Mother's emotional involvement with child	41	2.3	.11	45	2.4	.10	54	2.1	.09	43	1.9	.10	4.37	<.01	N.S.	N.S.	N.S.	N.S.	N.S.
Mother-child interaction	41	3.3	.10	45	3.3	.10	54	3.1	.09	43	3.0	.10	2.60	<.05	N.S.	N.S.	N.S.	N.S.	N.S.
Father-child interaction	40	2.9	.12	44	2.8	.12	53	2.8	.11	40	2.3	.12	4.70	<.01	N.S.	N.S.	N.S.	N.S.	N.S.
Total PSI/SF score, mother	38	68.2	2.4	42	63.7	2.3	55	66.7	2.0	39	73.8	2.4	3.18	<.05	N.S.	N.S.	N.S.	N.S.	N.S.
Parental distress	39	24.1	1.0	42	20.5	.9	55	21.7	.8	39	26.2	1.0	6.90	<.001	N.S.	N.S.	p < .01	N.S.	N.S.
Parent-child dysfunctional interaction	38	18.6	.7	42	18.0	.7	55	19.2	.6	39	20.1	.7	1.51	N.S.	...	...	...	...	...
Difficult child	39	25.7	1.1	42	24.9	1.0	55	25.7	.9	39	27.4	1.1	.92	N.S.	...	...	...	...	...
Total PSI/SF score, father	29	70.1	2.8	35	71.1	2.5	51	65.2	2.1	25	75.2	3.0	2.64	<.05	N.S.	N.S.	N.S.	N.S.	N.S.
Parent distress	30	23.4	1.1	35	23.5	1.0	51	21.8	.8	25	27.5	1.2	4.44	<.01	N.S.	N.S.	N.S.	N.S.	N.S.
Parent-child dysfunctional interaction	29	20.0	.9	35	19.8	.8	51	18.6	.7	25	20.2	1.0	.73	N.S.	...	...	...	...	...
Difficult child	29	26.7	1.3	35	27.3	1.2	51	24.7	.9	25	27.5	1.4	1.42	N.S.	...	...	...	...	...

NOTE.—Table shows sample size, mean, standard error, F, significance levels, and contrasts of one-way ANOVAs for scores of mother's warmth to child, mother's emotional involvement with child, mother-child interaction, father-child interaction, and mothers' and fathers' total and subscale PSI/SF scores.

^aUser contrast.

^bFisher's LSD comparison.

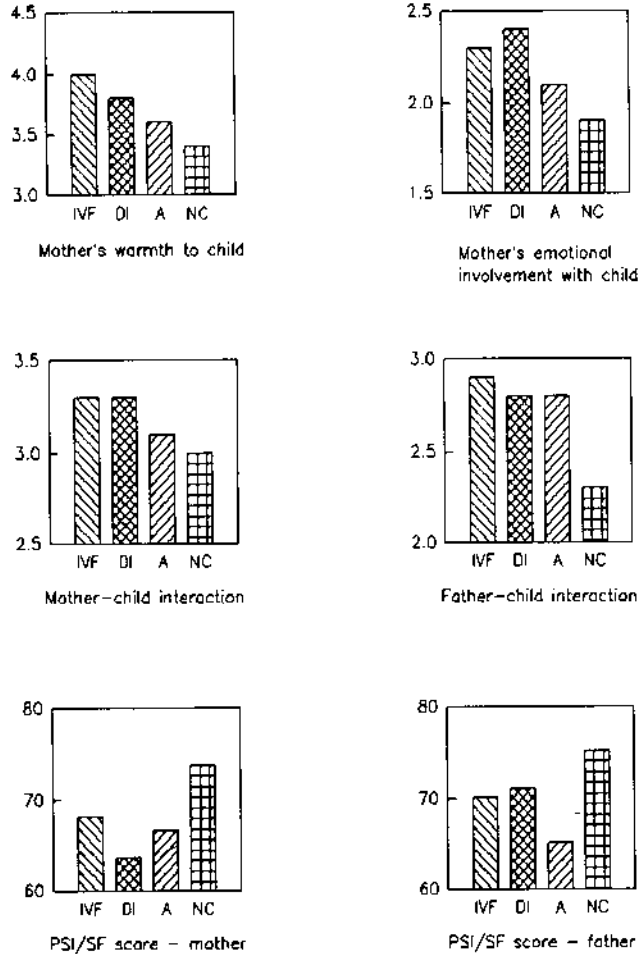


FIG. 1.—Mean scores for measures of parenting quality for IVF, DI, adoptive, and naturally conceived families.

$p < .05$. Contrast analyses showed that mothers with a child conceived by assisted reproduction expressed greater warmth toward their child than mothers with a naturally conceived child (User Contrast [AR vs. NC], $p < .01$). There was no significant difference in expressed warmth to the child according to type of assisted reproduction (IVF vs. DI). Whereas adoptive mothers did not differ in expressed warmth to the child from DI mothers, they did show less warmth than IVF mothers (Fisher's LSD comparison, $p < .05$).

The groups also differed in the level of mothers' emotional involvement with the child, $F(3, 179) = 4.37, p < .01$. Mothers of children conceived by assisted reproduction showed greater emotional involvement than mothers with a naturally conceived child (User Contrast [AR vs. NC], $p < .001$), with

no difference between IVF and DI mothers. The level of emotional involvement shown by mothers of adoptive children was similar to that of IVF and DI mothers.

Group differences were found for mother-child interaction, $F(3, 179) = 2.60, p < .05$, and father-child interaction, $F(3, 173) = 4.7, p < .01$. Both mothers (User Contrast [AR vs. NC], $p < .05$) and fathers (User Contrast [AR vs. NC], $p < .001$) of children conceived by assisted reproduction showed greater interaction with their children than mothers and fathers of naturally conceived children. There was no difference in the quality of interaction between IVF and DI mothers, or between IVF or DI fathers, and adoptive mothers and fathers did not differ significantly from the mothers and fathers of children conceived by assisted reproduction techniques.

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Stress associated with parenting as assessed by total Parenting Stress Index (Short Form) scores was found to differ between groups for mothers, $F(3, 170) = 3.18, p < .05$, and fathers, $F(3, 136) = 2.64, p < .05$. Analyses of the subscale scores showed that the group difference for total Parenting Stress Index (Short Form) scores reflected a difference in the parental distress subscale for both mothers, $F(3, 171) = 6.90, p < .001$, and fathers, $F(3, 137) = 4.44, p < .01$, with parents of naturally conceived children reporting significantly greater levels of distress than parents whose children were conceived by assisted reproduction (User Contrast for mothers [AR vs. NC], $p < .01$, and User Contrast for fathers [AR vs. NC], $p < .01$). A difference was also found between IVF and DI mothers for this subscale (Fisher's LSD comparison, $p < .01$), with IVF mothers reporting more distress than DI mothers. No significant differences in parental distress were found among IVF, DI, and adoptive fathers.

Factor analysis of the four parenting variables derived from the interview (warmth, emotional involvement, mother-child interaction, and father-child interaction) and the Parenting Stress Index (Short Form) scores for mothers and fathers yielded a first factor with an eigenvalue of 2.57, accounting for 43% of the variance. The loadings of the six variables on this factor ranged from 0.54 to 0.79.

In order to establish whether the group differences relating to quality of parenting may be explained by group differences in parents' anxiety, depression, and marital satisfaction, the ANOVAs contrasting assisted reproduction families with naturally conceived families (AR vs. NC) were repeated with mothers' and fathers' Trait Anxiety Inventory scores, Beck Depression Inventory scores, and Golombok Rust Inventory of Marital State scores as covariates. A significant group difference remained for all of the variables apart from mothers' stress associated with parenting (warmth $F = 4.42, p < .05$; emotional involvement $F = 7.16, p < .01$; mother-child interaction $F = 5.53, p < .05$; father-child interaction $F = 6.56, p < .01$; parenting stress—mothers $F = 1.28, N.S.$; parenting stress—fathers $F = 4.13, p < .05$).

Children's emotions, behavior, and relationships.—Only eight children in the entire sample were rated as showing psychiatric disorder. Of these, two were IVF

children (one with developmental disorder and one with conduct disorder), one was a DI child (with conduct disorder), three were adopted (two with conduct disorder and one with mixed conduct/emotional disorder), and two were naturally conceived (one with conduct disorder and one with mixed conduct/emotional disorder). Group comparisons of children's total "A" scale and "B" scale scores were conducted using one-way analyses of covariance, with age of the child and social class, respectively, as a covariate. In line with the ratings of psychiatric disorder, no significant differences between groups were found for these questionnaire measures of emotional and behavioral problems (see Table 3). Overall, the children's "A" scale and "B" scale scores were closely comparable to general population norms for 8-year-olds (Richman, Stevenson, & Graham, 1982; Stevenson, Richman, & Graham, 1985; Taylor, Sandberg, Thorley, & Giles, 1991).

Group comparisons of children's scores for the Separation Anxiety Test, the Family Relations Test, and the Pictorial Scale of Perceived Competence and Social Acceptance were conducted using one-way analyses of variance. The age of the child, age of the mother, and social class were not found to be significantly related to any of these measures and thus were not entered into the analyses as covariates. As shown in Table 3, no significant differences between groups were found for any of these measures. The subscale scores obtained by children for the Pictorial Scale of Perceived Competence and Social Acceptance in the present investigation were similar to normative data for this measure. As modified versions of the Separation Anxiety Test and the Family Relations Test were used, it was not possible to compare the scores of children in the present investigation with published norms.

Factor analysis of the variables derived from the Separation Anxiety Test, the Family Relations Test, and the Pictorial Scale of Perceived Competence and Social Acceptance gave two factors with eigenvalues greater than 1. The first factor had an eigenvalue of 2.23, accounting for 32% of variance, and the second factor had an eigenvalue of 1.62, accounting for 23% of variance. Factor 1 comprised all of the variables for the Pictorial Scale of Perceived Competence and Social Acceptance with loadings ranging from 0.69 to 0.80. Factor 2 is explained by the two Family Relations Test variables, which had loadings of 0.89

TABLE 3

COMPARISON BETWEEN IVF, DI, ADOPTIVE, AND NATURALLY CONCEIVED FAMILIES ON CHILDREN'S TEST SCORES

	IVF			DI			ADOPTIVE			NATURALLY CONCEIVED			F	p
	N	\bar{X}	SE	N	\bar{X}	SE	N	\bar{X}	SE	N	\bar{X}	SE		
A scale ^a	36	8.5	.79	41	8.1	.74	51	9.2	.67	37	9.2	.78	.48	N.S.
B scale ^b	28	3.5	.74	21	2.3	.86	44	3.2	.59	34	4.6	.67	1.62	N.S.
Separation Anxiety Test	30	5.3	.32	37	4.8	.29	49	5.5	.25	39	4.9	.28	1.15	N.S.
Family Relations Test:														
Positive feelings, mother	30	4.5	.83	37	4.1	.75	49	4.8	.65	39	5.2	.73	.38	N.S.
Positive feelings, father	30	2.0	.89	35	2.8	.82	49	4.1	.69	39	2.7	.78	1.25	N.S.
Pictorial Scale of Perceived Competence and Social Acceptance:														
Cognitive competence	31	3.2	.09	37	3.3	.08	49	3.3	.07	39	3.4	.08	.41	N.S.
Physical competence	31	3.2	.09	37	3.3	.08	49	3.2	.07	39	3.2	.08	.07	N.S.
Maternal acceptance	31	2.9	.09	37	2.8	.09	40	2.8	.07	39	2.9	.08	.67	N.S.
Peer acceptance	31	3.1	.11	37	3.1	.10	49	3.2	.09	39	3.0	.10	.83	N.S.

NOTE.—Table shows sample size, mean, standard error, F, and significance levels of one-way ANOVAs for children's scores on the A scale, the B scale, the Separation Anxiety Test, the Family Relations Test, and the Pictorial Scale of Perceived Competence and Social Acceptance.

^a With social class as a covariate.

^b With age of child as a covariate.

and 0.86, respectively. The Separation Anxiety Test score was found to be independent of the other variables.

Discussion

Contrary to the concerns that have been raised regarding the potential negative consequences of the new reproductive technologies for family functioning and child development, the findings of this study indicate that the quality of parenting in families with a child conceived by assisted conception is superior to that shown by families with a naturally conceived child, even when gamete donation is used in the child's conception. Families with a child conceived by assisted reproduction obtained significantly higher scores on measures of mother's warmth to the child, mother's emotional involvement with the child, mother-child interaction, and father-child interaction. In line with these findings, mothers and fathers of naturally conceived children reported significantly higher levels of stress associated with parenting. No significant differences were found between IVF and DI parents for any of these measures, apart from greater parental distress among IVF than DI mothers. It is important to point out that the families with a naturally conceived child were selected from the general population and did not constitute a dysfunctional group. Thus

the investigation shows that the assisted reproduction families were functioning extremely well, and not that the control group was experiencing difficulties. The adoptive mothers and fathers were very similar in quality of parenting to the mothers and fathers of children conceived by assisted reproduction.

In view of these findings, it is not surprising that children conceived by assisted reproduction did not obtain significantly poorer scores than naturally conceived children or adopted children for the assessments of psychiatric state, attachment relationships, feelings toward their mother and father, and perceived competence and social acceptance. Instead, given the greater commitment to parenting in the assisted reproduction families, it could perhaps be expected that they would have obtained significantly better scores on these assessments than their naturally conceived counterparts. Examination of the children's scores in relation to general population norms, where these were available, shows that the children in all types of families were generally functioning well. It seems, therefore, that in nondysfunctional families, raised levels of warmth and parental involvement do not result in even greater well-being for the child. Alternatively, group differences for the children's assess-

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ments may not have been detected due to weaknesses in the measures.

It is possible that biases involved in the sampling procedure may have influenced these results. In particular, the response rates of 62% for the DI and naturally conceived families may reflect a tendency for parents of DI and naturally conceived children who were experiencing difficulties to opt out of the investigation. The effect of this for families with a naturally conceived child would be an underestimate of the differences between these families and the other family types. For the DI families, however, the outcome would be a more positive view than is generally the case. Our impression from telephone conversations with some DI parents who declined to take part was not that they were experiencing problems, but that they had decided to keep the child's origins secret and were concerned that by participating in the study the secret may be jeopardized in some way. They also gave the impression of not wanting to be reminded of the lack of genetic relationship between the father and the child. The adoptive parents who refused to participate were concerned about information being fed back to the adoption agency. Interestingly, when the initial letter was modified to include a statement that no information would be passed on to the agency, the response rate for adoptive families increased from 69% to 87%.

A characteristic of parents whose child was conceived as a result of the new reproductive technologies is that they are generally older than first-time parents of a naturally conceived child. From the time that the couple first realize that they may have an infertility problem, many years may pass before they seek help, and then the process of diagnosis and treatment may take several more years before, if successful, a child is born. Typically, women undergoing assisted reproduction do not become mothers until they are in their mid-thirties, an age by which most mothers who do not have a history of infertility have given birth to more than one child. In order to match the different family types for the age of the parents and of the child, and because we wished the group of families with a naturally conceived child to be as representative as possible of the general population, about 40% of the children conceived by IVF and DI did not have siblings, compared with about 20% children in the naturally conceived and adoptive control groups. One possible explanation, therefore, for the greater commit-

ment to parenting shown by the assisted reproduction parents in comparison with the control group of parents with a naturally conceived child is that these parents were highly involved with their children due to the absence of siblings. However, when the group of families with a naturally conceived child was subdivided according to the presence or absence of siblings, no significant differences were found for any of the measures of quality of parenting. In addition, no significant relationship was found between number of children in the family and the measures of quality of parenting, apart from a significant association between larger family size and greater stress associated with parenting reported by mothers ($r = 0.23$, $p < .01$), or between birth order and any of the variables relating to quality of parenting for those children who had siblings.

The findings suggest that genetic ties are less important for family functioning than a strong desire for parenthood. Whether the child was genetically unrelated to one parent, in the case of donor insemination, or genetically unrelated to both parents, in the case of adoption, the quality of parenting in families where the mother and father had gone to great lengths to become parents was superior to that shown by mothers and fathers who had achieved parenthood in the usual way. The similarity in parenting quality between DI and adoptive mothers and fathers shows that it does not seem to matter whether the child is genetically unrelated to one parent or two; an imbalance in genetic relationships between the parents and the child does not appear to disrupt the parenting process. Thus the suggestion that DI fathers would have difficulty in relating to their children is not supported by the results of this study.

There is growing pressure from both social policy makers and from those working in the field of assisted reproduction to tell children conceived by gamete donation about their origins (Daniels & Taylor, 1993). This practice has been encouraged by the American Fertility Society (1993), and it has now become law in the United Kingdom that nonidentifying information about the donor may be given at age 18. In Sweden, individuals conceived by gamete donation even have a right to identifying information, allowing them to contact the donor when they grow up. The move toward greater openness stems to a large extent from research on adoption which has demonstrated that, for some people at least, knowledge

about genetic origins is important for the development of a clear sense of identity (Hoopes, 1990; Sants, 1964; Schechter & Bertocci, 1990; Triseliotis, 1973). Children conceived by gamete donation may also benefit from knowledge about their past. Snowden (1990), reporting on interviews with a small number of young adults who had been told that they had been conceived by donor insemination, found no evidence to suggest that they had been traumatized by this information, were unsure of their identity, or that the father-child relationship had been damaged. It is important to point out, however, that while adoptive families and families with a child conceived by gamete donation are similar in that the child is genetically unrelated to at least one parent, the two types of families differ not only in that usually one parent is a genetic parent but also, and perhaps more importantly, in that the child had not been born to a genetically related mother and then given up for adoption. The fact that a child has always been a wanted child may constitute a very important difference.

In the present study, all but one of the adopted children knew about their past. In contrast, none of the DI parents had told their child that he or she had been conceived using semen from an anonymous donor. Thus, for children aged 4–8 years at least, keeping the method of conception secret from the child does not appear to have a negative impact on family relationships. It is yet to be seen how many parents will decide to tell the children as they grow up, and whether difficulties will arise as issues of identity become more salient at adolescence. A discrepancy in attitudes exists between professionals and the parents themselves on the issue of secrecy. While there are generally accepted stories in our society to explain adoption, this is not the case for IVF or reproductive procedures involving gamete donation, making it difficult for parents to tell their children about the way in which they were conceived. Parents often fear that the child will respond negatively to being told and will reject them (Cook, Golombok, Bish, & Murray, in press). As so few parents are currently telling their children about their origins, it remains for future research to inform us about the consequences of telling or not telling children about how they were conceived. In the meantime, the picture these families present is one of positive interactions between parents and children. There is no evidence to suggest that

the negative experience of involuntary childlessness results in persisting difficulties when these extremely wanted children eventually arrive.

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