

# Mobile health system: A population based study

*Sistema sanitario móvil: Un estudio basado en la población*

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## Abstract

**Background:** In this research, it is aimed to reveal the opinions of university students about mobile health and personal health records and to reveal whether this differs in the context of students' personal characteristics.

**Methods:** In the study, students' views on mobile health and personal health records were discussed in the context of effectiveness, access, benefit, protection, user-friendliness, simplicity and prevalence. In this direction, the face to face survey method, one of the data collection techniques, was used. The questionnaires were applied to Turkish and foreign students studying at Tokat Gaziosmanpaşa University.

**Results:** A total of 1654 individuals were included. 35.6% (n=590) of them were foreign students and 64.4% (n=1064) were Turkish students. The average age of all participants is 21.45 years. Turkish participants were a more positive attitude in this difference ( $Z=-20,375$ ,  $p<0.05$ ). It has been determined that there is a positive and significant relationship between age in the sub-dimensions of access and user-friendliness.

**Conclusions:** In the results obtained, it was determined that the students' attitudes towards mobile health and personal health records differed significantly according to their nationality.

**Key words:** Mobile Health, Personal Health Records, Simplicity, Prevalence.

## Resumen

**Antecedentes:** En esta investigación, se pretende revelar las opiniones de los estudiantes universitarios sobre la salud móvil y los registros personales de salud y revelar si esto difiere en el contexto de las características personales de los estudiantes.

**Métodos:** En el estudio, las opiniones de los estudiantes sobre la salud móvil y los registros personales de salud se analizaron en el contexto de la eficacia, el acceso, el beneficio, la protección, la facilidad de uso, la simplicidad y la prevalencia. Para ello, se utilizó el método de encuesta cara a cara, una de las técnicas de recogida de datos. Los cuestionarios se aplicaron a estudiantes turcos y extranjeros que estudiaban en la Universidad de Tokat Gaziosmanpaşa.

**Resultados:** Se incluyó a un total de 1654 individuos. El 35,6% (n=590) de ellos eran estudiantes extranjeros y el 64,4% (n=1064) eran estudiantes turcos. La edad media de todos los participantes es de 21,45 años. Los participantes turcos mostraron una actitud más positiva en esta diferencia ( $Z=-20,375$ ,  $p<0,05$ ). Se ha determinado que existe una relación positiva y significativa entre la edad en las subdimensiones de acceso y facilidad de uso.

**Conclusiones:** En los resultados obtenidos se ha determinado que las actitudes de los estudiantes hacia la salud móvil y la historia clínica personal difieren significativamente según su nacionalidad.

**Palabras clave:** Salud móvil, Historia clínica personal, Simplicidad, Prevalencia.

## Introduction

The recent changes and advancements in technology have had a tremendous impact on every industry, including the field of health services. The traditional health service delivery paradigm is altered as a result of these advancements, which also significantly alter patient expectations. Mobile technologies are one of these Technologies<sup>1</sup>. The rise in prices and patient volume in the sphere of health services, the inadequacy of health professionals, etc. Depending on the issues, it may be crucial to take use of the possibilities provided by mobile technology as a substitute for the long-term sustainability of the delivery of health services<sup>2</sup>.

Around the world, governments are seeking solutions in order to reduce major concerns about the sustainability of health services<sup>3</sup>. While nations make enormous efforts to distribute health services that cover everyone, they also work hard to find answers to the cost increases seen in the health sector for a variety of reasons<sup>4</sup>. The delivery of healthcare services using mobile technology has come under scrutiny as a result of all these recent advancements in the health sector<sup>5</sup>. Patient records can be seen on these devices and the patient can access their medical information whenever they want using these technologies, which is one of the possible features offered by these technologies and offers enormous benefits to both the service provider and the user<sup>6</sup>.

This study aims to establish what university students think about personal health records and mobile health system, as well as whether such perspectives vary depending on the student's individual characteristics.

## Material and methods

The population of this study consists of 37950 students enrolled at Tokat Gaziosmanpaşa University for the 2021-2022 academic year, of whom 3500 are foreigners and 34450 are Turkish. The sample is made up of students who were chosen at random. The study included 1064 of 34450 Turkish and 3500 foreign students with 590 participants (a total: 1654 participants).

When gathering data for this study, the survey method was preferred. Face-to-face delivery of the questionnaires to the participants was accomplished. The survey includes an opinion scale on mobile health and personal health records in addition to questions that reveal the personal traits of university students. Koç and Bilgehan developed the scale<sup>7</sup>. There are a total of 31 statements in the scale, and these statements relate to the sub-dimensions of "effectiveness, access, benefit, protection, user-friendliness, simplicity, and prevalence." The statements that made up the dimensions were

organized using a 5-point Likert scale, with 1 being the strongest disagreement and 5 being the strongest agreement. The scale's lowest possible score is 31, and its highest possible score is 155. The scale does not have a reverse score. The scale's internal consistency was examined using Cronbach's alpha value, which was determined to be 0.94. The said value was found to be 0.96 in this study.

## Results

A total of 1654 individuals were included. 35.6% (n=590) of them were foreign students and 64.4% (n=1064) were Turkish students. The average age of all participants is 21.45 years. It is seen that Turkish participants mostly spend 4-6 hours a day on the Internet, while foreign participants spend 1-3 hours. Looking at the duration of use of smartphones by the participants, it is seen that Turkish participants use it mostly for 4-6 years, while the duration of use of foreign participants is 7 years or more. Considering the usage of mobile health applications, it is seen that there are more mobile health application users among Turkish and foreign participants. Finally, it is seen that Turkish participants using the mobile health application have been using this application for more than 2 years, while foreign participants have been using it for 1-6 months (**Table I**).

**Table II** shows the comparison results of the participants' views on mobile health and personal health records according to their nationality. Accordingly, in the context of the nationality variable, it was determined that the opinions of the participants about mobile health and personal health records differed significantly, and the opinions of the Turkish participants were more positive attitude in this difference ( $Z=-20,375$ ,  $p<0.05$ ). These results are similar in terms of sub-dimensions.

**Table III** shows the results of the correlation analysis between age and the participants' views on mobile health and personal health records. Accordingly, it was determined that there was no significant relationship between the views on mobile health and personal health records and age in Turkish participants ( $p>0.05$ ,  $r=0.060$ ). In this part, it has been determined that there is a positive and significant relationship between age in the sub-dimensions of access and user-friendliness. Similarly, it was found that there was no significant relationship between age and views on mobile health and personal health records among foreign nationals ( $p<0.05$ ,  $r=.007$ ). When considered in the context of all participants, it was determined that there was a significant relationship between age and views on mobile health and personal health records, and this relationship was negative ( $r=-.098$ ,  $p<.01$ ). This result is similar in terms of all sub-dimensions in the views on mobile health and personal health records.

**Table I:** Demographic data.

	Turkish Citizen		Foreign Citizen		Total	
	Mean	St. Deviation	Mean	St. Deviation	Mean	St. Deviation
Age	21.06	1.823	22.15	2.079	21.45	1.988
Gender	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Women	884	83.1	195	33.1	1079	65.2
Men	180	16.9	395	66.9	575	34.8
The time you spend daily on the internet	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Less than 1 Hour	20	1.9	77	13.1	97	5.9
1-3 hours	193	18.1	247	41.9	440	26.6
4-6 hours	490	46.1	153	25.9	643	38.9
7 hours or more	361	33.9	113	19.2	474	28.7
How long have you been using a smartphone?	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Less than 1 year	25	2.3	44	7.5	69	4.2
1-3 years	134	12.6	104	17.6	238	14.4
4-6 years	492	46.2	155	26.3	647	39.1
7 years and above	413	38.8	287	48.6	700	42.3
Have you ever used any mobile health app?	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Yes	990	93.0	419	71.0	1409	85.2
No	74	7.0	171	29.0	245	14.8
If your answer is "Yes". how long have you used this application?	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
1-6 months	114	10.7	207	35.1	321	19.4
7-12 months	78	7.3	80	13.6	158	9.6
1-2 years	263	24.7	75	12.7	338	20.4
More than 2 years	535	50.3	57	9.7	592	35.8

**Table II:** Comparison of Results of Views on Mobile Health and Personal Health Records by Nationality.

	Nationality	n	Mean Rank	Sum of Ranks	Z
The View of Mobile Health and Personal Health Records	Turkish Citizen	1064	1008.80	1073364.50	-20.735*
	Foreign National	590	500.54	295320.50	
	Total	1654			
Activity	Turkish Citizen	1064	985.33	1048386.00	-18.110*
	Foreign National	590	542.88	320299.00	
	Total	1654			
Access	Turkish Citizen	1064	994.77	1058438.00	-19.216*
	Foreign National	590	525.84	310247.00	
	Total	1654			
Benefit	Turkish Citizen	1064	995.48	1059195.50	-19.271*
	Foreign National	590	524.56	309489.50	
	Total	1654			
Protection	Turkish Citizen	1064	979.76	1042460.50	-17.515*
	Foreign National	590	552.92	326224.50	
	Total	1654			
User Friendly	Turkish Citizen	1064	977.15	1039683.50	-17.224*
	Foreign National	590	557.63	329001.50	
	Total	1654			
Simplicity	Turkish Citizen	1064	964.66	1026394.50	-15.863*
	Foreign National	590	580.15	342290.50	
	Total	1654			
Prevalance	Turkish Citizen	1064	958.30	1019631.50	-15.115*
	Foreign National	590	591.62	349053.50	
	Total	1654			

\* p&lt;0.05 (2-tailed)

**Table III:** Correlation Analysis Results of the Relationship Between Age and Views on Mobile Health and Personal Health Records.

Age	Turkish Citizen	Foreign Citizen	Total
The View of Mobile Health and Personal Health Records	.060	.007	-.098**
Activity	.051	.012	-.080**
Access	.090**	.002	-.074**
Benefit	.058	.020	-.081**
Protection	.021	-.012	-.105**
User Friendly	.064*	-.006	-.065**
Simplicity	.053	.010	-.073**
Prevalance	.040	-.034	-.086**

\*\* Correlation is significant at the 0.01 level (2-tailed). \* Correlation is significant at the 0.05 level (2-tailed).

## Discussion

Health services are delivered and accessed using mobile health services and applications. Health professionals have supported the use of mobile health applications on smartphones since 2010. However, it has begun to use patient-facing mobile health applications<sup>9</sup>. Mobile health provides information on the closest hospital, pharmacy, step counter, heart rate monitor, meditation, and medications<sup>9</sup>.

People who use mobile health applications benefit from having instant access to data, making appointments, and incorporating health recommendations into their daily lives around the clock. Mobile health applications have thus developed into an effective tool in the decision-making process of healthcare professionals regarding the patient, allowing for the storage of specific health data and the follow-up process to be realized when requested<sup>10</sup>. Mobile health applications enable remote disease management, professional collaboration, communication between patients and healthcare providers, and open access to resources regardless of location or time. With this use, patients can choose a doctor or hospital, schedule appointments online, reduce hospital wait times, and simultaneously access laboratory results from a distance. Approximately 80% of health managers think that mobile communication technologies should be used in health services<sup>10</sup>. According to the available statistics in 2012, 84% of smartphone users had downloaded at least one health-related app<sup>11</sup>. In our study, although the majority of them were Turkish citizens, it was found that 85% of the participants in total used mobile health services.

On the usability dimension, which states that the aforementioned technologies can be used by anyone easily, it has been observed that there is a generally positive opinion. Therefore, it can be concluded that personal health records and mobile health are generally well-received<sup>12</sup>. In this instance, it is possible to predict that these technologies will soon be embraced and proliferated. It can be said that this outcome will be a positive development in terms of more effective provision of health services in various aspects, given the potential and advantages of these technologies. In our study, it has been determined that there is a positive and significant relationship between age in the sub-dimensions of access and user-friendliness.

In the study by Arslan et al., participants between the ages of 18 and 20 were compared to participants between the ages of 21 and 23 regarding usability with regard to mobile health and personal health records; in terms of accessibility, those who use the internet primarily for shopping and reading news are those who use it for other purposes; and those who want to access their personal health records via a mobile device have a more positive opinion than those who do not<sup>13</sup>. Our study determined that there was no significant relationship between the views on mobile health and personal health records and age in Turkish participants ( $r=.060$ ). Similarly, it was found that there was no significant relationship between age and views on mobile health and personal health records among foreign nationals ( $r=.007$ ). When considered in the context of all participants, it was determined that there was a significant relationship between age and views on mobile health and personal health records, and this relationship was negative ( $r=-.098$ ,  $p<.01$ ).

In 2012, 84% of smartphone users had downloaded at least one health-related app, according to the data that was available. In addition, there have been some changes in the acceptance of technologies in health systems over the past few decades, and the public and policymakers have conflicting views on the application of new medical technology<sup>14</sup>. In our study, it is seen that there are more mobile health application users among Turkish compared to foreign participants.

## Conclusions

Utilizing the mobile health system is crucial. It was determined that the student's attitudes towards mobile health and personal health records differed significantly according to their nationality. In the part of the difference, it was concluded that the attitudes of the Turkish participants were higher.

## Conflict of Interest

The authors declare that no competing interests exist.

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