

# The Effect of Mobile Health Applications on the Health Literacy of Individuals

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## ABSTRACT

**Purpose:** The study aims to determine the effect of mobile health applications on the health literacy of individuals.

**Methods:** The study is a prospective, cross-sectional survey using a quantitative method. A questionnaire form consisting of a socio-demographic part of 15 questions and a part of the "Health Literacy Index" with 25 statements was used in the research. The study population consists of a total of 450,496 people between the ages of 18-40 living in Samsun. The number of samples for the study was determined as 384, and it was conducted online on a total of 431 people using the convenience sampling method between 22.09.2021 and 20.10.2021.

**Results:** There are significant differences between E-Nabız application usage status and access to information sub-dimension, appraisal sub-dimension, and general health literacy level. There is a significant difference between the participants' use of HES application and access to information sub-dimension, understanding information sub-dimension, appraisal sub-dimension, application sub-dimension, and general health literacy levels. There is a significant difference between gender status and access to information sub-dimension, understanding information sub-dimension, appraisal sub-dimension, practice sub-dimension, and general health literacy levels.

**Conclusion:** Women have a higher level of health literacy than men, and individuals aged 26-40 have more increased access to information than individuals aged 18-25. In addition, individuals who actively use the E-Nabız application and HES application have a higher level of health literacy than those who do not actively use it.

**Keywords:** E-Nabız, health literacy, HES, mobile health applications.

## INTRODUCTION

The healthy life parameters of individuals differ depending on the exercises performed<sup>1,2</sup>. In addition, individuals' attitudes towards health differ depending on the exercise models and recovery protocols applied<sup>3,4</sup>. Health literacy is a concept that emerged in the 1970s and has become more and more important in health services and public health. Health literacy, a term related to the state of the human capacity to meet the complex demands in health in modern societies, means that one puts the health of oneself, family, and community in context, understands what factors affect it, and knows how to address them<sup>5</sup>. In the literature, health literacy was first encountered in the study titled "Health Education as Social Policy," published by Simonds in 1974<sup>6</sup>. In the study on health education, Simonds mentions the necessity of establishing minimum standards for health literacy. At the same time, Simonds associated health literacy with health education and stated that health education is at the extreme point of social responsibility. Health, education, and mass communication share the responsibility for further development in this field<sup>7</sup>.

The definition of health literacy is developing day by day. Educational attainment has been considered an inconsistent indicator of skill level, as individuals with similar educational attainment may differ significantly in their reading and math skills. Therefore, it is thought that the basic skills of individuals may be an inaccurate assessment tool when evaluating the differences in health outcomes or the effectiveness of health-related interventions. For this reason, the need for a more precise conceptualization of health-related literacy has emerged<sup>8</sup>.

Health literacy is a fundamental but often overlooked competence in all aspects of health care<sup>9</sup>. Ratzan (2001) defines health literacy as how individuals can obtain, process, and understand basic health information and services necessary to make appropriate health decisions<sup>10</sup>.

Nutbeam (2008), on the other hand, defines health literacy as personal, cognitive, and social skills that determine the ability of individuals to access, understand and use the information to improve and maintain health. These skills include improved knowledge and understanding of the determinants of health and changing attitudes and behaviors related to health behavior<sup>11</sup>. Freedman et al. (2009) defined health literacy as how individuals and groups obtain, process, understand, evaluate and act on the information needed to make health decisions that benefit society<sup>12</sup>.

Based on all these definitions, health literacy, with its shortest purpose, is the ability to read, understand and act on health information. This includes reading and understanding drug inserts, inferring from test results, completing health-related forms, following instructions for diagnostic tests, and understanding other basic health-related materials necessary to function adequately as a patient. Health literacy varies by setting and can be significantly worse than a person's general literacy. While people can read and understand materials with familiar content at home or work, they may have difficulty when medical material containing foreign words and concepts of the same complexity is presented. Even well-educated patients may show functionally low health literacy when they do not understand the meaning of health information. Patients with poor health literacy are at risk of misunderstanding diagnoses, medication administration instructions, and self-care instructions. The literacy status of the patients and their inability to perform necessary functions such as reading the test results or following the instructions in the prospectuses in the healthcare setting have severe effects on the quality of medical care<sup>13</sup>.

Inadequate health literacy has a significant impact on various health outcomes, including lower use of preventive measures and emergency services, higher hospitalization and health care costs, health behavior, and health equity. In the study conducted by Cuthino, Sheilini, and Chandrababu (2021), it is stated that the lack of health literacy poses an excellent risk for economic stability in India as a result of the increase in the population and health expenditures<sup>14</sup>. Hawkins et al. (2017), according to a study conducted in India, it was concluded that the barriers to health literacy are language, economy, communication, infrastructure, literacy, and psychological barriers<sup>15</sup>.

In the United States, another section measuring health literacy was included in the National Adult Literacy Assessments in 2003. As a result of the research, it was concluded that 22% of adults have a basic level of health literacy. An individual with a basic level of health literacy needs simple worded definitions and instructions written at the primary or secondary school reading level. An individual below the basic level of health literacy needs much more straightforward explanations with figures and examples. As a result of this study, health professionals stated that strategies should be developed and implemented better to understand the scope of the health literacy problem and to improve the health literacy of American citizens<sup>9</sup>.

The U.S. Institute of Medicine showed that about half of the American adult population might have difficulty acting on their health information. This finding has been called the "health literacy epidemic" in the USA. In response to this situation, measures were taken to provide better health communication by creating health literacy guidelines, and an interdisciplinary approach was encouraged to improve health literacy<sup>5</sup>.

In recent years, developments in digital health terminology have gained momentum due to the growth and increase of technical information. Mobile health projects carried out through smartphones, which are described as smartphones, make health literacy very necessary in terms of the management of chronic diseases and health promotion<sup>16</sup>.

This study it is aimed to determine the relationship between E-Nabiz and Hayat Eve Siğar (HES) applications, which are mobile health applications developed by the Ministry of Health, with the level of health literacy of individuals. The research question is, "Is there a relationship between E-Nabiz and HES applications, which are mobile health applications developed by the Ministry of Health, and the health literacy levels of individuals?" is in the form.

**MATERIAL AND METHODS**

The study was a prospective, cross-sectional survey using the quantitative method. A questionnaire form consisting of a socio-demographic part of 15 questions and a part of the "Health Literacy Index" with 25 statements was used in the study. The study population consists of a total of 450,496 people between the ages of 18-40 living in Samsun. The population number was obtained from the Turkish Statistical Institute (TUIK) "Population by province, single age, and gender". The number of samples for the study was determined as 384, and it was conducted online on a total of 431 people using the convenience sampling method between 22.09.2021 and 20.10.2021. To carry out the study, the ethics committee approval was obtained by the Ethics Committee of the Rectorate of Samsun University with the decision numbered 2021-30.

In the study, Toçi et al. The "Health Literacy Index" created by was used. This scale was developed by Sorensen et al. (2013) is the short version of the "European Health Literacy Scale" and the Turkish validity and reliability study were conducted by Aras and Bayık Temel (2017)<sup>17</sup>. The scale is a 5-point Likert-type scale consisting of four sub-dimensions: access to information, understanding information, appraisal/evaluation, and practice/use, and a total of 25 statements. The Cronbach's alpha value of the scale was found to be 0.92.

The SPSS program analyzed the obtained data. As a result of the normality analysis, it was determined that the data showed normal distribution, and parametric tests were used in the analysis. In the study, the confidence interval for the analysis was 95%, and the statistical significance value was p<0.05.

**RESULTS**

While 234 (54.3%) of the participants in the study were women, 291 (67.4%) were individuals between the ages of 18-25. 331 (76.9%) of the participants are single, and the income level of 220 (50.9%) of them is between 0-2000 TL. 339 (78.5%) of the study participants are at the undergraduate education level.

The results showing whether there is a significant difference between the health literacy sub-dimensions and general health literacy levels according to the participants' use of the E-Nabiz application in the study are given in Table 1. According to the results, there were significant differences between the participants' E-Nabiz application usage status and access to information sub-dimension (p<0.05), appraisal sub-dimension (p<0.05), and general health literacy level (p<0.05) are available. There was no significant difference between the participants' use of the E-Nabiz practice and the sub-dimension of understanding information (p>0.05) and the practice sub-dimension (p>0.05).

Table 1: Health literacy of individuals by using the e-nabiz application

Do you use the e-nabiz application?	Group	N	Mean	SD	p
Access to Information	Yes	345	21.51	3.44	0.01
	No	86	20.33	3.87	
Understanding Information	Yes	345	29.97	4.62	0.13
	No	86	29.09	4.95	
Appraisal	Yes	345	34.26	5.66	0.02
	No	86	32.70	6.26	
Practice	Yes	345	21.36	3.63	0.29
	No	86	20.90	3.70	
Grand total	Yes	345	107.10	15.26	0.02
	No	86	103.01	16.51	

Table 2: Health literacy of individuals by using Hayat Eve Siğar (HES) application

Do you use Hayat Eve Siğar (HES) application?	Group	N	Mean	SD	p
Access to Information	Yes	382	21.43	3.53	0.01
	No	49	20.02	3.56	
Understanding Information	Yes	382	29.99	4.75	0.00
	No	49	28.29	3.95	
Appraisal	Yes	382	34.26	5.77	0.00
	No	49	31.47	5.63	
Practice	Yes	382	21.45	3.61	0.00
	No	49	19.84	3.65	
Grand total	Yes	382	107.14	15.56	0.00
	No	49	99.61	14.28	

Table 2 shows whether there is a significant difference between the health literacy sub-dimensions and general health literacy levels according to the participants' use of HES application in the study. According to the results, there is a significant difference between the participant's use of the HES application and the sub-dimensions of accessing information (p<0.05), understanding information (p<0.05), appraising (p<0.05) and practice (p<0.05), and general health literacy levels

Table 3: Health literacy status of individuals by gender

Health Literacy Sub-Dimensions	Group	N	Mean	SD	p
Access to Information	Woman	197	22.04	2.97	0.00
	Man	234	20.63	3.87	
Understanding Information	Woman	197	31.07	3.81	0.00
	Man	234	28.73	5.09	
Appraisal	Woman	197	35.33	4.79	0.00
	Man	234	32.78	6.33	
Practice	Woman	197	21.91	3.16	0.00
	Man	234	20.72	3.93	
Grand total	Woman	197	110.35	12.42	0.00
	Man	234	102.86	17.11	

The results showing whether there is a significant difference between the health literacy sub-dimensions and general health literacy levels according to the gender status of the participants are given in Table 3. According to the results, there is a significant difference between the gender status of the participants and the sub-dimensions of accessing information (p<0.05), understanding (p<0.05), appraising (p<0.05), and practice (p<0.05), and between general health literacy levels (p<0.05).

**DISCUSSION**

The study was carried out on a total of 431 participants. While 54.3% of the participants in the study were women, 67.4% were individuals between the ages of 18-25. 76.9% of the participants are single, and the income level of 50% of them is between 0-2000 TL. 78.5% of the study participants are at the undergraduate education level.

According to the study results, significant differences were found between the genders of the participants and all sub-dimensions of health literacy (access to information, understanding information, appraisal, practice) and general health literacy levels. It has been concluded that women have a higher literacy level than men in terms of accessing information, understanding information,

appraising, practice, and general health literacy level of health literacy. In the literature, some studies support this result in the study. In the survey conducted by Biçer and Malatyalı (2018), and in the survey conducted by Kıraç and Öztürk (2020), it was concluded that the health literacy levels of women are higher than that of men<sup>18,19</sup>. However, it is also possible to come across studies in the literature stating no significant difference between gender and health literacy level. In the studies conducted by Değerli and Tüfekçi (2018), Bayazit and Sümer (2019) on individuals from the young age group, it was concluded that the level of health literacy did not differ significantly according to the gender<sup>20,21</sup>. It is thought that the reason for this difference in the literature may be due to the demographic characteristics of the participants, the education they received and their interest in the field of health.

One of the main results of the study is to determine whether there are significant differences between health literacy sub-dimensions and general health literacy levels according to the participants' E-Nabız application use. According to E-Nabız usage status, individuals' health literacy levels show significant differences in access to information sub-dimension, appraisal sub-dimension and general health literacy level. The level of access to information, appraisal level and general health literacy level of individuals who use the E-Nabız application is higher than those who do not use the E-Nabız application. In the study conducted by Yalman and Öcel (2021) on individuals residing in the city centre of Düzce, five factors emerged under health literacy, while two factors related to the use of E-Nabız were obtained. In the study, it was revealed that the dimension showing the highest correlation between health literacy and E-Nabız was the dimension of understanding health-related information<sup>22</sup>.

Finally, in the study, it was investigated whether there is a significant difference between the health literacy levels of the individuals according to the use of the HES application. According to the results of the study, access to information, understanding of information, appraisal, practice sub-dimensions and general health literacy levels of individuals who actively use HES application are higher than individuals who do not actively use HES application.

In the literature, no study has been found that directly measures the relationship of E-Nabız and HES application with health literacy level, but it is possible to come across studies examining the relationship of mobile health applications with health literacy.

In a study conducted in the Netherlands by Bol, Helberger, and Weer (2018), it was concluded that mobile health application users are generally younger, more educated, and have higher levels of e-health literacy skills than non-users<sup>23</sup>.

Dunn and Hazzard (2019) state that health technologies show great promise in creating digital health literacy skills and improving health outcomes in patients with cardiovascular and other chronic diseases, but this has not been fully proven yet<sup>24</sup>.

Chen et al. (2018), it was concluded that individuals obtained their health information mostly from primary health care providers, nurses, family, medical websites, online search engines, specialist doctors, and friends, respectively<sup>25</sup>. Again, Kelley, Su and Britigan (2016) and Poinhos et al. (2017), it was concluded that the sources most used by individuals to access health information are healthcare professionals and the Internet<sup>26,27</sup>.

Kim et al. (2019) stated in their study that there is an increasing interest in the use of mobile health applications to improve health literacy. According to researchers, mobile health applications can empower patients and healthcare professionals by providing features or functions to improve interactive communication between patients and staff and to more easily understand medical information. However, although mobile health applications have the potential to improve health literacy, the lack of equal access to mobile technology, lack of familiarity and knowledge about using mobile health applications, and in addition, concerns about privacy and security in mobile health applications are the problems that may arise at this point appears<sup>28,30,31</sup>. Wittink and Oosterhaven (2018) also stated in their study that many

patients have low health literacy skills and have difficulties in understanding health-related information and using technology<sup>29,32,33</sup>.

## CONCLUSION

The study has two main aims. The first of these is to determine whether there are significant differences between the health literacy levels of individuals according to their use of mobile health applications, and the second is to determine whether the health literacy levels of individuals differ significantly according to gender and age variable.

According to the results of the study, it has been determined that women have a higher level of health literacy than men, and the level of access to information of individuals aged 26-40 is higher than individuals aged 18-25. In addition, it was concluded in the study that the individuals who actively use the E-Nabız application and the HES application have a higher health literacy level than the individuals who do not actively use it.

As a result, it is recommended to take necessary measures to eliminate the differences between men and women in the level of health literacy and to provide health literacy training. In addition, in order to increase the level of access to information of individuals between the ages of 18-25, it is recommended to provide health literacy training to students and graduates during the university period and after graduation, to provide necessary information and training on the beneficial use of the internet in the field of health, and to broadcast public service ads on the importance of health literacy in mass media. In addition, it is thought that bringing equal access to the Internet for all individuals will contribute to the increase in the level of health literacy of individuals.

As seen in the Covid-19 period, the use of correct health care is of great importance. The correct use of the resources allocated to health is related to the correct health service delivery and use. Therefore, the development of individuals' health literacy levels is of great importance in this respect.

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