

## ORIGINAL ARTICLE

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## Investigation of the relationship between E-health literacy and attitudes towards the use of telehealth services in individuals applying to tertiary healthcare

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### Abstract

Telemedicine is a key component in improving healthcare delivery and accessibility, especially when distance poses a challenge. With the increasing digitalization of healthcare, this study aimed to investigate the relationship between e-health literacy and attitudes towards telehealth services. This cross-sectional study included 385 patients aged 45–65 who applied to a family medicine outpatient clinic at a tertiary care center. Participants completed the E-Health Literacy Scale (e-HLS) and the Attitude Scale for the Use of Telemedicine Services (ASUTS). The mean age was  $52.67 \pm 6.39$  years; 86.5% owned mobile phones with internet access, and 66.2% used the E-Nabız application. In case of a health problem, the Family Health Center was the most frequently visited institution (49.6%), followed by State Hospitals (23.9%). A moderately positive correlation was observed between e-health literacy and attitudes towards telehealth services ( $r=0.485$ ,  $p<0.001$ ). Multivariable linear regression showed that each one-unit increase in e-health literacy was associated with a 0.956-unit increase in attitude scores ( $p<0.001$ ). Higher attitude scores were found among males, individuals over 50, those with education above high school, E-Nabız users, and participants who considered the internet useful and important ( $p<0.05$ ). The findings suggest that improving e-health literacy may positively influence acceptance of telehealth services. This can be achieved by enhancing access to digital health platforms, developing user-friendly technologies, providing education and awareness programs, and involving healthcare professionals in promoting digital health literacy.

**Keywords:** Telemedicine, health literacy, healthcare services

### Introduction

Health literacy is defined as the ability to read and understand health-related information, to act in accordance with that information, to communicate with healthcare professionals, and to adhere to medical advice [1]. In other words, it refers to the degree to which individuals have the capacity to obtain, comprehend, and use basic health information and services to make appropriate health decisions. Without improving the health literacy of individuals in society, scientific advancements in this field will not be adequately reflected in or contribute to better health outcomes [2]. Today, developments in technology and the rapid proliferation of the internet have led

to the creation of applications that significantly affect the roles of both healthcare providers and recipients. People have become more inclined to research health-related topics, and access to information through search engines has become easier and faster [2,3]. E-health literacy enables individuals to more effectively manage their health by facilitating research on required health services and institutions in online environments, understanding the risks and benefits of available treatment options, applying appropriate treatments, accessing test results, and developing decision-making skills for obtaining reliable information [3]. Telemedicine is defined as the use of information and communication technologies by healthcare professionals to diagnose, treat, prevent, and evaluate diseases,

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especially in circumstances where distance is a significant factor. It aims to improve the health of individuals and communities and to provide training for healthcare providers. It also refers to the use of communication and information technology applications for the remote care of patients over long distances [4,5]. To date, no study has been found that evaluates the relationship between the level of electronic health literacy and the perspective on telehealth services. This study aims to investigate the relationship between e-health literacy and attitudes towards the use of telehealth services among individuals aged 45–65, as well as the factors that influence these concepts.

## Material and Methods

This cross-sectional study was conducted in 2025 with patients aged between 45 and 65 who applied to the family medicine outpatient clinic at Turgut Özal Medical Center. The minimum required sample size was calculated as 384 based on the following parameters: hypothesized frequency of outcome factor in the population (p): 50%±5%, confidence limits (d): 5%, and design effect (DEFF): 1. In total, 385 participants were included in the study. Participants were selected through convenience sampling. After obtaining informed consent, the questionnaire forms were completed face-to-face using an electronic form created in Google Forms. Ethical approval for the study was obtained from the Non-Interventional Research Ethics Committee of İnönü University on 25.03.2025, with decision number 2025/7306.

### Exclusion Criteria

- Individuals under the age of 45 or 65 and over
- Individuals who did not provide consent
- Individuals with communication difficulties, mental or physical illnesses
- Healthcare workers

The questionnaire used as the data collection tool consisted of three sections. It included demographic questions, the (ASUTS), and the (e-HLS). The demographic section included questions on age, gender, marital status, presence of chronic disease, regular medication use, use of smartphone/tablet/computer, presence of a dependent person (disabled and/or in need of care), first healthcare institution consulted, and its proximity. These questions were developed based on a review of the relevant literature.

### E-Health Literacy Scale

This is the Turkish version of the e-HLS developed by Norman and Skinner [6]. The scale aims to assess individuals' skills in using health-related information technologies and their compatibility with e-health programs. It consists of 10 items: 2 items assess internet usage and 8 items assess attitudes toward the internet. The scale uses a 5-point Likert format, where responses range from "strongly disagree" (1 point) to "strongly agree" (5 points). The score is calculated by summing the eight items that measure internet attitude. The total possible score ranges from 8 to 40. Higher scores indicate higher levels of e-health literacy. The scale's internal consistency analysis showed a Cronbach's alpha value of 0.97, indicating high reliability [7].

## Attitude Scale for the Use of Telemedicine Services

The validated and reliable (ASUTS) consists of 18 items and is unidimensional. Each item is rated on a 5-point Likert scale: "5: Strongly Agree," "4: Agree," "3: Neutral," "2: Disagree," "1: Strongly Disagree." The scale is appropriate for use with both male and female individuals over 18 years of age and can be used in any situation requiring the assessment of attitudes toward telehealth services. The total score can range from 18 to 90. Scores closer to 18 indicate a negative attitude, while scores closer to 90 indicate a positive attitude toward telehealth services. Item 8, which is negatively worded, must be reverse-coded before calculating the total score [8].

### Statistical Analysis

Data were analyzed using SPSS version 20. The Kolmogorov-Smirnov test was used to assess the normality of the distribution. Parametric tests were used for normally distributed data, while non-parametric tests were applied to data that did not meet normality assumptions. Pearson correlation analysis, Mann-Whitney U test, Kruskal-Wallis test, and multivariable linear regression analysis were used in the analyses. A p-value of <0.05 was considered statistically significant.

## Results

The mean age of the individuals included in our study was 52.67±6.39 years (min: 45 – max: 65). Of the participants, 50.6% were male, and 39% had a university-level education or higher. Additionally, 48.8% of the participants had at least one chronic disease. Detailed sociodemographic and clinical characteristics of the participants are presented in Table 1.

When evaluating participants' internet usage and healthcare service utilization characteristics, it was found that 86.5% used a mobile phone with internet access, and 66.2% used the E-Nabız application. The most frequently visited healthcare institution in case of a health issue was the Family Health Center, followed by the State Hospital. For 75% of the participants, the Family Health Center was located close to their residence. Approximately 50% of the participants stated that the internet is useful and important in the utilization of healthcare services (Table 2).

When the correlation between electronic health literacy and attitudes toward the use of telehealth services was examined, a moderate positive correlation was found (Table 3).

The multivariable linear regression model established to predict attitudes toward the use of telehealth services was found to be significant ( $p<0.001$ ). The dependent variable in the model was the attitude scale score, while the independent variables were age and e-health literacy score. Among the variables included in the model, the e-health literacy score made a significant contribution; each a unit increase in the e-health literacy score resulted in a 0.956 unit increase in the attitude score toward the use of healthcare services (Table 4).

When the scale scores were compared based on participants' sociodemographic characteristics and telemedicine usage, it was

found that (e-HLS) scores were significantly higher among males, individuals over the age of 50, those with education above high school level, E-Nabız users, individuals with a dependent person in need of care at home, and those who perceived the internet as useful and important. Additionally, the median scores on the attitude scale were significantly higher among females, individuals under the age of 50, those with education above high school level, participants with chronic diseases, those who applied to state hospitals, E-Nabız users, and those who viewed the internet as beneficial and important (Table 5).

Table 1. Sociodemographic and clinical characteristics of participants

|                           | n   | %     |
|---------------------------|-----|-------|
| Sex                       |     |       |
| Male                      | 195 | 50.6  |
| Female                    | 190 | 49.4  |
| Education                 |     |       |
| Literate                  | 33  | 8.6   |
| Primary school            | 73  | 19.0  |
| Middle school             | 48  | 12.5  |
| High school               | 80  | 20.8  |
| University                | 123 | 31.9  |
| Postgraduate              | 28  | 7.3   |
| Marital status            |     |       |
| Married                   | 337 | 87.5  |
| Single                    | 42  | 10.9  |
| Widowed                   | 6   | 1.6   |
| Income                    |     |       |
| Income less than expenses | 138 | 35.8  |
| Income equal to expenses  | 153 | 39.7  |
| Income more than expenses | 94  | 24.4  |
| Chronic illness           |     |       |
| Yes                       | 188 | 48.8  |
| No                        | 197 | 51.2  |
| Cardiovascular disease    | 108 | 28.1  |
| Endocrine disorder        | 75  | 19.5  |
| Neurological              | 9   | 2.3   |
| Psychiatric disorder      | 10  | 2.6   |
| Respiratory disease       | 14  | 3.6   |
| Musculoskeletal system    | 15  | 3.9   |
| Other                     | 28  | 7.3   |
| Total                     | 385 | 100.0 |

Note: The total number of chronic illnesses exceeds 385 because some participants reported more than one chronic illness

Table 2. Characteristics of internet and healthcare services use

|                                                          | n   | %    |
|----------------------------------------------------------|-----|------|
| Use of phone with internet access                        |     |      |
| Yes                                                      | 333 | 86.5 |
| No                                                       | 52  | 13.5 |
| Do you use the e-Nabız System?                           |     |      |
| Yes                                                      | 255 | 66.2 |
| No                                                       | 130 | 33.8 |
| First healthcare institution consulted                   |     |      |
| Family health center                                     | 191 | 49.6 |
| Faculty of medicine hospitals                            | 26  | 6.8  |
| City hospital                                            | 65  | 16.9 |
| State hospital                                           | 92  | 23.9 |
| Private hospital/clinic                                  | 11  | 2.9  |
| Is the family health center near your home?              |     |      |
| Yes                                                      | 291 | 75.6 |
| No                                                       | 94  | 24.4 |
| Is the internet useful in accessing healthcare services? |     |      |
| Not useful at all                                        | 43  | 11.2 |
| Not useful                                               | 59  | 15.3 |
| Undecided                                                | 90  | 23.4 |
| Useful                                                   | 154 | 40.0 |
| Very useful                                              | 39  | 10.1 |
| How important is your access to online health resources? |     |      |
| Not important at all                                     | 43  | 11.2 |
| Not important                                            | 76  | 19.7 |
| Undecided                                                | 74  | 19.2 |
| Important                                                | 148 | 38.4 |
| Very important                                           | 44  | 11.4 |

Table 3. Correlations between scales

|                                            |   | E-Health Literacy Scale | Attitude Scale for the Use of Telemedicine |
|--------------------------------------------|---|-------------------------|--------------------------------------------|
| E-Health Literacy Scale                    | r | 1.000                   | .485                                       |
|                                            | p | .                       | .000                                       |
| Attitude Scale for the Use of Telemedicine | r | .485                    | 1.000                                      |
|                                            | p | .000                    | .                                          |

Table 4. Prediction of attitude towards the use of remote health services by multivariate linear regression analysis

| Model                   | Unstandardized coefficients |            | p      | Collinearity statistics |       |
|-------------------------|-----------------------------|------------|--------|-------------------------|-------|
|                         | B                           | Std. error |        | Tolerance               | VIF   |
| (Constant)              | 31.097                      | 6.901      | <0.001 |                         |       |
| E-Health Literacy Scale | .956                        | .090       | <0.001 | 0.964                   | 1.038 |
| Age                     | -.011                       | .114       | 0.925  | 0.964                   | 1.038 |

**Table 5.** Comparison of scale scores according to sociodemographic characteristics and telemedicine use

|                                                                | E-Health Literacy Scale<br>Median (IQR) | p      | Attitude Scale for the Use of Telemedicine<br>Median (IQR) | p      |
|----------------------------------------------------------------|-----------------------------------------|--------|------------------------------------------------------------|--------|
| Sex                                                            |                                         |        |                                                            |        |
| Male                                                           | 30 (8)                                  | 0.014  | 60 (23)                                                    | 0.035  |
| Female                                                         | 27 (15)                                 |        | 56 (27)                                                    |        |
| Age                                                            |                                         |        |                                                            |        |
| 0-50                                                           | 30 (8)                                  | 0.004  | 61 (23)                                                    | 0.004  |
| >50                                                            | 28 (14)                                 |        | 55 (27)                                                    |        |
| Education                                                      |                                         |        |                                                            |        |
| High school and below                                          | 26 (15)                                 | <0.001 | 56 (27)                                                    | 0.024  |
| High school and above                                          | 31 (5)                                  |        | 60 (21)                                                    |        |
| Chronic disease                                                |                                         |        |                                                            |        |
| Yes                                                            | 29 (14)                                 | 0.145  | 55.5 (29)                                                  | 0.027  |
| No                                                             | 29 (35)                                 |        | 60 (23)                                                    |        |
| Using a phone with internet connection                         |                                         |        |                                                            |        |
| Yes                                                            | 29 (10)                                 | 0.829  | 58 (23)                                                    | 0.470  |
| No                                                             | 29 (32)                                 |        | 65 (38)                                                    |        |
| Do you use E-nabız?                                            |                                         |        |                                                            |        |
| Yes                                                            | 30 (8)                                  | 0.001  | 59 (22)                                                    | 0.263  |
| No                                                             | 24 (16)                                 |        | 56 (29)                                                    |        |
| First applied health institution                               |                                         |        |                                                            |        |
| Family health center                                           | 28 (11)                                 | 0.068  | 58 (22)                                                    | <0.001 |
| Medical faculty hospitals                                      | 24.5 (15)                               |        | 58.5 (32)                                                  |        |
| City hospital                                                  | 29 (14)                                 |        | 54 (26)                                                    |        |
| State hospital                                                 | 32 (13)                                 |        | 66 (21)                                                    |        |
| Private hospital/private practice                              | 29 (18)                                 |        | 50 (24)                                                    |        |
| Is FHC close to your home?                                     |                                         |        |                                                            |        |
| Yes                                                            | 29 (11)                                 | 0.301  | 59 (23)                                                    | 0.739  |
| No                                                             | 29 (13)                                 |        | 56.5 (27)                                                  |        |
| Is the internet useful in using health services?               |                                         |        |                                                            |        |
| Not useful at all                                              | 16 (9)                                  | <0.001 | 52 (31)                                                    | <0.001 |
| Not useful                                                     | 19 (13)                                 |        | 46 (24)                                                    |        |
| Undecided                                                      | 26 (10)                                 |        | 58 (19)                                                    |        |
| Useful                                                         | 31 (4)                                  |        | 61 (20)                                                    |        |
| Very useful                                                    | 35 (6)                                  |        | 70 (21)                                                    |        |
| How important is it to have access to health resources online? |                                         |        |                                                            |        |
| Not at all important                                           | 16 (16)                                 | <0.001 | 47 (28)                                                    | <0.001 |
| Not important                                                  | 20.5 (11)                               |        | 50 (26)                                                    |        |
| Undecided                                                      | 29 (9)                                  |        | 54 (24)                                                    |        |
| Important                                                      | 31 (5)                                  |        | 61 (17)                                                    |        |
| Very important                                                 | 35 (7)                                  |        | 69.5 (20)                                                  |        |
| Having a person living at home who needs care                  |                                         |        |                                                            |        |
| Yes                                                            | 32 (12)                                 | 0.014  | 60 (20)                                                    | 0.129  |
| No                                                             | 28.5 (11)                               |        | 58 (25)                                                    |        |

## Discussion

Health literacy refers to the knowledge and motivation to access, read, and evaluate health information for the purpose of improving quality of life, enhancing self-care, preventing diseases, and promoting healthy living. In this study, we investigated the relationship between e-health literacy and attitudes toward the use of remote health services. A moderate positive correlation was observed between electronic health literacy and attitudes toward using remote health services. Multivariate linear regression analysis revealed that for each one-unit increase in the (e-HLS) score, the attitude score toward the use of remote health services increased by 0.956 units. Higher levels of e-health literacy were found among males, individuals over the age of 50, those with educational attainment above high school, users of the e-Nabız system, and those who perceived the internet as useful and important. Similarly, higher attitudes toward the use of remote health services were observed among females, individuals under the age of 50, those with education above high school, individuals with chronic illnesses, patients presenting to public hospitals, users of the e-Nabız system, and those who considered the internet to be a beneficial and significant tool. The lack of studies in the literature directly comparing these two conditions highlights the need for further comprehensive research in this area.

In a study conducted by Uslu et al., 61% of participants considered the internet useful when making health-related decisions, and 56% emphasized the importance of accessing health resources online. Their findings indicated that women had higher e-health literacy compared to men, and that age, education level, and presence of chronic disease did not significantly affect health literacy [9]. Conversely, a study by Salar et al. reported that men had significantly higher e-health literacy levels than women, and that e-health literacy scores increased significantly with improved internet usage skills [10]. In our study, e-health literacy was higher among men, and was associated with age, education level, and presence of chronic disease. These differences may stem from sample characteristics and socio-cultural factors. This suggests that health literacy is not a fixed trait, but rather a contextual and multidimensional construct.

In a study by Akgün et al., 32.6% of participants reported not knowing exactly how to access the e-Nabız system. Internet resources (29.8%) were identified as the most influential in providing information about e-Nabız. Additionally, 38.1% of respondents stated that they lacked the necessary knowledge to fully use the system. Among those who used e-Nabız, proficiency levels in utilizing its services varied. The study concluded that differences in e-Nabız knowledge and usage were influenced by educational level, internet use for health information, interest in technological developments in healthcare, and e-health skills—such as accessing health information from reliable online sources and evaluating the credibility of this information [11]. Our findings are consistent, showing that individuals who used e-Nabız had higher e-health literacy and more positive attitudes

toward remote health services. As perceptions of the internet as a useful and important tool increased, so did levels of health literacy and attitudes toward remote healthcare usage.

In the study by İlgar et al., 79.1% of participants reported being familiar with e-Nabız and/or the MHRS applications, while 30.2% had used both. Among elderly participants, 84.9% reported experiencing difficulties using digital health services. Statistically significant differences in e-health literacy were observed in relation to age ( $p=0.001$ ), marital status ( $p=0.007$ ), education level ( $p=0.001$ ), employment status ( $p=0.006$ ), and income level ( $p=0.001$ ). The findings indicate the need to support older individuals in the use of digital health services and to plan interventions aimed at improving their e-health literacy [12].

Salar et al. also found that the most important factors affecting e-health literacy among older adults were gender and internet proficiency, and that accessing accurate information online posed challenges. Educational interventions targeting elderly individuals should consider gender differences, aim to improve internet literacy, and support access to high-quality health information from reliable sources [10].

Our study similarly found that individuals over the age of 50 had lower levels of e-health literacy and less favorable attitudes toward the use of remote health services. Digitalization has transformed healthcare delivery. While offering certain advantages, digital health services may disadvantage older adults with low e-health literacy, making adaptation to these systems more difficult. Our findings highlight this issue, emphasizing the need for strategies to help older individuals adapt to digital healthcare services.

This study's limitations include its single-center design and the selection of patients from only one outpatient clinic, which may introduce selection bias. Additionally, the reliance on self-reported measures could result in information bias. The cross-sectional nature of the study prevents the establishment of causal relationships between e-health literacy and attitudes towards telehealth services. Furthermore, the study sample may not be representative of the general population, limiting the generalizability of the findings. Lastly, potential confounding factors, such as participants' digital access or prior experience with telehealth, were not controlled for, which may have influenced the results.

## Conclusion

The findings of this study indicate a positive relationship between e-health literacy and attitudes toward the use of remote health services. Increased e-health literacy is associated with more favorable attitudes toward such services. This increase may be achieved through facilitating access to digital health services, developing user-friendly technologies, implementing public education and awareness programs, and actively involving healthcare professionals in the process. Additionally, our study indicates that e-health literacy is lower among women, older adults, and individuals with less than a high school education,



whereas attitudes toward the use of remote health services are more positive among those with chronic illnesses. Educational interventions aimed at improving health literacy in these groups may enhance the adoption and effectiveness of remote health services. We particularly recommend the implementation of targeted interventions for high-risk populations.

#### Conflict of Interests

*The authors declare that there is no conflict of interest in the study.*

#### Financial Disclosure

*The authors declare that they have received no financial support for the study.*

#### Ethical Approval

*Ethical approval for the study was obtained from the Non-Interventional Research Ethics Committee of İnönü University on 25.03.2025, with decision number 2025/7306.*

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