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Research Article

THE RELATIONSHIP BETWEEN UNIVERSITY STUDENTS' E-HEALTH LITERACY AND HEALTHY LIFESTYLE BEHAVIORS

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Abstract: *This study aimed to analyze the relationship between university students' e-health literacy and healthy lifestyle behaviors. This is a descriptive study. It was conducted with 1,714 students in a university in the east of Turkey during the 2018-2019 academic year. The data were collected using Lifestyle Behaviors Scale II in face-to-face interviews. Of the participants, 64% were female, 45.9% were studying at the Faculty of Education. Of the participants, 54.6% said that internet was helpful for making decisions about their health, and 57% said that it was important for them to access health resources on the internet. The participants' mean age was 21.03±2.27 years. The participants' mean e-Health Literacy Scale score was 27.80±6.12, and their mean Healthy Lifestyle Behaviors Scale II score was 125,74±19,09. These scores did not vary significantly by age, gender, or residence. They did vary significantly by year of study and faculty. A positive significant relationship was found between the participants' total e-Health Literacy Scale and Healthy Lifestyle Behaviors Scale II scores. The participants' mean e-Health Literacy Scale score was above the moderate level, and their mean Healthy Lifestyle Behaviors Scale II score was at a moderate level. Higher mean e-health literacy correlated with higher mean healthy lifestyle behaviors. Training programs should be developed considering the factors that affect university students' healthy lifestyle behaviors and e-health literacy, and students should be encouraged to adopt these behaviors.*

Keywords: *e-health literacy, healthy lifestyle behaviors, university students*

1. Introduction

Health is a universal concept, but its meaning differs from person to person and culture to culture, which makes it a relative concept. The World Health Organization (WHO) describes health not only as suffering from no diseases or disabilities but also as having complete physical, mental and social well-being [1]. Health is a necessary right for a person to maintain a socially and economically productive life. Health is directly or indirectly affected by a number of interrelated factors such as environmental conditions, lifestyles, genetic characteristics and the structure of healthcare services [2].

A healthy lifestyle is an important factor in the quality and level of health. Healthy lifestyle behaviors (HLBs) are positive behaviors that affect health, abandoning negative behaviors and rearranging daily activities by choosing behaviors to stay healthy and avoid diseases [3]. Individuals can keep healthy and improve their health if they adopt healthy lifestyle behaviors such as a balanced diet,

exercising regularly, coping with stress effectively, and taking responsibility to maintain and improve their health [4].

Health literacy has a key role in protecting and promoting health and enabling individuals to make decisions about their own health. Health literacy serves as an intermediator between individuals, health systems, educational systems and health issues. Therefore, it is an important concept that involves information, motivation, and competence in terms of maintaining and improving health, preventing diseases, and accessing, understanding, evaluating and using health information [5]–[7]. Adequate health literacy is considered a crucial factor for individuals to access the health care services they need, to make decisions about treatments, to support their health effectively and to actualize positive health [8].

Today, the internet has become a source of online health information thanks to developing technology. It helps people to access any kind of health-related information easily and quickly. Fast-growing information and internet technologies and their increasing use have led to the emergence of the term, e-health literacy [9]. Norman and Skinner defined e-health literacy as, "the ability to search, find, understand and evaluate health information from electronic sources and to use this information to address or resolve health problems" [10].

E-health literacy is a novel concept that refers to the use of information and communication technologies (ICT) to learn about health care. It is described as the ability to search and collect health information from digital resources and to use this information to resolve health problems [11].

Studies have shown that individuals with lower levels of health literacy: have poor health conditions, have higher health care costs, use health care services more frequently, delay seeking health care when they have symptoms, cannot understand their medical condition and to adhere to medical advice, and are unable to develop healthy lifestyle behaviors and to practice self-care activities [5], [11]–[13].

University education is the transition period for young people from adolescence to adulthood. The university period is a critical period in which students experience individual, social, and health changes. It is very important for young people, who are the cornerstone of a healthy society, to be aware of their own health and adopt healthy lifestyle behaviors. Therefore, this study aimed to analyze the relationship between university students' e-health literacy and healthy lifestyle behaviors and answers to the following research questions were sought.

1. What are the healthy lifestyle behaviors and e-health literacy levels of university students?

2. What are the factors affecting the healthy lifestyle behaviors and e-health literacy levels of university students?

3. What is the relationship between university students' healthy lifestyle behaviors and e-health literacy levels?

2. Material and Methods

2.1. Study Design

This study is a descriptive study.

2.2. Setting and Sample

The population of the research consists of 10,877 undergraduate students studying in six faculties (Faculty of Education, Art and Science, Law, Economics and Administrative Sciences, Engineering and Theology) of a university in the east of Turkey in the 2018-2019 academic year. No sampling method was used in the research, and the research sample consisted of a total of 1,714 students studying at the specified faculties between March and May 2019. Health Sciences, Faculty of Medicine, Faculty of

Pharmacy and Dentistry Faculties of this university were not included in the sample group because it would affect the results of the research.

2.3. Data Collection Instruments

The data were collected in face-to-face interviews using a demographic information form, " The e-Health Literacy Scale " and "The Healthy Lifestyle Behaviors Scale II''. No sampling method used. All the students who agreed to participate were included in this study.

2.3.1 The Demographic Information Form

This form was prepared by researchers. It has eight questions about education, age, gender, place of residence, year of study and health-related internet usage.

2.3.2 The e-Health Literacy Scale (e-HEALS)

The scale was developed by Cameron D. Norman and Harvey A. Skinner in Canada in 2006. Its validity and reliability tests were performed. It was adapted into Turkish by Gencer (2017). The scale assesses how, why, when and to what extent people benefit from using the internet lo learn about health. The scale items, consisting of a total of 8 items, are in a 5-point Likert type as "1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree". The lowest 8 and the highest 40 points are taken from the scale. A high score from the scale indicates a high level of e-health literacy. The coefficient of reliability for the Turkish version of this scale is 0.86. [10], [14]. In this study, the reliability coefficient of the scale was found 0.89.

2.3.3 The Healthy Lifestyle Behaviors Scale II (HLBS II)

The scale was developed in 1987 by Walker et al., based on Pender's health promotion model. This 48-question scale is used to assess health-promoting behaviors related to a healthy lifestyle [15]. It was then revised by Walker, Sechrist, and Pender as the HLBS II with 52 questions [16]. Bahar et al. did a validity and reliability study of its Turkish version in 2008. The reliability coefficient was 0.92 for the Turkish version of the scale, indicating a high level of reliability. The scale consists of six sub-dimensions: health responsibility (α =0.77), physical activity (α =0.79), nutrition (α =0.68), mental development (α =0.79), interpersonal relations (α =0.80), and stress management (α =0.64). The scale consists of 52 items and a 4-point Likert scale (never: 1, sometimes: 2, often :3, regularly:4). The scores that can be obtained from the scale range from 52 to 208. Higher scores indicate high levels of healthy behaviors [17]. The reliability coefficient of this scale was 0.90 in this study. The reliability coefficient of its subscales was: 0.75 for health responsibility, 0.80 for physical activity, 0.58 for nutrition, 0.72 for mental development, 0.73 for interpersonal relationships, and 0.59 for stress management.

2.4. Data Collection

After the researchers were informed by the researchers about the purpose and process of the research, the data collection tools, and the volunteering of the research, the data collection tools were distributed and the students were asked to fill in all the questions completely. It took approximately 10-15 minutes for each participant to fill out the data collection forms.

2.5. Ethical Considerations

Before starting the research, ethics committee approval from the Human Research Ethics Committee of the Erzincan University (Date:02/07/2019, Number: 02) and written permission from the faculties where the research would be conducted were obtained. While conducting this study, we adhered to the principles of informed consent, autonomy, and respect for privacy during data collection.

2.6. Data Analysis

The data were analyzed using SPSS 23.0 (Statistical Package for the Social Sciences 23.0) software based on a 95% confidence interval. The threshold for statistical significance was $p \leq 0.05$, $p < 0.001$. Using the Kolmogorov-Smirnov test, it was determined that the data showed a homogeneous distribution. The statistical methods used in the analysis of the data; are numbers, percentages, minimum and maximum values, means, and standard deviations. The independent samples t-test was used to compare two normally distributed groups, and variance analysis and Pearson's correlation were used to compare multiple groups.

3. Results

It was determined that the mean age of the students included in the study was 21.03 ± 2.27, 64% of them were women and 66.3% of them were currently living in the dormitory. Another result of the study is that 32.9% of the students were in 1st grade, 22.5% in 2nd grade, 23.9% in 3rd grade, and 20.8% in 4th-grade students. 45.9% of the students were educated in Education, 15.8% in FEAS, 9.5% in Law, 7.2% in Engineering, 11% in Theology, and 10.6% in Science and Literature Faculty (Table 1).

According to the results of the study, the participants' age did not have a statistically significant relationship with their mean e-HEALS and HLBS II scores. Additionally, these scores did not vary significantly by gender or residence.

It was determined that there was a statistically significant difference between the class variable of the students and the total mean score of the e-health literacy and healthy lifestyle behaviors scale. In further analysis, it was determined that this significance was due to the 3rd-grade group for e-health literacy and the 4th-grade group for healthy lifestyle behaviors, and the average score was higher than the other groups (Table 1).

It has been determined that there is a statistically significant difference between the variable of the faculty being studied by the students and the total score average of the e-health literacy and healthy lifestyle behaviors scale. In further analysis, it was determined that this significance was due to the FEAS student group and the average score was higher than the other groups (Table 1).

When the question "What are your thoughts about the internet helping your health?" was asked of participants 54.6% of them stated that it was useful, 16.9% of them had no idea about this issue and 15.8% of them stated that it was not useful. It was determined that there was a significant difference between the students' thinking that the internet is useful in helping them make decisions about their health and the total score average of the e-health literacy and healthy lifestyle behaviors scale. In further analysis, it was determined that this significance stemmed from the group that answered as very useful, and the mean score was higher than the other groups.

Another question "What is the importance of having access to health resources on the Internet for yourself?" was asked to students. It was determined that 57% of the respondents stated that it is important, 15.7% is very important, 13.5% have no idea and 10.4% is not important. It was determined that the difference between the students' state of stating that it is important for them to access health resources on the internet and the total score average of the e-health literacy and healthy lifestyle behaviors scale was found to be significant. In further analysis, it was determined that this significance stemmed from the group that answered as very important and the mean score was higher than the other groups.

The Participants' Mean e-HEALS and HLBS II Scores and relationships with their demographic characteristics were calculated by statistical programs and presented in Table 1.

Table 1. Comparison of the Participants' Mean e-HEALS and HLBS II Scores and Their Demographic Characteristics (n=1,714)

Characteristics	n	%	The e-Health Literacy Scale	Total HLBS II Score
Age	Mean±SD		r=0.021	r=0.039
	21.03±2.27		p=0.378	p=0.108
Gender				
Female	1097	64.0	27.82±5.88	125.58±18.30
Male	617	36.0	27.76±6.51	126.38±20.67
Test and p			t=-0.212	t=0.835
			p=0.832	p=0.406
Residence				
Family	343	20.1	28.53±5.84	127.75±20.00
Dormitory	1137	66.3	27.70±6.14	125.51±18.80
With friends	184	10.7	27.17±6.32	124.74±19.25
Alone	50	2.9	27.28±6.39	125.38±21.48
Test and p			F=2.520	F=1.459
			p=0.056	p=0.224
Class				
Freshman	564	32.9	27.48±6.41	123.59±19.23
Sophomore	385	22.5	27.56±5.87	126.58±19.63
Junior	409	23.9	28.55±5.85	126.66±17.48
Senior	356	20.8	27.70±6.12	127.81±20.20
Test and p			F=2.802	F=4.289
			p=0.039	p=0.005
Faculty of				
Education	786	45.9	28.19±5.72	126.93±18.63
FEAS*	270	15.8	28.37±6.48	127.67±18.97
Law	163	9.5	26.67±6.56	122.63±16.61
Engineering	124	7.2	28.19±6.18	126.33±20.46
Theology	189	11.0	26.47±6.21	124.83±21.34
Arts and Sciences	182	10.6	27.34±6.37	122.34±20.15
			F=4.366	F=3.259
Test and p			p=0.001	p=0.006

p<0.05,   *FEAS: Faculty of Economics and Administrative Science, r= Pearson's correlation,
t= The independent samples t-test, F= variance analysis.

Table 2 shows that the participants' mean e-HEALS score was 27.80±6.12. Their mean subscale scores on the HLBS II were 19,58±4,52 for health responsibility, 16.21±4.71 for physical activity, 19,74±3,91 for nutrition, 26,07±4,67 for mental development, 25,16±4,46 for interpersonal relationships, and 18,98±3,73 for stress management. Their mean scale score was 125,74±19,09.

Table 2. Distribution of the Participants' Mean e-HEALS and HLBS II Scores (n=1,714)

Scales	Min.	Max.	Mean±SD
The e-Health Literacy Scale	8	40	27.80±6.12
The Healthy Lifestyle Behaviors Scale II and its Subscales			
Health Responsibility	9	36	19,58±4,52
Physical Activity	8	32	16.21±4.71
Nutrition	9	36	19,74±3,91
Mental Development	9	36	26,07±4,67
Interpersonal Relationships	10	36	25,16±4,46
Stress Management	8	32	18,98±3,73
Total Score	68	208	125,74±19,09

Table 3 shows the correlation analysis between the participants' mean e-HEALS and HLBS II scores. The participants' total e e-HEALS score had a positive significant relationship with their mean

HLBS II scores and its subscale scores (p<0.001). Higher mean e-HEALS scores correlated with higher mean HLBS II scores.

Table 3. The Relationship between the Participants' Mean e-HEALS and HLBS II Scores

Scales	The Healthy Lifestyle Behaviors Scale II						
	Health Responsibility	Physical Activity	Nutrition	Mental Development	Interpersonal Relationships	Stress Management	Total HLBS II Score
The e-Health Literacy Scale	r=0.772** p=0.000	r=0.708** p=0.000	r=0.712** p=0.000	r=0.721** p=0.000	r=0.697** p=0.000	r=0.743** p=0.000	r=0.289** p=0.000

**p<0.001, r= Pearson's correlation

4. Discussion

Today, the internet is a priceless resource that provides information about health and is an important tool for socializing. Rapid advances in technology bring the concept of e-health literacy to the agenda as an important issue as it enables people to access information that allows them to take responsibility for their own health, manage their health, and make decisions about their own health. [11], [18].

The participants' healthy lifestyle behaviors were at a moderate level. Their highest mean scores were in mental development and the lowest mean scores were in the physical activity subscale. There are studies that support this study's results in the literature, which have found that students' HLBs were at a moderate level, that their highest mean score was on the mental development subscale, and that their lowest mean score was on the physical activity subscale [19]–[21]. Ceylantekin and Öcalan conducted a similar study and found that students' healthy lifestyle behaviors were at a moderate level, their highest mean score was on the interpersonal relationships subscale, and their lowest mean score was on the physical activity subscale [22]. This study found that most of the students had low levels of physical activity. Physical activity is one of the factors that positively affect students' psychological and physical health. Therefore, it is important to encourage students to do physical activities and to improve infrastructural opportunities for physical activities.

E-health literacy is expressed as the ability to search and collect health-related resources from digital sources and use this information to solve health problems. [11]. This study found that the participants had an e-Health Literacy Scale average score above the moderate level. Arli found that university students' mean e-health literacy score was above the moderate level [23]. Other studies in the literature have found that university students' e-health literacy was at a moderate level [24]–[26].

The participant's age, gender, and residence did not affect their e-health literacy levels. A number of studies have also found that university students' age, gender, and residence did not affect their e-health literacy levels [24]–[28]. On the other hand, there are studies indicating that students who were living in a separate residence from their family had higher levels of e-health literacy [27]. One study conducted with people over 18 years old found that age affected their level of e-health literacy [28]. The literature suggests that young people may have higher levels of e-health literacy because they have better knowledge of and ability to use technology [29].

It has been found that the idea of finding the use of the internet very useful and important in making decisions about their own health and accessing health-related resources affects the e-health literacy level of the students. Similar studies have also revealed that thinking that internet use is very useful and important in terms of accessing relevant resources affects students' e-health literacy levels [23], [26], [30].

The participant's age, gender, and residence did not affect their healthy lifestyle behaviors. Some studies in the literature support this study's result by finding that gender did not affect healthy lifestyle behaviors [21], [31]. Unlike this study, another study found that gender and residence affected healthy lifestyle behaviors, and that male [22] students who were living alone or with their friends had higher levels of healthy lifestyle behaviors [20], [22].

In this study, it was found that the grade level and faculty variables studied affect students' e-health literacy and healthy lifestyle behaviors. The literature includes studies indicating that students' years of study both affected [22] and did not affect [20] their healthy lifestyle behaviors. One study found that students' healthy lifestyle behaviors varied by faculty and that students who were studying at departments related to health and physical activity were more likely to have healthy lifestyle behaviors [20].

In this study, it was found that the thought of finding internet use very useful and important when making decisions about their individual health and accessing health-related resources affects the level of healthy lifestyle behavior of students. It has become a source of health-related information [32]. For this reason, the Internet continues to be an important source of access to health-related information.

E-health literacy refers to searching for and collecting health information from digital resources on the internet and related technologies to resolve health-related problems [11]. The literature shows that people with higher levels of health literacy are more likely to have more health-related knowledge, visit health institutions less frequently, develop positive attitudes towards their health, and develop higher levels of healthy lifestyle behaviors as a result of their self-efficacy and motivation [5]. The participants' mean Healthy Lifestyle Behaviors II Scale scores increased as their mean e-Health Literacy Scale scores increased. This study's results support those in the literature, indicating that students with higher levels of e-health literacy were more likely to have knowledge and awareness about protecting and improving their own health.

5. Conclusions and recommendations

In this study, it was found that university students' e-Health Literacy Scale score averages were above the medium level, and their healthy lifestyle behaviors were at a moderate level. Age, gender and residence did not affect the participants' levels of e-health literacy and healthy lifestyle behaviors. The participants' mean HLBS II scores increased as their mean e-HEALS scores increased. These results suggest that:

Training programs should be developed considering the factors that affect university students' healthy lifestyle behaviors and e-health literacy, and students should be encouraged to adopt these behaviors. Students should be encouraged to engage in activities that positively affect their healthy lifestyle behaviors and necessary infrastructure should be provided to them. Students should be informed about how to obtain accurate and reliable information about health on the internet and how they can analyze and use this information starting in the first years of their education. Courses about protecting and improving health should be included in the curricula, and further studies should be conducted with larger samples because this study was limited to six faculties of a state university in the east of Turkey.

Limitations of the Research:
This study is limited to first, second, third, and fourth-year students studying at the faculties of education, science and literature, law, economics and administrative sciences, engineering, and theology at a university in the east of Turkey. In addition, since the Cronbach alpha values of the Healthy Lifestyle Behaviors Scale sub-dimensions used in the study were low, discussing the study over the total score constitutes the limitation of the study.

Informed Consent:

All participants filled out informed consent forms before the study began.

Ethical statement:

Ethics committee approval was obtained from the Human Research Ethics Committee of the Erzincan University (Date:02/07/2019, Number: 02).

Conflict of Interests:

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Author Contributions:

NK. led the research. All the authors undertook the intervention field works. NK. and SAB. collected the data. PK conducted the analysis and drafted the manuscript. All the authors read and approved the final manuscript.

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