

# Inequality Among Adolescents in the Developing Countries is the Main Determinant of e-Health Literacy

Sevil Çınar Özbay<sup>1</sup> , Handan Boztepe<sup>2</sup> , Hilal Özcebe<sup>3</sup> 

<sup>1</sup>Faculty of Health Sciences, Artvin Coruh University, Artvin, Turkey

<sup>2</sup>Department of Nursing, Faculty of Health Sciences, Atilim University, Ankara, Turkey

<sup>3</sup>Department of Public Health, Faculty of Medicine, Hacettepe University, Ankara, Turkey

Sevil ÇINAR ÖZBAY  
Handan BOZTEPE  
Hilal ÖZCEBE

**Correspondence:** Sevil Çınar Özbay  
Faculty of Health Sciences, Artvin Coruh University, Artvin, Turkey  
**Phone:** +905378619797  
**E-mail:** cinarsevil87@gmail.com

**Received:** 17 January 2022  
**Accepted:** 06 February 2022

## ABSTRACT

**Purpose:** In this study, it was aimed to find out the e-health literacy levels in the adolescent age group, and its relation to adolescent decision making as well as social and economic determinants of the adolescents and their families.

**Materials and Methods:** The participants were 14–18 years old from 9-12 grades of the high schools at the different socioeconomic settlements in Turkey. The data was collected using a data collection form consisting of questions related to the adolescents and the socio-demographic characteristics of their parents, Adolescent Decision Making Scale and E-Health Literacy Scale for Adolescents. Data was collected from 1,082 adolescents aged 14 to 18 years.

**Results:** The e-health literacy level increases with the age of the adolescents, the monthly income of the family, adolescent decision making scores. Economic status and age of the adolescents are the main factors to form their e-health literacy.

**Conclusion:** There is an urgent need to improve e-health literacy education aiming to teach to adolescents how to find reliable health information and make appropriate decisions to prevent their own health. The e-health information literacy and services should be provided to the adolescents in low socioeconomic status as social policies of the governments in the developing countries.

**Keywords:** adolescents, information technology, e-health literacy, inequality, developing country

## Gelişmekte Olan Ülkelerde Adölesanlar Arasındaki Eşitsizlik E-Sağlık Okuryazarlığının Temel Belirleyicisidir

### ÖZET

**Amaç:** Bu çalışmada, adölesan yaş grubundaki e-sağlık okuryazarlık düzeylerinin, adölesan karar verme süreçleri ile adölesanların ve ebeveynlerin sosyal ve ekonomik belirleyicileri ile ilişkisinin ortaya çıkarılması amaçlanmıştır.

**Methods:** Katılımcılar Türkiye'deki farklı sosyoekonomik yerleşimlerdeki liselerin 9-12. sınıflarında okuyan 14-18 yaş grubudur. Veriler, adölesanların ve ebeveynlerinin sosyo-demografik özelliklerine ilişkin sorulardan oluşan veri toplama formu, Ergen Karar Verme Ölçeği ve Adölesanlar için E-Sağlık Okuryazarlığı Ölçeği kullanılarak toplanmıştır. Veriler, 14 ila 18 yaşları arasındaki 1.082 adölesandan toplanmıştır.

**Results:** Adölesanların yaşı, ailenin aylık geliri, karar verme puanları arttıkça e-sağlık okuryazarlığı düzeyi artmaktadır. Adölesanların ekonomik durumu ve yaşı, e-sağlık okuryazarlığını oluşturan temel faktörlerdir.

**Conclusions:** Adölesanlara güvenilir sağlık bilgilerini nasıl bulacaklarını ve kendi sağlıklarını korumak için uygun kararları nasıl alacaklarını öğretmeyi amaçlayan e-sağlık okuryazarlığı eğitiminin acilen iyileştirilmesine ihtiyaç vardır. Gelişmekte olan ülkelerde hükümetlerin sosyal politikaları olarak düşük sosyoekonomik statüdeki ergenlere e-sağlık bilgi okuryazarlığı ve hizmetleri sağlanmalıdır.

**Anahtar kelimeler:** Adölesan, Bilgi teknolojisi, E-sağlık okuryazarlığı, Eşitsizlik, Gelişmekte olan ülke

**H**ealth literacy is defined as development of the ability of the people to promote and maintain health through gaining, accessing, understanding and using the health information. Internet has entered into the daily life to reach the health information, therefore the people have changed from traditionally health resources to mobile technology, the health information in the Internet has become the first easily accessible resource in the community (1,2). As a result of this change; a great majority of the population have started to use the Internet to search for the health information (3). Electronic-health information (also called e-health) has widely used as a health literacy terminology since 2000's (4). Today, the definition of e-health literacy is accepted as "using electronic sources, understanding and evaluating it, and applying the obtained health information to address and/or solve a health problem" (5–7). E-health literacy is recognized as essential for enhancing healthcare quality and health outcomes (2). E-health literacy is also accepted as an important issue for community to gain preventive behaviors against infectious and noncommunicable diseases (8).

There is a meaningful relationship between health behaviors and health literacy in the adolescent ages (9). The main healthy behaviors are being developed in the adolescent ages (6); developing decision-making and judgement skills are also very important to gain and improve health promoting behaviors, which are influencing the lifestyle and health in the future. Media literacy was also introduced as fourth level of health literacy for the adolescents by (10). It is already known that e-health literacy can support care, improve healthcare decision-making skills, and advance health knowledge and skills (11) and encourages positive changes in the decision-making procedure and the health behaviors of the people (12), which, in turn, could empower them to better manage their health problems. It was reported that internet usage was correlated with adolescent patients and e-health literacy (3,13). Wartella et al found that 84% of 13–18 years old adolescents had obtained health information on the Internet at least once before, 38% searched online for health information once a year, and 24% searched for online health information at least monthly or more frequently in USA (14). Hove et al showed that the Internet was the most suitable environment for dissemination of health information and also the promotion of health among adolescents (15). On the other hand, adolescents with insufficient e-health literacy may be exposed to false information from low-quality health sources through the Internet (14). According to Change et al, adolescents can have difficulty in using and understanding online health information,

although they use information technologies frequently (16). It was reported that there was a need for safe browsing by adolescents, especially on important health subjects, as incorrect, misleading, and low-quality information on the Internet could result in major problems (5,6). As the world has been transforming into a more compact and well-connected locale, the information and messages on the Internet can reach and affect adolescents living across.

Media exposure has also increased very sharply among adolescents in the developed and developing countries; 98% of the adolescents use the internet every day and this rate is higher compared to the rate of all the other age groups in USA (17) and the percentage of internet use was 90.4% among 13–15 years old children in Turkey, which is a developing country. The percentage of the children who can access to Internet at their own homes was 81.2% and 71.1% of them reached through their mobile phone in Turkey (18,19). Despite the high percentage of internet access like Turkey, there is a scarcity of studies focusing on the e-health literacy levels of adolescents in the developing countries (20–22). For these reasons, we aimed to find out the e-health literacy levels in the adolescent age group, and its relation to adolescent decision making as well as social and economic determinants of the adolescents and their families.

## MATERIAL AND METHODS

Ethics committee approval was received from University Noninvasive Clinical Trials Ethics Committee (Number: GO18/231-18) to assess the ethical suitability of the study. Written permission was received from the Ministry of National Education to conduct the study. In addition, the written consent of each adolescent participating in the study was obtained. The written consent of their parents and the permission of the relevant institution were also received.

### *Participants*

This study was conducted in Ankara, the capital city of Turkey. The participants were 14–18 years old from 9–12 grades of the high schools at the different socioeconomic settlements. Adolescent age group was determined as the target population; because the capacity of decision making is developed during this age group, also they can understand and answer the questionnaire on the concept of e-health literacy.

According to the Turkish Statistical Institute (TurkSTAT) and Provincial Directorate of National Education, the

settlements and high schools were determined as low, medium and high socioeconomic levels. One school from each socioeconomic level was selected randomly, and the total numbers of the students at the selected schools were 1782. It was aimed to reach to all the students, but 1082 students volunteered to participate in the study; the participation rate was found as 60.7%. Therefore, our study was a descriptive research for three schools from different socioeconomic settlements.

Inclusion criteria were determined as being at the school at the time of the data collection, parents' permissions and the adolescents' willingness to participate in the study.

#### *Data Collection Tools*

The questionnaire of the study composed of three main sections. The aim of the first part of the questionnaire was to determine social and economic characteristics of the adolescents and their families, also including having a cell phone/a computer, using the Internet, spending time on the Internet, and reading about health issues in general and their own health problems on the Internet (16,21,23,24). The second part of the questionnaire included the E-Health Literacy Scale for Adolescents developed by Norman and Skinner (2006). The scale has eight items that aim to assess the individual's knowledge, comfort, and perceived skills in finding, evaluating, and applying, e-health information to health problems (24). A Turkish reliability and validity study of the e-Health Literacy Scale for Adolescents was conducted by Coşkun and Bebiş in 2014 (25). The scale was reported as a reliable tool with an alpha of 0.88 in the original study, and the same Cronbach's alpha coefficient was found in the Turkish study (0.88). The responses from 'strongly agree' to 'strongly disagree' are scored on a five-point Likert scale. The minimum score of the scale could be "8" and the maximum "40". Higher scale scores indicate high levels of e-health literacy. The third part of the questionnaire included The Adolescent Decision-Making Questionnaire developed to examine the decision-making styles of adolescents (26). The questionnaire has 30 items and is responded on the basis of a four-point rating (0 = Never Applies to Me, 3 = Always Applies to Me). The questionnaire has five subscales: self-esteem in decision-making, cautious selectivity, negligence, panic and evading responsibility. Each subscale has six items and the scores to be obtained for the subscales range from 0 to 18. Highness of self-esteem in decision-making scores indicates highness of self-respect level. Highness of scores of the other subscales indicates that the relevant decision-making style is used more frequently. The questionnaire was adapted

into Turkish by Çolakkadioğlu and Güçray (27). In the confirmatory and exploratory factor analyses which were performed to test the construct validity of the questionnaire, it was seen that 30 items in the Turkish form of the questionnaire were loaded over five factors, as in the original form. The Cronbach's alpha internal consistency reliability coefficient obtained for measurements acquired from the questionnaire was found to be between 0.65-0.79 and the test-retest consistency was found to be between 0.80-0.86 for the subscales. Cronbach's alpha for the present sample was calculated as 0.73.

#### *Data Collection*

The schools were visited and informed about the research, and the data collection date was determined with the principal of the high school. The parents' consents forms were sent to the families by the principal of the high schools three days before data collection. All the adolescents were answered the questionnaires at the same lecture hour to avoid the information contamination among the students.

The data was analyzed using the IBM Statistical Package for the Social Sciences (SPSS) for Windows, 23.0, a packaged software. The descriptive characteristics of the adolescents and their parents were presented by the numbers, percentages, mean, and standard deviation values. T-test was used in the comparison of the quantitative and continuous data between any two independent groups; on the other hand, a one-way ANOVA test was used in the comparison of the quantitative, continuous data among more than two independent groups.

The level of significance was taken to be  $p < 0.05$ . The predictors of e-health literacy in adolescents were analyzed using linear regression models. E-health literacy was accepted as dependent variable, the independent variables found statistically significant in the descriptive analyses were included in the regression model. The variables in linear regression model were individual factors (age, gender, decision making scale), family factors (father's educational level, numbers of siblings, health care worker in the family), economic factors (monthly family income, having a computer) and the behavior of searching health-related information on the internet (about own health and health subjects). Also, Tukey's HSD post-hoc analysis was performed to determine between which groups, the significant differences obtained as a result of ANOVA exactly occurred.

## RESULTS

Data was collected from 1,082 adolescents aged 14 to 18 years; 56% of the adolescents were male. The mean age of the participants was 15.9 ( $\pm 1.1$ ) years old, and 79.3% of the participants were between the ages of 15 and 17 years.

In the study, the mean score of e-health literacy for adolescents was found as 26.9 ( $\pm 7.6$ ) with the range of 8 to 40. Female adolescents had significantly higher e-health literacy levels than males ( $p < 0.001$ ). The level of e-health literacy increases, as the age of the adolescents increases ( $p < 0.001$ ); the numbers of siblings decreases ( $p = 0.007$ ); the adolescents with chronic disease ( $p = 0.045$ ); the education level of the father increases ( $p = 0.001$ ); the monthly family income increases, and having a healthcare worker in the family ( $p < 0.05$ ) (Table 1). The mean score of adolescent decision-making scale was found as 39.5 ( $\pm 10.0$ ) with the range of 9-85. The adolescents from the school in high economic settlement had the higher e-health literacy level (28.6 $\pm$ 6.9) than the adolescents from the school in the low economic settlement (26.3 $\pm$ 7.6) and adolescents from the school in the middle economic settlement (25.7 $\pm$ 7.9) ( $p < 0.001$ ). (table is not given)

E-health literacy levels of the adolescents increases with accessing the Internet through cell phones ( $p < 0.05$ ), having a computer ( $p < 0.05$ ), the duration of internet usage on weekdays increases ( $p < 0.05$ ) and on the weekends ( $p < 0.001$ ), and reading the general health information ( $p < 0.001$ ) and their own health problems ( $p < 0.001$ ) on the internet (Table 2).

In the linear regression model, the e-health literacy level increases with the age of the adolescents ( $p < 0.05$ ), the monthly income of the family ( $p < 0.05$ ), adolescent decision making scores ( $p < 0.001$ ); but an increase in the number of siblings ( $p < 0.05$ ) caused a decrease in e-health literacy scores (Table 3).

## DISCUSSION

The aim of this study was to find out the e-health literacy levels in the adolescent age group, and its relation to adolescent decision making as well as social and economic determinants of the adolescents and their families. It was found that individual development stage of the adolescent such as age and decision making capacity, also economic statuses of the parents had a positive relation with the e-health literacy levels of the adolescents.

In the study, it was found the "e-health literacy" total mean score of the adolescents was 26.9  $\pm$  7.6, and they used the Internet at a high rate. Similar results have been obtained in some other studies across the world; the e-health literacy mean scores have been found to be 26.0 in a study conducted in Serbia by Gazibara, et al. with adolescents in the age group of 14–19 years (28), 30.6 in a study conducted in USA by Ghaddar, et al. with adolescents in the age group of 14–20 years (29), and 22.6 in a study conducted in Taiwan by Chang, et al. (2015) with high school students (from 7th, 8th, and 9th grades) (16). The e-health literacy levels among adolescents were quite similar in different countries with different opportunities and cultures. E-health literacy has become widespread all over the world due to electronic communication emerging within the scope of globalization.

According to bivariate analyses of our data, gender, health care workers in the family, having chronic disease, duration of internet usage were the significant determinants for the level of e-health literacy.

Females showed higher e-health literacy levels compared to the males. Gazibara, et al. (2019) determined that females had higher e-health literacy in USA. This was stated to be related to the fact that female adolescents generally used the websites on health more frequently compared to male adolescents (28). Also, many other studies support the opinion that female adolescents are more interested in health subjects, and they have more positive health behaviors compared to male adolescents (11,23).

Chang et al. observed that the adolescents whose parents had low levels of education had lower e-health literacy levels (16); we also had the same finding. The e-health literacy levels of the adolescents increased as the higher education levels of the fathers in our study. However, it did not have a significant impact based on the education statuses of the mothers. This situation could be caused by the fact that in Turkey, men could reach high school and university education more than the women could; therefore the educational levels and health literacy levels of women remained lower than those of the men (23,30).

In this study, healthcare worker in the family played an important role in increasing the level of e-health literacy among adolescents. Many studies have determined that the health care professionals are one of the important health information sources to access health information for the adolescents (29,31).

**Table 1. Mean e-health literacy scores of the adolescents by social and economic characteristics of the adolescents and their families (n=1082)**

	n	%	Mean e- HL± SD <sup>a</sup>	p
<b>Gender</b>				
Female	476	44.0	27.5±6.3	0.000
Male	606	56.0	26.4±8.4	
<b>Age</b>				
14	142	13.1	24.6±7.6	0.000
15	288	26.6	26.6±7.5	
16	239	22.1	26.9±7.9	
17	331	30.6	27.5±7.3	
18	82	7.6	28.7±7.4	
<b>Chronic disease</b>				
Having chronic illness	100	9.2	29.1±6.8	0.045
Not having chronic disease	180	16.7	26.9±8.1	
Not having any disease	802	74.1	26.5±7.5	
<b>Family type</b>				
Extended	107	9.9	26.3±7.9	0.164
Nuclear	837	77.4	26.9±7.6	
With single parents and relatives	138	12.8	27.0±7.1	
<b>Number of sibling</b>				
0	83	7.7	28.4±7.3	0.007
1	471	43.5	27.5±7.3	
2 and more	528	48.8	24.5±7.6	
<b>Mother's educational level</b>				
Illiterate	34	3.1	25.4±8.7	0.654
Literate	19	1.8	24.7±6.7	
Primary school	266	24.6	27.3±7.4	
High school	289	26.7	26.4±7.5	
University	352	32.5	27.1±7.8	
Post graduate education	122	11.3	27.3±7.1	
<b>Mother's employment status</b>				
Employed	361	33.4	27.2±7.5	0.855
Unemployed	720	66.6	26.7±7.5	
<b>Father's educational level</b>				
Illiterate	16	1.5	24.7±8.4	0.001
Literate	4	0.4	19.3±6.9	
Primary school	170	15.7	26.1±7.6	
High school	245	22.6	26.3±6.9	
University	431	39.8	27.5±7.8	
Post graduate education	216	20.0	27.2±7.6	
<b>Father's employment status</b>				
Employed	968	89.5	26.9±7.6	0.449
Unemployed	113	10.5	26.4±6.9	

<b>Monthly family income</b>				
1000 TL and lower	19	1.8	25.1±6.5	0.000
1001-2000 TL	243	22.5	25.5±7.4	
2001-3000 TL	336	31.1	26.4±7.7	
3001-5000 TL	282	26.1	27.7±6.9	
5001 TL and over	202	19.7	28.4±8.2	
<b>Having a healthcare worker in the family</b>				
Yes	103	9.5	28.5±6.4	0.022
No	979	90.5	26.7±7.7	

Note. SD= standard deviation; TL= Turkish lira.

**Table 2. Mean e-health literacy scores of the adolescents by having internet accessibility (n=1082)**

Internet accessibility	n	%	Mean e-HL ± SD <sup>a</sup>	p
<b>Having a cell phone</b>				
Yes	1039	96.0	26.9±7.6	0.056
No	43	4.0	24.7±7.1	
<b>Internet access though cell phone</b>				
Yes	1000	92.4	27.0±7.5	0.016
No	82	7.6	24.9±8.2	
<b>Having a computer</b>				
Yes	767	70.9	27.4±7.6	0.002
No	315	29.1	25.7±7.5	
<b>Duration of internet usage on weekdays</b>				
60 minutes and less	160	14.8	25.3±8.3	0.001
61-119 minutes	220	20.3	26.6±7.2	
121-179 minutes	284	26.2	27.4±6.6	
180 minutes and more	418	38.6	27.3±8.1	
<b>Duration of internet usage on weekends</b>				
60 minutes and less	118	10.9	23.4±9.2	0.000
61-119 minutes	154	14.2	27.0±6.3	
121-179 minutes	200	18.5	27.4±7.1	
180-239 minutes	237	21.9	27.5±6.7	
240 minutes and more	373	34.5	27.3±8.0	
<b>Reading the general health information on the internet</b>				
Yes	652	60.3	27.9±7.2	0.000
No	430	39.7	25.3±7.9	
<b>Reading the health information for their own health problems on the internet</b>				
Yes	396	36.6	28.3±7.2	0.000
No	686	63.4	26.1±7.7	

<sup>a</sup>SD= standard deviation



Table 3. Multiple linear regression predicting adolescents' e-health literacy (n =1082)

Variable	B	SE	Beta	T	P	95% CIs for B	
						Lower	Upper
(Constant)	19.940	4.134		4.824	0.000	11.829	28.051
Gender	0.494	0.461	0.032	1.072	0.284	-0.410	1.399
Age	0.578	0.191	0.090	3.023	<b>0.003</b>	<b>0.203</b>	<b>0.954</b>
Number of siblings	-0.577	0.194	0.089	-2.975	<b>0.003</b>	<b>-0.958</b>	<b>-0.196</b>
Monthly family income	0.468	0.206	0.071	2.277	<b>0.023</b>	<b>0.065</b>	<b>0.871</b>
Father's educational level	0.494	0.461	0.032	1.072	0.284	-0.410	0.494
Having a healthcare worker in the family	0.933	0.762	0.036	1.224	0.221	2.428	0.562
Having a computer	0.935	0.504	0.056	1.856	0.064	1.923	0.053
Reading the general health information on the internet	1.791	0.483	0.115	3.704	<0.001	2.740	0.842
Reading the health information for their own health problems on the internet	1.201	0.491	0.076	2.448	0.015	2.164	0.238
Having chronic disease	0.336	0.355	0.031	1.032	0.302	1.062	0.390
Adolescent decision making questionnaire	0.094	0.022	0.124	4.196	<b>0.000</b>	<b>0.050</b>	<b>0.138</b>

The communication technologies to access health information have developed dramatically in the last ten years and continue to develop rapidly (20). Adolescents also evaluate the content of the information they obtain via the Internet and use the information to solve their health problems in their daily lives (32). In this study, most of the adolescents in the age group of 14–18 years (60.3%) stated that they used the Internet to obtain information about their health. In a study by Chang (2015), it was determined that the rate of searching for online health information among internet-using adolescents was 61% (16). Also, in this study, the e-health literacy levels of adolescents with a chronic disease were found to be higher. Chisolm et al. (2011) determined that 50% of adolescents with asthma and diabetes used the Internet to obtain health information (33). The people with high e-health literacy skills are aware that they should go into action when having a serious health issue. Therefore, adolescents with chronic diseases performed more searches for health information (34). In a study by Park, it was determined that adolescents with asthma, disk hernia, and atopic dermatitis had lower e-health literacy levels compared to healthy adolescents (22). Although health literacy – relevant skills are mainly developed on the needs of the adolescent (35), it is very important for the adolescents how to be aware of their needs to be healthier.

Besides the significant variables found in the bivariate analyses, mainly adolescent development stage and economic determinants found the most significant

determinants in our further analyses. In the present study, it was determined that as the age of the adolescents increased, the e-health literacy level increased. This result can be explained by the fact that the age of the adolescents and their awareness levels increased with their cognitive and social development. As the age and the grade of the adolescents increase, e-health literacy increases their ability to search for health information on the Internet (24). It is already known that decision making and judgement skills are improved with the development of the frontal lobe of the brain in the adolescence period of the life (9). Adolescents stated that they used health information found on the Internet for their health-related decision making, if they found it reliable after evaluation (16). Health-literacy is considered as a combination of the personal characteristics and cognitive skills in the adolescence (35). With increasing age, brain development also affects the increase in health literacy. In our study, both age and decision-making scale were found the important determinants to increase of the e-health literacy levels of the adolescents. Therefore, further studies can help to find the most effective and age-specific strategies to improve e-health literacy among the adolescents, as promoting e-health literacy among adolescents is an important strategy to pave way for positive health behaviors in life (29). This age-specific strategies and intervention studies should be developed consider of the development stage of the brain in the adolescent ages.

In improving the health-literacy skills in the adolescents, it is important to establish the convenient environmental

settings, which are increasing the adolescents' motivation on searching and learning health information through internet. It has been observed in the literature that those in late adolescence had higher health literacy compared to those in early adolescence; it has also been determined that the accessibility to facilities to search for health information via the Internet was lower in the early adolescence period (20,29,33). In a study conducted in Spain, it was reported that the education provided in secondary schools developed e-health literacy among adolescents (36). In this study, as family income levels and having a computer, the e-health literacy levels also increased in the adolescents. Having fewer siblings can be also accepted as indicators of nuclear family, and an economic status in Turkey. It is shown that the children from lower socioeconomic backgrounds had lower e-health literacy levels than the children from higher socioeconomic levels; our finding is similar to the previous studies demonstrated that adolescents in lower socioeconomic levels, used the Internet less, exhibited lower online health information search behaviors and lower e-health literacy levels than the adolescents in the higher socioeconomic levels (37–39).

Accessing health information on the Internet by adolescents was considered a social privilege. The results of this study also indicate that there is a need to improve e-health literacy levels among adolescents, especially for those from low socioeconomic backgrounds. Having access to accurate and reliable health information is also a human right as it is declared as "*Basic health services and access to information are the priority issues*" in Astana Declaration (40). In this context, the Internet and electronic environment provide a new opportunity for adolescents to acquire health education, and becoming more necessary in our life. However, it is also required that adolescents should be protected from misinformation and disinformation on the Internet. We have already learned how infodemic affect the people's knowledge and behaviors of the people in COVID-19 pandemic (41). There is an urgent need to improve e-health literacy education aiming to teach to the adolescents how to find reliable health information, evaluate the content, and make appropriate decisions to promote and prevent their own health. E-health literacy programs for adolescents should be integrated into the school health education syllabus to strengthen the adolescents' life skills (42).

During COVID-19 pandemic, we have also observed that social inequality among adolescents in developing countries, are the main barriers in front of the technologies (43). United Nations Committee on the Rights of the Child recommended that states parties should encourage the use of digital technologies to promote healthy life styles, also

research and development focused on children's health needs (44).

In our study also showed that the adolescents from lower socioeconomic level had lower e-health literacy levels. Inequal access of communication technology will increase the inequality between social classes and strata, the adolescents in lower socioeconomic level of the developing countries will be the most vulnerable adults to reach the accurate health information on the internet in the world. For this reason, the e-health information literacy and services should be provided to the adolescents in low socioeconomic status as social policies of the governments in the developing countries. New communication technology and e-health literacy education will be introduced to the adolescents living in disadvantage communities.

#### Limitations

There are some limitations to this study, as well. The sample of this study was selected from high schools with three different socioeconomic levels from the capital city of the country. However, it is assumed that high school students living in little towns and rural areas might have lower accessibility of Internet than urban settlements. Another limitation is that the internet usage behavior of the high school students and the e-health literacy of their parents, which may influence the e-health literacy levels and health outcomes, have not been assessed in this study. Further studies are required to examine the longitudinal effects on the e-health literacy of adolescents.

#### Conclusions and Future Directions

This study is the first research in Turkey, describing the e-health literacy levels of high school students and related to the variables of economic statuses and mental development. In the study, the inequality such as economic statuses come into prominence, affecting e-health literacy. The results of this study are important for decision makers, school health professionals, public and pediatric health care providers.

The results of this study add to the literature concerning the variables related to the e-health literacy levels and the health of adolescents in developing countries. Understanding the variables of health characteristics or statuses and the socio-demographic factors helps to design the content of training on e-health literacy interventions and achieve effective e-health literacy levels. This study has revealed that e-health literacy should be developed among adolescents; for this, training programs suitable for the developmental period should be organized in the schools.

## ACKNOWLEDGMENTS

The authors thank the students, staff, families, and school board of the Ankara school district for their support of this study.

### Declaration of Conflicting Interests

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

### Funding

The author(s) did not receive financial support for the research, authorship, and/or publication of this article.

### Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## REFERENCES

- Park H, Lee E. Self-reported eHealth literacy among undergraduate nursing students in South Korea: a pilot study. *Nurse Educ Today*. 2015;35(2):408–13.
- Robb M, Shellenbarger T. Influential factors and perceptions of eHealth literacy among undergraduate college students. *On-Line J Nurs Informatics*. 2014;18(3).
- Holmberg C, Berg C, Dahlgren J, Lissner L, Chaplin JE. Health literacy in a complex digital media landscape: pediatric obesity patients' experiences with online weight, food, and health information. *Health Informatics J*. 2019;25(4):1343–57.
- Chesser A, Burke A, Reyes J, Rohrberg T. Navigating the digital divide: a systematic review of eHealth literacy in underserved populations in the United States. *Informatics Heal Soc Care*. 2016;41(1):1–19.
- Kim H, Xie B. Health literacy in the eHealth era: a systematic review of the literature. *Patient Educ Couns*. 2017;100(6):1073–82.
- Maitz E, Maitz K, Sendlhofer G, Wolfsberger C, Mautner S, Kamolz LP, et al. Online Health Information Seeking Behavior of Children and Adolescents Aged from 12 to 14 Years-A Mixed-Methods Study. *J Med Internet Res*. 2020;
- Neter E, Brainin E. eHealth literacy: extending the digital divide to the realm of health information. *J Med Internet Res*. 2012;14(1):e19.
- Natsume N, Kawai T, Kohama G, Teshima T, Kochi S, Ohashi Y, et al. Incidence of cleft lip or palate in 303738 Japanese babies born between 1994 and 1995. *Br J Oral Maxillofac Surg*. 2000;38(6):605–7.
- Fleary SA, Joseph P, Pappagianopoulos JE. Adolescent health literacy and health behaviors: A systematic review. *J Adolesc*. 2018;62:116–27.
- Manganello JA. Health literacy and adolescents: a framework and agenda for future research. *Health Educ Res*. 2008;23(5):840–7.
- Beck F, Richard J-B, Nguyen-Thanh V, Montagni I, Parizot I, Renahy E. Use of the internet as a health information resource among French young adults: results from a nationally representative survey. *J Med Internet Res*. 2014;16(5):e128.
- Xie B. Effects of an eHealth literacy intervention for older adults. *J Med Internet Res*. 2011;13(4):e90.
- Zhou J, Fan T. Understanding the factors influencing patient E-health literacy in online health communities (OHCs): a social cognitive theory perspective. *Int J Environ Res Public Health*. 2019;16(14):2455.
- Wartella E, Rideout V, Montague H, Beaudoin-Ryan L, Lauricella A. Teens, health and technology: A national survey. *Media Commun*. 2016;4(3):13–23.
- Hove T, Paek H-J, Isaacson T. Using adolescent eHealth literacy to weigh trust in commercial web sites: the more children know, the tougher they are to persuade. *J Advert Res*. 2011;51(3):524–37.
- Chang F-C, Chiu C-H, Chen P-H, Miao N-F, Lee C-M, Chiang J-T, et al. Relationship between parental and adolescent eHealth literacy and online health information seeking in Taiwan. *Cyberpsychology, Behav Soc Netw*. 2015;18(10):618–24.
- Center PR. Internet/broadband fact sheet. *Pew Res Cent Internet, Sci Tech*. 2017;
- Turgut YE, Kursun E. Mobile Internet Experiences of the Children in Turkey and European Countries: A Comparative Analysis of Internet Access, Use, Activities, Skills and Risks. *Eurasian J Educ Res*. 2020;88:225–48.
- Güzeller CO, Coşguner T. Development of a problematic mobile phone use scale for Turkish adolescents. *Cyberpsychology, Behav Soc Netw*. 2012;15(4):205–11.
- Freeman JL, Caldwell PHY, Bennett PA, Scott KM. How adolescents search for and appraise online health information: A systematic review. *J Pediatr*. 2018;195:244–55.
- Gazibara T, Cacic J, Cacic M, Pekmezovic T, Grgurevic A. eHealth and adolescents in Serbia: psychometric properties of eHeals questionnaire and contributing factors to better online health literacy. *Health Promot Int*. 2018;
- Park BK. Factors Influencing eHealth Literacy of Middle School Students in Korea: A Descriptive Cross-Sectional Study. *Health Inform Res*. 2019;25(3):221–9.
- Kaya N, Asti T, Kaya I, Yaylaci S, Kaya H, Turan N, et al. Association between attitudes towards Internet usage and health practices in high-school students in 2 schools in Turkey: a cross-sectional study. *EMHJ-Eastern Mediterr Heal J*. 2016;22(11):824–31.
- Norman CD, Skinner HA. eHEALS: the eHealth literacy scale. *J Med Internet Res*. 2006;8(4):e27.
- Coşkun S, Bebiş H. Adolesanlarda e-sağlık okuryazarlığı ölçeği: Türkçe Geçerlik ve güvenilirlik çalışması. *Gülhane Tıp Derg*. 2015;57:378–84.
- Mann L, Harmoni R, Power C. Adolescent decision-making: The development of competence. *J Adolesc*. 1989;12(3):265–78.
- Çolakradioğlu O, Güçray SS. Ergenlerde Karar Verme Ölçeği'ni Türkçe'ye Uyarlama Çalışması. *Eurasian J Educ Res*. 2007;(26).
- Gazibara T, Cacic J, Cacic M, Pekmezovic T, Grgurevic A. eHealth and adolescents in Serbia: psychometric properties of eHeals questionnaire and contributing factors to better online health literacy. *Health Promot Int*. 2019;34(4):770–8.
- Ghaddar SF, Valerio MA, Garcia CM, Hansen L. Adolescent health literacy: the importance of credible sources for online health information. *J Sch Health*. 2012;82(1):28–36.
- Toçi E, Burazeri G, Myftiu S, Sørensen K, Brand H. Health literacy in a population-based sample of adult men and women in a South Eastern European country. *J Public Health (Bangkok)*. 2016;38(1):6–13.
- Nordheim LV, Pettersen KS, Espehaug B, Flottorp SA, Guttersrud Ø. Lower secondary school students' scientific literacy and their proficiency in identifying and appraising health claims in news media: a secondary analysis using large-scale survey data. *BMJ Open*. 2019;9(10):e028781.
- Chang A, Schulz P. The measurements and an elaborated understanding of Chinese eHealth Literacy (C-eHEALS) in chronic patients in China. *Int J Environ Res Public Health*. 2018;15(7):1553.



33. Chisolm DJ, Hardin DS, McCoy KS, Johnson LD, McAlearney AS, Gardner W. Health literacy and willingness to use online health information by teens with asthma and diabetes. *Telemed e-Health*. 2011;17(9):676–82.
34. Schulz PJ, Fitzpatrick MA, Hess A, Sudbury-Riley L, Hartung U. Effects of eHealth literacy on general practitioner consultations: a mediation analysis. *J Med Internet Res*. 2017;19(5):e166.
35. Bröder J, Carvalho GS. Health literacy of children and adolescents: Conceptual approaches and developmental considerations. *Int Handb Heal Lit*. 2019;39.
36. Hernandez-Rabanal C, Vall A, Boter C. Training, the key to improving eHealth literacy of upper secondary school students. *Gac Sanit*. 2018;32(1):48–53.
37. Ramalingam A, Kar SS. Is there a digital divide among school students? an exploratory study from Puducherry. *J Educ Health Promot*. 2014;3.
38. Nölke L, Mensing M, Krämer A, Hornberg C. Sociodemographic and health-(care-) related characteristics of online health information seekers: a cross-sectional German study. *BMC Public Health*. 2015;15(1):31.
39. Lee YJ, Boden-Albala B, Larson E, Wilcox A, Bakken S. Online health information seeking behaviors of Hispanics in New York City: a community-based cross-sectional study. *J Med Internet Res*. 2014;16(7):e176.
40. Organization WH. New global commitment to primary health care for all at Astana conference. In: URL: <http://www.who.int/news-room/detail/25-10-2018-new-global-commitment-to-primary-health-care-for-all-at-astana-conference> Archived at: <http://www.webcitation.org/73khN3DGL>. 2018.
41. Jakovljevic M, Bjedov S, Jaksic N, Jakovljevic I. COVID-19 pandemic and public and global mental health from the perspective of global health security. *Psychiatr Danub*. 2020;32(1):6–14.
42. Paakkari LT, Torppa MP, Paakkari O-P, Välimaa RS, Ojala KSA, Tynjälä JA. Does health literacy explain the link between structural stratifiers and adolescent health? *Eur J Public Health*. 2019;29(5):919–24.
43. Barney A, Buckelew S, Mesheriakova V, Raymond-Flesch M. The COVID-19 pandemic and rapid implementation of adolescent and young adult telemedicine: challenges and opportunities for innovation. *J Adolesc Heal*. 2020;67(2):164–71.
44. United Nations Committee on the Rights of the Child (2021) Consideration of reports submitted by states parties under Art. 25 of the Convention: United Kingdom of Great Britain and Northern Ireland (UN Doc. CRC/C/GC/25) (Geneva, United Nations).