JPHN

Halk Sağlığı Hemşireliği Dergisi
Journal of Public Health Nursing
Araştırma Makalesi / Original Article

Level of Health Literacy among High School Students and Associated Factors

Elif Üner Asil[1]
Recep Kara[2]
Özcan Aygün[1]
Gonca Karayagiz Muslu[2]

[1] Department of Public Health Nursing, Faculty of Health Sciences, Muğla Sıtkı Koçman University, Muğla, Türkiye
[2] Department of Paediatric Nursing, Muğla Sıtkı Koçman University, Faculty of Health Sciences, Muğla, Türkiye

Sorumlu Yazar / Corresponding Author:

Elif Üner Asil

Email: elifuner@mu.edu.tr

Geliş Tarihi/Received	22.08.2024
Revizyon Tarihi/ Revised	19.09.2024
Kabul Tarihi/Accepted	29.10.2024
Yayın Tarihi/Publication Date	27.12.2024

Abstract

Objective: Identifying the factors that influence health literacy among high school students is vital for improving health education and promoting effective health initiatives. This study aims to evaluate the health literacy levels of high school students and identify the associated factors influencing them.

Methods: A descriptive-correlational study was conducted involving 681 high school students from the Fethiye district in Turkey. Data collection utilized a sociodemographic data Form alongside the Health Literacy Scale for School-Age Children. Chi-square tests and multiple logistic regression analyses were applied to explore the relationships between health literacy levels and various socio-demographic and health-related factors.

Results: In this study, students' health literacy scores are at a medium level. The results showed significant associations between health literacy levels and factors such as age, economic status, perceived general and mental health, and daily internet and social media usage ($p<.05$). Students aged 15 and above, those with higher economic status, and those who rated their health as good or better demonstrated elevated levels of health literacy.

Conclusions: These results underscore the significant impact of age, economic status, internet and social media use, and perceived health on the health literacy levels of high school students. To improve health literacy, it is recommended to integrate health literacy topics into school curricula and organize educational activities such as seminars, conferences, and scientific events. These interventions can foster a health-conscious younger generation and promote better health outcomes.

Keywords: Health Literacy, high school students, socio-demographic factors, mental health, health education.

Öz

Lise Öğrencileri Arasında Sağlık Okuryazarlığı Düzeyi ve İlişkili Faktörler

Amaç: Lise öğrencileri arasında sağlık okuryazarlığını etkileyen faktörlerin belirlenmesi, sağlık eğitiminin iyileştirilmesi ve etkili sağlık girişimlerinin teşvik edilmesi açısından hayati önem taşımaktadır. Bu çalışma, lise öğrencilerinin sağlık okuryazarlığı düzeylerini değerlendirmeyi ve bunları etkileyen ilişkili faktörleri belirlemeyi amaçlamaktadır.

Yöntem: Türkiye'nin Fethiye ilçesinden 681 lise öğrencisini kapsayan tanımlayıcı-ilişkisel bir çalışma yürütülmüştür. Veri toplamada sosyodemografik veri formunun yanı sıra Okul Çağı Çocukları için Sağlık Okuryazarlığı Ölçeği kullanılmıştır. Sağlık okuryazarlığı düzeyleri ile çeşitli sosyo-demografik ve sağlıkla ilgili faktörler arasındaki ilişkileri araştırmak için ki-kare testleri ve çoklu lojistik regresyon analizleri uygulanmıştır.

Bulgular: Bu çalışmada, öğrencilerin sağlık okuryazarlığı puanları orta düzeydedir. Sonuçlar, sağlık okuryazarlığı düzeyleri ile yaş, ekonomik durum, algılanan genel sağlık ve ruh sağlığı, günlük internet ve sosyal medya kullanımı gibi faktörler arasında anlamlı ilişkiler olduğunu göstermiştir ($p<.05$). Yaşı 15 ve üzeri olan, ekonomik durumu daha yüksek olan ve sağlığını iyi veya daha iyi olarak değerlendiren öğrencilerin sağlık okuryazarlığı düzeyleri daha yüksek çıkmıştır.

Sonuçlar: Bu sonuçlar yaş, ekonomik durum, internet ve sosyal medya kullanımı ve algılanan sağlığın lise öğrencilerinin sağlık okuryazarlığı düzeyleri üzerindeki önemli etkisinin altını çizmektedir. Sağlık okuryazarlığını geliştirmek için, sağlık okuryazarlığı konularının okul müfredatına entegre edilmesi ve seminerler, konferanslar ve bilimsel etkinlikler gibi eğitim faaliyetlerinin düzenlenmesi önerilmektedir. Bu müdahaleler, sağlık bilincine sahip genç bir nesli teşvik edebilir ve daha iyi sağlık sonuçlarını destekleyebilir.

Anahtar Kelimeler: Sağlık Okuryazarlığı, Lise Öğrencileri, Sosyo-Demografik Faktörler, Ruh Sağlığı, Sağlık Eğitimi

Atıf/Cite; Asil Üner, E., Kara, R., Aygün, Ö., Muslu Karayagiz G. (2024). Level of health literacy among high school students and associated factors. *Halk Sağlığı Hemşireliği Dergisi*, *6*(3), 152-163.https://doi.org/10.54061/jphn.1537102

2667-8047/© The Authors. This is an open access article under the CC BY NC license
https://creativecommons.org/licenses/by-nc/4.0/

INTRODUCTION

Health literacy encompasses the cognitive and social competencies required for individuals to acquire, comprehend, and effectively utilize health information to maintain and enhance their well-being (Morrison et al., 2019; WHO, 2019). This multifaceted concept includes the ability to adopt healthy behaviors, optimize the use of healthcare services, utilize medical devices in the home setting, critically evaluate health-related information, understand fundamental health concepts and services, and access and assess relevant information (Parnell et al., 2019; Nutbeam, 2021). The level of health literacy is a critical determinant of the health knowledge and future quality of life of younger generations. High school students are in a pivotal stage of developing the knowledge and skills that form the foundation of health literacy (Prihanto et al., 2021). Therefore, the health behaviors of high school students are significantly affected by their level of health literacy (Fleary et al., 2018; Velasco et al., 2021).

High health literacy in students has been shown in national and international literature to promote accurate evaluation of health information, healthy choices and behaviours, ultimately leading to improved sustained health and overall well-being (Tümer & Sümen, 2020; Jafari et al., 2021). Conversely, individuals with low health literacy often lack essential health information, rely on misinformation or inaccurate data for decision-making, and engage in unhealthy behaviors. This deficiency has been shown to negatively impact overall well-being and result in poor health outcomes (Khajouei & Salehi, 2017; Duplaga & Grysztar, 2021). Health literacy empowers young people to embrace healthier lifestyles, develop informed attitudes, and effectively utilize healthcare services (Arslan & Karabey, 2023). However, research has shown that students face limitations in their health literacy levels and conduct (Cheng et al., 2020; Kim et al., 2023; Sarhan et al., 2023). Understanding the determinants that impact the health literacy levels of high school pupils is crucial to devise efficacious health education methods and cultivate a health-savvy younger cohort (Klinker et al., 2020; De Albuquerque et al., 2022).

This study is significant in examining the relationships between socio-demographic factors, health status, anthropometric data, and technology proficiency, all of which contribute to the health literacy levels of high school students. The primary aim of the research was to assess health literacy levels and identify the factors that influence these levels among secondary school students.

Research Questions

Which socio-demographic factors are associated with high school students' health literacy levels?

What are the factors affecting high school students' health literacy levels such as health status and technology use?

METHODS

Participants

The research is a descriptive-correlational study conducted between 15 April – 15 June 2023. In the study, three different high schools (Imam Hatip, Vocational and Anatolian High Schools) in Fethiye district were selected as the sample. These high schools were chosen to represent the socio-economic, cultural and academic differences of the students to examine the diversity in health literacy levels and to increase the representativeness of the general population. These high schools have a total enrollment of 1,737 students, consisting of 599, 342 and 796 students respectively. Using G*Power 3.1.9.7 software, it was determined that a sample size of 564 students was required to conduct a two-way logistic regression analysis with a power of 0.95, a confidence interval of 95%, and a sampling error of 5% based on an odds ratio of 1.4 (Demidenko, 2007; Buchner et al., 2020). The sample size was increased by 20 percent to account for potential data loss during the survey, which meant that 677 students were included. In the study, 235 students from a high school with 599 students, 134 students from a high school with 342 students, and 312 students from a high school with 796 students were selected as the sample using the stratified sampling method. The study was conducted with a total of 681 students.

Measures

The study measures included a socio-demographic data form and a health literacy scale for school-aged children.

Socio-demographic Data Form: The study used a sociodemographic data form consisting of information on students' age, gender, economic status, general health status, mental health status, body weight, and height measurements (Abacıgil et al., 2019) 23-question data form consisting of information on students' computer ownership, use, internet, and social media use (Coşkun & Bebiş, 2015) developed by the researchers in alignment with existing literature.

Health Literacy Scale for School-Age Children: The scale comprises 10 items designed to evaluate children's health literacy across five distinct dimensions: theoretical knowledge (items 1, 5), practical knowledge (items 4, 7), critical thinking (items 3, 9), self-awareness (items 8, 10), and citizenship (items 2, 6). Öztürk Haney (2017) conducted a study on the Turkish version of the scale, confirming its validity and reliability with a Cronbach's alpha of 0.77 (Öztürk Haney, 2017). Participants rated each item on a 4-point Likert scale, ranging from 1 (not relevant) to 4 (highly relevant). The cumulative score spans from 10 to 40, where scores between 10 and 25 indicate low health literacy, 26 and 35 signify medium health literacy, and 36

and 40 denote high health literacy. In this study, the scale of Cronbach's alpha was found to be 0.74.

Procedure

Ethical approval for this study was granted by the Medicine and Health Sciences Ethics Committee of Muğla Sıtkı Koçman University (28.02.2023-35). Necessary permissions were obtained from the relevant authorities to conduct the research. Informed consent was collected from both students and their parents after they were briefed on the study's objectives. Data collection forms were distributed to the students during times coordinated with the school administration. Measurements of students' height and weight were conducted in the designated sports rooms of each school, with the process of filling out forms taking approximately 15 minutes per student and the height and weight measurements taking about 2 minutes each.

Analysis

The Statistical Package for IBM SPSS 22.0 was used for data analysis. Numbers and percentages were used for the descriptive variables of the study, and the chi-squared test was used to compare descriptive variables and health literacy levels. Multiple logistic regression analysis was used to examine the relationship between descriptive variables and health literacy levels. In this analysis, low health literacy was taken as the reference, and odds ratios (OR) were calculated for the relationship between medium and high health literacy and the descriptive variables. For all statistical analyses, p<.05 was accepted as the level of significance.

RESULTS

Among the participants in this study, 35% were 16 years old, 56.9% were girls, and 57.3% had an income to cover their expenses. It was found that 3.8% of the students had hearing problems, 30.3% had vision problems, 41% had tooth decay and 52.1% brushed their teeth twice a day. It was determined that 56.6% of the students had a computer or tablet and 80.3% of them were good or better users of the computer or tablet. It was reported that 89.9% of participants had good or higher levels of internet and social media skills, 76.1% of the participants reported using the internet for over three hours daily, and 52.2% indicated that they engaged with social media daily (Table 1).

It was found that 10.7% of the students had chronic diseases. 72.4% of them reported their general health and 68.7% of them reported their mental health as good or better. The Standard Deviation Score (SDS) values of weight, height and body mass index of the students according to age are presented in Table 2. It was noted that 61.8% of the students had moderate health literacy. It was determined that 76.1% of the students obtained health-related information from the internet, 54.3% from health institutions, 43.6% from social media, 31.5% from television and 22.2% from friends (Table 2).

The comparison of students' health literacy levels against the descriptive variables is detailed in Table 3. The analysis revealed a statistically significant relationship between students' age and their health literacy levels (p<.05). Subsequent pairwise comparisons indicated that 17-year-olds exhibited significantly higher health literacy compared to 14-year-olds (p < .001), and similarly, 15-year-olds had higher health literacy than 14-year-olds (p<.05), with these differences being statistically significant.

A statistically significant variation exists in students' outcomes in economic status and health literacy (p<.05) (Table 3). Pairwise comparisons showed that students who described their economic status as having more income than expenses had higher health literacy than those who described their economic status as having less income than expenses (p<.05) and income equal to expenses (p<.05), and this difference was statistically significant.

A significant relationship was identified between students' self-evaluation of their overall health and their health literacy levels (p<.001) (Table 3). Pairwise comparisons indicated that students who rated their general health as excellent exhibited higher health literacy scores compared to those who assessed their health as good (p<.05), fair (p<.01), or poor (p<.01), confirming the statistical significance of these differences. Furthermore, there was a marked statistical significance between students' self-assessed mental health and their health literacy (p <.001) (Table 3). Pairwise comparisons revealed that students with a very good perception of their mental health had higher health literacy levels than those who rated their mental health as poor (p<.05) or good (p<.05), with the differences being statistically significant.

A statistically significant difference (p<.01) was found between students' level of social media use and their level of health literacy (Table 3). However, the pairwise comparisons indicated that this difference did not reach statistical significance (p >.05). In contrast, a statistically significant correlation was identified between health literacy levels and the duration of internet usage (p<.01) (Table 3). In the pairwise comparison, students who reported 0-2 hours of internet use had a statistically significantly higher level of health literacy than students who reported 6-9 hours of internet use (p<.05). In addition to students' internet use, the difference between health literacy and social media use duration was statistically significant (p<.05) (Table 3). However, after pairwise comparison, this difference was not statistically significant (p >.05). Although the difference between students' health literacy level and SDS level according to age was statistically significant (p<.01) (Table 3), this difference was not statistically significant (p >.05).

Table 1. Distribution of socio-demographic and descriptive information of participants

Variables	Number	%
Age		
14 ages	67	10.2
15 ages	218	33.3
16 ages	229	35.0
17 ages	140	21.4
Gender		
Female	372	56.9
Male	282	43.1
Economic situation		
Income more than expenditure	208	31.8
Income is equal to expenditure	375	57.3
Income less than expenditure	71	10.9
Hearing problem status		
No	629	96.2
Yes	25	3.8
Visual problem status		
No	456	69.7
Yes	198	30.3
Number of tooth decay		
None	386	59.0
1 piece	91	13.9
2 pieces	95	14.5
3 pieces	47	7.2
4 pieces and more	35	5.4
Number of tooth fillings		
None	382	58.4
1 piece	84	12.8
2 pieces	77	11.8
3 pieces	45	6.9
4 pieces and more	66	10.1
Frequency of brushing		
3 times a day	35	5.4
2 times a day	341	52.1
1 time a day	220	33.6
Sometimes	58	8.9
Tablet/computer availability		
Yes	370	56.6
No	284	43.4
Level of tablet/computer use		
Perfect	129	19.7
Pretty good	184	28.1
Good	204	31.2
Middle	137	20.9
Level of internet and social media use		
Perfect	199	30.4
Pretty good	217	33.2
Good	172	26.3
Middle	66	10.1
Daily internet usage time		
0-2 hours	156	23.9
3-5 hours	335	51.2
6-9 hours	163	24.9
Daily social media usage time		
0-2 hours	312	47.7
3-5 hours	256	39.1
6-9 hours	86	13.1

Table 2. Distribution of participants' descriptive information on health status and practices

Variables	Number	%
Chronic disease status		
No	584	89.3
Yes	70	10.7
First health institution contacted		
Family Health Centre	350	53.5
Hospital	304	46.5
Perceived general health level		
Perfect	50	7.6
Pretty good	152	23.2
Good	272	41.6
Not bad	151	23.1
Bad	29	4.4
Perceived mental health level		
Pretty good	173	26.5
Good	276	42.2
Not bad	154	23.5
Bad	51	7.8
Weight-for-age Standard Deviation Score level		
Overweight	124	19.0
Normal	343	52.4
Underweight	139	21.3
Excessive underweight	48	7.3
Height for age Standard Deviation Score level		
Normal	554	84.7
Short	86	13.1
Excessively short (stunted)	14	2.1
Body mass index for age Standard Deviation Score level		
Overweight	33	5.0
Overweight carries a risk	88	13.5
Normal	343	52.4
Low	121	18.5
Extreme Low	69	10.6
Health literacy levels of students		
Low	125	19.1
Medium	404	61.8
High	125	19.1
Students' health literacy resources		
Newspaper/Magazine	32	4.9
Television	206	31.5
Internet	498	76.1
Social media	285	43.6
Friends	145	22.2
Institutions	355	54.3
Scientific Journals	95	14.5

Table 3. Comparison of Participants' Health Literacy Levels and Demographic Characteristics

Variables	Low Health Literacy	Medium Health Literacy	High Health Literacy	X^2	p
	% (n)	% (n)	% (n)		
Age					
14 ages	29.9 (20)	56.7 (38)	13.4 (9)	14.73	0.022*
15 ages	22.1 (48)	57.3 (125)	20.6 (45)		
16 ages	17.0 (39)	66.8 (153)	16.2 (37)		
17 ages	12.9 (18)	62.9 (88)	24.2 (34)		
Gender					
Female	19.8 (74)	60.8 (226)	19.4 (72)	0.44	0.800
Male	18.1 (51)	63.1 (178)	18.8 (53)		
Economic situation					
Income more than expenditure	16.3 (34)	58.2 (121)	25.5 (53)	9.68	0.046*
Income is equal to expenditure	19.4 (73)	64.3 (241)	16.3 (61)		
Income less than expenditure	25.4 (18)	59.2 (42)	15.4 (11)		
Perceived general health level					
Perfect	12.0 (6)	48.0 (24)	40.0 (20)	30.90	<.001***
Pretty good	16.4 (25)	59.2 (90)	24.4 (37)		
Good	16.9 (46)	66.2 (180)	16.9 (46)		
Not bad	25.2 (38)	62.9 (95)	11.9 (18)		
Bad	34.5 (10)	51.7 (15)	13.8 (4)		
Perceived mental health level					
Pretty good	30.1 (52)	52.6 (91)	17.3 (30)	28.19	<.001***
Good	13.4 (37)	68.1 (188)	18.5 (51)		
Not bad	16.9 (26)	65.6 (101)	17.5 (27)		
Bad	19.6 (10)	47.1 (24)	33.3 (17)		
Chronic disease status					
No	18.7 (109)	61.8 (361)	19.5 (114)	1.05	0.591
Yes	22.9 (16)	61.4 (43)	15.7 (11)		
First health institution contacted					
Family Health Centre	18.3 (64)	66.6 (233)	15.1 (53)	9.28	0.010*
Hospital	20.1 (61)	56.3 (171)	23.6 (72)		
Hearing problem status					
No	19.2 (121)	61.9 (389)	18.9 (119)	0.47	0.791
Yes	16.0 (4)	60.0 (15)	24.0 (6)		
Visual problem status					
No	19.3 (88)	62.1 (283)	18.6 (85)	0.22	0.894
Yes	18.7 (37)	61.1 (121)	20.2 (40)		
Number of tooth decay					
None	18.4 (71)	60.4 (233)	21.2 (82)	5.84	0.665
1 piece	25.3 (23)	60.4 (55)	14.3 (13)		
2 pieces	18.9 (18)	63.2 (60)	17.9 (17)		
3 pieces	14.9 (7)	70.2 (33)	14.9 (7)		
4 pieces and more	17.1 (6)	65.7 (23)	17.2 (6)		
Number of tooth fillings					
None	19.1 (73)	61.3 (234)	19.6 (75)	9.19	0.326
1 piece	14.3 (12)	66.7 (56)	19.0 (16)		
2 pieces	22.1 (17)	66.2 (51)	11.7 (9)		
3 pieces	28.9 (13)	53.3 (24)	17.8 (8)		
4 pieces and more	15.2 (10)	59.1 (39)	25.7 (17)		
Frequency of brushing					

Table 3. Comparison of Participants' Health Literacy Levels and Demographic Characteristics (Continued)

Variables	Low Health Literacy	Medium Health Literacy	High Health Literacy	X^2	p
	% (n)	% (n)	% (n)		
3 times a day	11.4 (4)	54.3 (19)	34.3 (12)	11.10	0.085
2 times a day	20.8 (71)	58.4 (199)	20.8 (71)		
1 time a day	17.7 (39)	66.8 (147)	15.5 (34)		
Sometimes	19.0 (11)	67.2 (39)	13.8 (8)		
Tablet/computer availability					
Yes	14.6 (65)	70.4 (232)	15.0 (73)	1.35	0.508
No	22.1 (60)	62.5 (172)	15.4 (52)		
Level of tablet/computer use					
Perfect	18.6 (24)	55.0 (71)	26.4 (34)	10.62	0.101
Pretty good	16.8 (31)	65.3 (120)	17.9 (33)		
Good	17.2 (35)	64.2 (131)	18.6 (38)		
Middle	25.5 (35)	59.9 (82)	14.6 (20)		
Level of internet and social media use					
Perfect	23.1 (46)	50.3 (100)	26.6 (53)	18.92	0.004**
Pretty good	15.2 (33)	67.3 (146)	17.5 (38)		
Good	19.2 (33)	65.7 (113)	15.1 (26)		
Middle	19.7 (13)	68.2 (45)	12.1 (8)		
Daily internet usage time					
0-2 hours	12.1 (19)	66.7 (104)	21.2 (33)	16.90	0.002**
3-5 hours	17.3 (58)	63.6 (213)	19.1 (64)		
6-9 hours	29.4 (48)	53.4 (87)	17.2 (28)		
Daily social media usage time					
0-2 hours	16.3 (51)	64.1 (200)	19.6 (61)	11.97	0.018*
3-5 hours	18.0 (46)	62.9 (161)	19.1 (49)		
6-9 hours	32.6 (28)	50.0 (43)	17.4 (15)		
Weight-for-age SDS level					
Overweight	16.1 (20)	63.7 (79)	20.2 (25)	10.92	0.091
Normal	21.0 (72)	60.3 (207)	18.7 (64)		
Underweight	17.3 (24)	68.3 (95)	14.4 (20)		
Excessive underweight	18.8 (9)	47.9 (23)	33.3 (16)		
Height for age SDS level					
Normal	17.3 (96)	63.4 (351)	19.3 (107)	14.52	0.006*
Short	26.7 (23)	58.1 (50)	15.2 (13)		
Excessively short (stunted)	42.9 (6)	21.4 (3)	35.7 (5)		
Body mass index for age SDS level					
Overweight	11.6 (8)	65.2 (45)	23.2 (16)	5.04	0.752
Overweight carries a risk	17.4 (21)	65.3 (79)	17.3 (21)		
Normal	21.0 (72)	60.3 (207)	18.7 (64)		
Low	18.2 (16)	62.5 (55)	19.3 (17)		
Extreme Low	24.2 (8)	54.5 (18)	21.3 (7)		
X^2 =Chi square test, *p<.05, **p<.01, ***p<.001					

The analysis of factors associated with the determinants of health literacy levels is shown in the study (Table 4). As a result of the analysis, it was found that 15-year-old students (OR: 2.17, 95% CI: 1.04 – 4.56), those who rated their health level as not bad (OR: 2.81, 95% CI: 1.55 – 5. 09), those with excellent (OR: 2.40, 95% CI: 1.01 – 5.70) and fairly good (OR: 2.44, 95% CI: 1.16 – 5.14) tablet/PC usage levels, daily internet usage time of 0-2 hours (OR: 3.15, 95% CI: 1.29 – 7.69), 3-5 hours (OR: 1. 97, 95% CI: 1.02 – 3.81), those with high weight-for-age (OR: 9.27, 95% CI: 1.60 – 53.68), those with normal height-for-age (OR: 6.30, 95% CI: 1.18 – 33.64) and those with short height-for-age (OR: 6. 06, 95% CI: 1.11 – 33.04), and those with overweight BMI for age SDS levels (OR: 11.56, 95% CI: 1.71 – 78.06) were found to have higher intermediate levels of health literacy (Table 4). In addition, 14-year-old students (OR: 4.32, 95% CI: 1.46 – 12.76) and those who spent 0-2 hours per day using the Internet (OR: 4.08, 95% CI: 1.36 – 12.30) were identified as having elevated levels of health literacy (Table 4).

Table 4. Multiple logistic regression analysis for determinants of health literacy levels

Variables	Medium Health Literacy						High Health Literacy					
	B	SE	OR	95% OR		p	B	SE	OR	95% OR		p
				Lower	Upper					Lower	Upper	
Fixed	-3.87	1.59				0.015	-3.28	1.88				0.081
Age												
14 ages	0.83	0.43	2.30	1.00	5.31	0.051	1.46	0.55	**4.32**	**1.46**	**12.76**	**0.008**
15 ages	0.78	0.38	**2.17**	**1.04**	**4.56**	**0.040**	0.63	0.52	1.87	0.68	5.15	0.226
16 ages	0.27	0.38	1.31	0.62	2.77	0.472	0.49	0.51	1.64	0.60	4.44	0.334
17 ages **(Reference)**	0						0					
Gender												
Female	0.17	0.27	1.19	0.70	2.03	0.528	0.32	0.34	1.37	0.71	2.67	0.349
Male **(Reference)**	0						0					
Economic situation												
Income more than expenditure	0.42	0.41	1.52	0.69	3.39	0.302	0.76	0.52	2.14	0.78	5.89	0.140
Income is equal to expenditure	0.32	0.37	1.38	0.67	2.85	0.382	0.31	0.48	1.37	0.53	3.52	0.520
Income less than expenditure **(Reference)**	0						0					
Perceived general health level												
Perfect	0.60	0.74	1.83	0.43	7.79	0.415	1.46	0.88	4.28	0.76	24.08	0.099
Pretty good	0.28	0.61	1.32	0.40	4.33	0.650	0.78	0.80	2.18	0.46	10.36	0.327
Good	0.32	0.55	1.38	0.47	4.07	0.559	0.41	0.74	1.50	0.35	6.40	0.584
Not bad	-0.10	0.54	0.91	0.31	2.63	0.854	-0.41	0.75	0.67	0.15	2.91	0.588
Bad **(Reference)**	0						0					
Perceived mental health level												
Pretty good	0.60	0.36	1.83	0.90	3.72	0.097	-0.06	0.46	0.95	0.39	2.32	0.902
Good	0.16	0.54	1.18	0.41	3.36	0.761	0.35	0.60	1.42	0.44	4.62	0.559
Not bad	1.03	0.30	**2.81**	**1.55**	**5.09**	**0.001**	0.59	0.38	1.80	0.86	3.77	0.121
Bad **(Reference)**	0						0					
Chronic disease status												
No	0.13	0.36	1.14	0.56	2.32	0.725	0.53	0.47	1.70	0.68	4.26	0.260
Yes **(Reference)**	0						0					
First health institution contacted												
Family Health Centre	0.21	0.23	1.23	0.78	1.95	0.374	-0.37	0.29	0.69	0.39	1.21	0.198
Hospital **(Reference)**	0						0					
Hearing problem status												
No	-0.93	0.67	0.40	0.11	1.47	0.166	-0.81	0.78	0.45	0.10	2.07	0.303
Yes **(Reference)**	0						0					
Visual problem status												
No	0.07	0.26	1.07	0.64	1.78	0.802	-0.23	0.32	0.79	0.42	1.49	0.468
Yes **(Reference)**	0						0					
Number of tooth decay												
None	-0.57	0.55	0.57	0.19	1.67	0.302	-0.10	0.69	0.90	0.24	3.46	0.881
1 piece	-0.92	0.60	0.40	0.12	1.29	0.125	-0.75	0.76	0.47	0.11	2.11	0.326
2 pieces	-0.45	0.61	0.64	0.19	2.09	0.455	-0.23	0.76	0.79	0.18	3.48	0.759
3 pieces	-0.18	0.70	0.84	0.21	3.30	0.797	0.19	0.89	1.20	0.21	6.84	0.835
4 pieces and more **(Reference)**	0						0					

Table 4. Multiple logistic regression analysis for determinants of health literacy levels (Continued)

Variables	Medium Health Literacy						High Health Literacy					
	B	SE	OR	95% OR		p	B	SE	OR	95% GA OR		p
				Lower	Upper					Lower	Upper	
Number of tooth fillings												
None	-0.08	0.43	0.93	0.40	2.15	0.859	-0.33	0.50	0.72	0.27	1.90	0.503
1 piece	0.27	0.54	1.30	0.45	3.75	0.623	0.11	0.63	1.12	0.33	3.83	0.856
2 pieces	-0.28	0.51	0.76	0.28	2.04	0.581	-1.18	0.65	0.31	0.09	1.09	0.068
3 pieces	-0.94	0.56	0.39	0.13	1.16	0.091	-1.08	0.69	0.34	0.09	1.31	0.117
4 pieces and more **(Reference)**	0						0					
Frequency of brushing												
3 times a day	0.06	0.74	1.06	0.25	4.53	0.935	1.16	0.86	3.20	0.59	17.28	0.177
2 times a day	-0.50	0.44	0.61	0.26	1.43	0.251	0.09	0.57	1.09	0.36	3.30	0.879
1 time a day	-0.19	0.45	0.83	0.34	1.99	0.669	-0.03	0.59	0.97	0.31	3.05	0.955
Sometimes **(Reference)**	0						0					
Tablet/computer availability												
Yes	0.07	0.25	1.08	0.66	1.75	0.770	-0.23	0.31	0.80	0.44	1.46	0.462
No **(Reference)**	0						0					
Level of tablet/ computer use												
Perfect	0.88	0.44	**2.40**	**1.01**	**5.70**	**0.048**	0.69	0.55	1.99	0.68	5.81	0.210
Pretty good	0.89	0.38	**2.44**	**1.16**	**5.14**	**0.018**	0.36	0.48	1.43	0.56	3.69	0.455
Good	0.47	0.33	1.59	0.83	3.05	0.161	0.49	0.43	1.63	0.71	3.75	0.252
Middle **(Reference)**	0						0					
Level of internet and social media use												
Perfect	-0.86	0.51	0.42	0.16	1.15	0.091	0.52	0.66	1.67	0.46	6.11	0.436
Pretty good	-0.17	0.47	0.85	0.34	2.12	0.723	0.50	0.62	1.65	0.49	5.57	0.420
Good	-0.33	0.45	0.72	0.30	1.75	0.468	0.07	0.61	1.08	0.33	3.54	0.903
Middle **(Reference)**	0						0					
Daily internet usage time												
0-2 hours	1.15	0.46	**3.15**	**1.29**	**7.69**	**0.012**	1.41	0.56	**4.08**	**1.36**	**12.30**	**0.012**
3-5 hours	0.68	0.34	**1.97**	**1.02**	**3.81**	**0.043**	0.74	0.43	2.09	0.90	4.86	0.087
6-9 hours **(Reference)**	0						0					
Daily social media usage time												
0-2 hours	0.01	0.47	1.01	0.40	2.50	0.991	-0.09	0.60	0.91	0.28	2.93	0.877
3-5 hours	0.06	0.39	1.06	0.49	2.30	0.877	0.01	0.51	1.01	0.37	2.76	0.978
6-9 hours **(Reference)**	0						0					
Weight-for-age SDS level												
Overweight	2.23	0.90	**9.27**	**1.60**	**53.68**	**0.013**	0.38	1.06	1.46	0.18	11.62	0.719
Normal	1.20	0.71	3.31	0.82	13.28	0.092	-0.36	0.83	0.70	0.14	3.58	0.668
Underweight	1.22	0.64	3.39	0.97	11.84	0.056	-0.38	0.73	0.68	0.16	2.87	0.601
Excessive underweight **(Reference)**	0						0					
Height for age SDS level												
Normal	1.84	0.86	**6.30**	**1.18**	**33.64**	**0.031**	1.04	0.81	2.84	0.58	13.87	0.198
Short	1.80	0.87	**6.06**	**1.11**	**33.04**	**0.037**	0.57	0.85	1.76	0.34	9.23	0.504
Excessively short (stunted) **(Reference)**	0						0					

Table 4. Multiple logistic regression analysis for determinants of health literacy levels (Continued)

Variables	Medium Health Literacy						High Health Literacy					
	B	SE	OR	95% OR		p	B	SE	OR	95% OR		p
				Lower	Upper					Lower	Upper	
Body mass index for age SDS level												
Overweight	2.45	0.97	**11.56**	**1.71**	**78.06**	**0.012**	1.22	1.17	3.37	0.34	33.22	0.298
Overweight carries a risk	1.40	0.78	4.05	0.88	18.77	0.074	0.43	0.95	1.53	0.24	9.91	0.654
Normal	1.04	0.68	2.82	0.75	10.58	0.125	0.45	0.81	1.57	0.32	7.65	0.575
Low	0.80	0.59	2.23	0.70	7.14	0.178	0.43	0.72	1.53	0.38	6.21	0.552
Extreme Low **(Reference)**	0						0					

[1] In this analysis, low health literacy was used as a reference and the factors affecting medium and high health literacy were examined.
SE= Standard Error, OR= Odd Ratio, Model fit value X^2=187.98, p<.001, Cox and Snell R^2= .250, Nagelkerke R^2= .296

DISCUSSION

In this study, students' health literacy scores are at a medium level. Various studies (Paakkari et al., 2018; Sukys et al., 2019; Ozturk & Ayaz-Alkaya, 2020) show that students' health literacy scores are at a medium level. However, there are also studies that highlight that students' health literacy scores are insufficient (Ran et al., 2018; Javier et al., 2019; Nutbeam, 2021). Considering that the general health literacy level of society in adult health literacy studies conducted in Turkey is inadequate or problematic at a rate of 2/3, it can be inferred that the health literacy levels of high school students in this study are comparatively higher than those of their parents (Aygun & Cerim, 2021).

In this study, the Internet ranked first among the sources from which students obtained health-related information. Internet use meets the need for access to understandable information on health issues (Nutbeam & Lloyd, 2021). It is believed that health educators and health information providers can increase the level of health literacy among young people, particularly by making more effective use of Internet-based resources. This has been demonstrated in several studies (Sarhan et al., 2023).

In this study, it was found that the health literacy of the students increased with age. This finding, in line with other studies, highlights that age has a positive effect on health literacy and that age increases the tendency to be aware and informed about health issues (Perry et al., 2017; Cınkıl, 2022). Consequently, it is anticipated that as students age, their health literacy levels will improve alongside their desire to acquire more knowledge and awareness about health-related matters. In this context, the design and implementation of health education and awareness programs for age groups is considered an important strategy to increase the health literacy of the society.

Students from higher socioeconomic backgrounds tend to possess greater levels of health literacy. This is consistent with other studies that have shown a positive correlation between economic status and health literacy (Tümer & Sümen, 2020; Duplaga & Grysztar, 2021). As economic circumstances improve, individuals are likely to be better equipped to evaluate their health status and make effective use of health services and educational resources, thanks to easier access to information.

In this study, it was found that as students' perceived level of general and mental health increased, so did their level of health literacy. Therefore, improving one's health status could also lead to improvements in their health literacy. A study by Karabacak (2019) emphasized this link between health status and literacy, demonstrating that improving one's health status can raise their level of health literacy (Karabacak, 2019). Other studies indicate that people who rate their general health as poor may have inadequate health literacy (Demirli, 2018). Additionally, negative health perceptions can result in insufficient knowledge or misinformation about health issues (De Albuquerque et al., 2022). Enhancing the overall health condition of society is considered an effective strategy to develop and improve health literacy.

In the present study, it was observed that students who use the internet for less than three hours per day and use tablets or computers frequently display higher levels of health literacy. Several studies have revealed that excessive internet use for over five hours adversely affects individuals across various domains, including problem-solving, creative thinking, and perceptual acuity (Kim et al., 2023). However, a different perspective suggests that extended internet usage by young people enhances their health literacy levels (Richtering et al., 2017; Ergün et al., 2019). Nonetheless, contradictory findings indicate that the quality and content of internet and tablet/computer use may have different effects on health literacy, depending on factors such as age group and how individuals use them.

In this study, overweight students were found to have higher levels of health literacy than those with extremely low body weight. Similarly, the findings suggested that students with normal and short height SDS levels within their age group displayed higher levels of health literacy than those with extremely short height. Additionally, it was observed that students with an overweight body mass index SDS level for their age demonstrated higher health literacy levels than those with an extremely low body mass index for their age. The present findings explicate the correlation between health literacy levels and physical indices, namely weight and height. The findings suggest inconclusive results on the association between health literacy and anthropometric indices, including weight for age, height, and body mass index in children. Although certain studies indicate that being overweight for one's age may have a positive correlation with health literacy (Wijga et al., 2018; Chrissini & Panagiotakos, 2021; Zare-Zardiny et al., 2021), other studies report no significant statistical correlation. Therefore, these contradictory findings suggest that additional research is required to understand the multifaceted relationship between health literacy and anthropometry. Several studies have indicated an association between students' anthropometric measures and their nutritional literacy. An important finding in this study is that being excessively short for age is positively associated with children's health literacy.

CONCLUSIONS

The findings of the study show that high school students generally have a moderate level of health literacy, and the internet is the most common source of information. Factors such as age, economic status, duration of internet use and general health perception were found to have positive effects on health literacy levels. It was also found that students in the normal height and weight range had higher health literacy. It was suggested that seminars, conferences and scientific activities should be organized in schools to increase health literacy, and health literacy topics should be included in the curriculum. It is recommended that researchers interested in the subject can contribute to the literature by conducting similar studies at different educational levels (e.g., university students) and in various regions and evaluating health literacy on a large scale. In addition, studies examining students' use of digital health information and the accuracy of the information they obtain from digital platforms can be conducted. It is thought that these studies may be useful in evaluating the effective use of digital resources in increasing health literacy levels.

Limitations

The findings of the study represent a specific sample of students among whom the study was conducted. As such, they cannot be extrapolated to all high school students. However, this does not negate the limited generalizability of the findings. The study's potency is demonstrated using a stratified sampling technique, which enabled the inclusion of a substantial sample size.

Acknowledgements: *We would like to thank the school administration and students who supported the conduct of the study and data collection. This study was presented as an oral presentation at the V. International Congress of Youth Researches (November-2024)*

Funding: *This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors*

Conflicts of Interest: *The authors declare that they have no conflict of interest.*

Ethics Committee Approval: *This study was approved by Medicine and Health Sciences Ethics Committee of Muğla Sıtkı Koçman University, (approval date 28.02.2023 and number 35).*

Peer-review: *Externally peer-reviewed.*

Author Contributions:

Research idea: EUA, RK, OA, GKM
Design of the study: EUA, RK
Acquisition of data for the study: EUA, RK, OA, GKM
Analysis of data for the study: EUA, RK
Interpretation of data for the study: EUA, RK, OA, GKM
Drafting the manuscript: EUA, RK
Revising it critically for important intellectual content: EUA, RK
Final approval of the version to be published: EUA, RK, OA, GKM

Data Availability Statement: *The datasets used and analyzed during the current study are available from the corresponding author upon request.*

REFERENCES

Abacigil, F., Harlak, H., Okyay, P., Kiraz, D. E., Gursoy Turan, S., Saruhan, G., Karakaya, K., Tuzun, H., Baran Deniz, E., Tontus, O., & Beşer, E. (2019). Validity and reliability of the Turkish version of the European Health Literacy Survey Questionnaire. *Health Promotion International*, *34*(4), 658–667. https://doi.org/10.1093/heapro/day020

Arslan, S., & Karabey, S. (2023). High school students' and teachers' mental health literacy levels in Istanbul, Turkey: A comprehensive analysis. *The Journal of School Health*, 93(8), 698–706. https://doi.org/10.1111/josh.13316.

Aygun, O., & Cerim, S. (2021). The relationship between general health behaviors and general health literacy levels in the Turkish population. *Health Promotion International*, 36(5), 1275–1289. https://doi.org/10.1093/heapro/daaa151

Buchner, A., Erdfelder, F., Faul, F., & Lang, A. G. (2020). G* Power for Windows (Release 3.1. 9.7).

Cheng, L., Chen, Q., Ying Zhang, F., Wu, W., Cui, W., & Hu, X. (2020). Functional health literacy among left-behind students in senior high schools in an ethnic minority area: A cross-sectional study. *Medicine*, 99(8), 1-7. e19167. https://doi.org/10.1097/MD.000.000.0000019167.

Chrissini, M.K., & Panagiotakos, D.B. (2021). Health literacy as a determinant of childhood and adult obesity: A systematic review. *International Journal of Adolescent Medicine and Health,* 33(3), 9–39. https://doi.org/10.1515/ijamh-2020-0275.

Cınkıl, Z. (2022). The relationship between adolescents' health literacy and their eating attitudes [Unpublished master's thesis]. Ondokuz Mayıs University.

Coşkun, S., & Bebiş, H. (2015). Adolesanlarda e-Sağlık Okuryazarlığı

Ölçeği: Türkçe geçerlik ve güvenirlik çalışması. *Gülhane Tıp Dergisi*, 57(4), 378-384. http://dx.doi.org/10.5455/gulhane.(Turkish)

De Albuquerque, J.V., Chen, Y., Moir, F., & Henning, M. (2022). School-based interventions to improve health literacy of senior high school students: A scoping review protocol. *JBI Evidence Synthesis*, 20(4), 1165–1173. https://doi.org/10.11124/JBIES-21-00333.

Demidenko, E. (2007). Sample size determination for logistic regression revisited. *Statistics in Medicine*, 26(18), 3385-3397.

Demirli, S. (2018). Research on health literacy of individuals: Edirne province example [Unpublished master's thesis]. Trakya University.

Duplaga, M., & Grysztar, M. (2021). Socio-economic determinants of health literacy in high school students: A cross-sectional study. *International Journal of Environmental Research and Public Health*, 18(22), 12231. https://doi.org/10.3390/ijerph182212231.

Ergün, S., Sürücüler, H. K., & Işık, R. (2019). Ergenlerde e-sağlık okuryazarlığı ve sağlıklı yaşam biçimi davranışları: Balıkesir örneği. *Hemşirelik Akademik Araştırma Dergisi*, 5(3), 194-203. http://doi.org/10.5222/jaren.2019.65002. (Turkish)

Fleary, S.A., Joseph, P., & Pappagianopoulos, J.E. (2018). Adolescent health literacy and health behaviors: A systematic review. *Journal of Adolescence*, *62,* 116–127. https://doi.org/10.1016/j.adolescence.2017.11.010.

Jafari, A., Sany, S.B.T., & Peyman, N. (2021). The status of health literacy in students aged 6 to 18 years: A systematic review study. *Iranian Journal of Public Health*, 50(3), 448-458. http://doi.org/10.18502/ijph.v50i3.5584.

Javier, E.J., Tiongco, M., & Jabar, M.A. (2019). How health literate is the Generation Filipinos? Health literacy among Filipino early adolescents in middle schools. *Asia-Pacific Social Science Review*, 19(3), 16–29. http://doi.org/10.59588/2350-8329.1237.

Karabacak, F. (2019). Health literacy of high school students [Unpublished master's thesis]. Marmara University.

Khajouei, R., & Salehi, F. (2017). Health literacy among Iranian high school students. *American Journal of Health Behavior,* 41(2), 215–222. https://doi.org/10.5993/AJHB.41.2.13.

Kim, K., Shin, S., Kim, S., & Lee, E. (2023). The relation between ehealth literacy and health-related behaviors: Systematic review and meta-analysis. *Journal of Medical Internet Research*, *25,* e40778. https://doi.org/10.2196/40778.

Klinker, C.D., Aaby, A., Ringgaard, L.W., Hjort, A.V., Hawkins, M., & Maindal, H.T. (2020). Health literacy is associated with health behaviors in students from vocational education and training schools: A Danish population-based survey. *International Journal of Environmental Research and Public Health*, 17(2), 1-13. http://doi.org/10.3390/ijerph17020671.

Morrison, A.K., Glick, A., & Yin, H.S. (2019). Health Literacy: Implications for child health. *Pediatrics in Review*, 40(6), 263–277. https://doi.org/10.1542/pir.2018-0027.

Nutbeam, D. (2021). From health education to digital health literacy – building on the past to shape the future. *Global Health Promotion*, 28(4), 51–55. https://doi.org/10.1177/175.797.59211044079.

Nutbeam, D., & Lloyd, J.E. (2021). Understanding and responding to health literacy as a social determinant of health. *Annual Review of Public Health*, 42(1), 159–173. https://doi.org/10.1146/annurev-publhealth-090.419.102529.

Ozturk, F.O., & Ayaz-Alkaya, S. (2020). Health literacy and health promotion behaviors of adolescents in Turkey. *Journal of Pediatric Nursing,* 54, e31-e35. https://doi.org/10.1016/j.pedn.2020.04.019.

Ozturk Haney, M. (2018). Psychometric testing of the Turkish version of the Health Literacy for School-Aged Children Scale. *Journal of child health care: for professionals working with children in the hospital and community*, *22*(1), 97–107. https://doi.org/10.1177/136.749.3517738124

Paakkari, O., Torppa, M., Villberg, J., Kannas, L., & Paakkari, L. (2018). Subjective health literacy among school-aged children. *Health Education*, 118(2), 182–195. https://doi.org/10.1108/HE-02-2017-0014.

Parnell, T.A., Stichler, J.F., Barton, A.J., Loan, L.A., Boyle, D.K., & Allen, P.E. (2019). A concept analysis of health literacy. *Nursing Forum*, 54(3), 315–327. https://doi.org/10.1111/nuf.12331.

Perry, E.L., Carter, P.A., Becker, H.A., Garcıa, A.A., Mackert, M., & Johnson, K.E. (2017). Health literacy in adolescents with sickle cell disease. *Journal of Pediatric Nursing*, 36(7), 191-196. https://doi.org/10.1016/j.pedn.2017.05.012.

Prihanto, J.B., Nurhayati, F., Wahjuni, E.S., Matsuyama, R., Tsunematsu, M., & Kakehashi, M. (2021). Health literacy and health behavior: Associated factors in Surabaya high school students, Indonesia. *International Journal of Environmental Research and Public Health*, 18(15), 1-20. https://doi.org/10.3390/ijerph1815811.

Ran, M., Peng, L., Liu, Q., Pender, M., He, F., & Wang, H. (2018). The association between quality of life (QOL) and health literacy among junior middle school students: A cross-sectional study. *BMC Public Health*, 18(1183), 1-10. https://doi.org/10.1186/s12889.018.6082-5.

Richtering, S.S., Hyun, K., Neubeck, L., Coorey, G., Chalmers, J., Usherwood, T., Peiris, D., Chow, C.K., & Redfern, J. (2017). eHealth literacy: Predictors in a population with moderate-to-high cardiovascular risk. *JMIR Human Factors*, 4(1), 1–9. http://dx.doi.org/10.2196/humanfactors.6217.

Sarhan, M.B.A., Fujiya, R., Kiriya, J., Htay, Z.W., Nakajima, K., Fuse, R., Wakabayashi, N., & Jimba, M. (2023). Health literacy among adolescents and young adults in the Eastern Mediterranean region: A scoping review. *BMJ Open*, 13(6), 1-11. https://doi.org/10.1136/bmjopen-2023-072787.

Sukys, S., Trinkuniene, L., & Tilindiene, I. (2019). Subjective health literacy among school-aged children: First evidence from Lithuania. *International Journal of Environmental Research and Public Health*, 16(18), 1-11. https://doi.org/10.3390/ijerph16183397.

Tümer, A., & Sümen, A. (2020). E-health literacy levels of high school students in Turkey: Results of a cross-sectional study. *Health Promotion International*, 37(2), 1-8. https://doi.org/10.1093/heapro/daab174.

Velasco, V., Gragnano, A., Gruppo Regionale HBSC Lombardia, & Vecchio, L.P. (2021). Health literacy levels among Italian students: Monitoring and promotion at school. *International Journal of Environmental Research and Public Health*, 18(19), 1-13. https://doi.org/10.3390/

ijerph18199943.

Wijga, A.H., Mohnen, S.M., Vonk, J.M., & Uiters, E. (2018). Healthcare utilisation and expenditure of overweight and non-overweight children. *Journal of Epidemiology and Community Health*, 72(10), 940–943. https://doi.org/10.1136/jech-2017-210222.

World Health Organization. (2019, May). Health literacy and healthy behaviour. https://www.who.int/healthpromotion/conferences/7gchp/track2/en/.

Zare-Zardiny, M.R., Abazari, F., Zakeri, M.A., Dastras, M., & Farokhzadian, J. (2021). The association between body mass index and health literacy in high school students: A cross-sectional study. *Journal of Education and Health Promotion,* 30(10), 431-437. https://doi.org/10.4103/jehp.jehp_96_21.