From knowledge to action: How health literacy shapes microplastic pollution awareness in future health professionals?

Bilgiden eyleme: Sağlık okuryazarlığı geleceğin sağlık profesyonellerinde mikroplastik kirliliği farkındalığını nasıl şekillendirir?

Erhan ATICI[1], Mehmet Ali ŞEN[2]

doi.org/10.35232/estudamhsd.1807582

ESTUDAM Public Health Journal. 2026;11(2):159-170

***1-**Elazığ Health Directorate, Elazığ, Türkiye.*

***2-**Atatürk Health Services Vocational School, Dicle University, Diyarbakır, Türkiye.*

Sorumlu Yazar / Corresponding Author:
Erhan ATICI , PhD
e-posta / e-mail: erhanatici8123@gmail.com

***Geliş Tarihi / Received:** 22.10.2025*
***Kabul Tarihi / Accepted:** 12.02.2026*

Abstract

This study aims to examine the factors affecting students' awareness of microplastic pollution and health literacy status. This descriptive and cross-sectional study consisted of 1800 students studying in a vocational school for health services. The study used a stratified sampling method, and the sample size was 384. The questionnaire included socio-demographic characteristics, a microplastic pollution awareness scale (MPAS), and a health literacy scale (HLS). The data were uploaded to SPSS, and statistical analysis was performed. In the study, there was a significant relationship between HLS and MPAS scores and gender, place of residence, grade, general health status, taking environmental courses, and being sensitive to the environment ($p<0.05$). The study found a significant positive correlation between MPAS and all sub-dimension scores and HLS and all sub-dimension scores ($r=0,265$, $p<0.05$). Our study showed that a high level of health literacy and environmental awareness and sensitivity was significantly associated with increased awareness of microplastic pollution. In order to increase awareness, it would be beneficial to include more interactive courses and activities on this topic in the education system and to encourage continuity of education.

Keywords: Microplastics, environmental pollution, health literacy, student

Özet

Bu çalışma, öğrencilerin mikroplastik kirliliği farkındalığını ve sağlık okuryazarlığı düzeylerini etkileyen faktörleri incelemeyi amaçlamaktadır. Bu tanımlayıcı ve kesitsel çalışma, sağlık hizmetleri meslek yüksekokulunda öğrenim gören 1800 öğrenciden oluşmuştur. Çalışmada tabakalı örnekleme yöntemi kullanılmış ve örneklem büyüklüğü 384 olarak belirlenmiştir. Anket; sosyo-demografik özellikler, mikroplastik kirliliği farkındalık ölçeği (MPAS) ve sağlık okuryazarlığı ölçeğini (HLS) içermektedir. Veriler SPSS'e yüklenmiş ve istatistiksel analiz yapılmıştır. Çalışmada, HLS ve MPAS puanları ile cinsiyet, ikamet yeri, sınıf, genel sağlık durumu, çevre dersleri alma ve çevreye duyarlılık arasında anlamlı bir ilişki bulunmuştur ($p<0,05$). Çalışma, MPAS ile tüm alt boyut puanları ve HLS ile tüm alt boyut puanları arasında anlamlı pozitif korelasyon olduğunu göstermiştir ($r=0,265$, $p<0,05$). Çalışmamız, yüksek düzeyde sağlık okuryazarlığı ile çevresel farkındalık ve duyarlılığın, mikroplastik kirliliği farkındalığını artırmada çok önemli bir faktör olduğunu göstermiştir. Farkındalığı artırmak için eğitim sisteminde bu konuya yönelik daha fazla etkileşimli ders ve etkinliklerin dahil edilmesi ve eğitimin sürekliliğinin teşvik edilmesi faydalı olacaktır.

Anahtar Kelimeler: Mikroplastikler, çevre kirliliği, sağlık okuryazarlığı, öğrenci

ORCID:
Erhan ATICI:
0000-0001-9186-2754
Mehmet Ali ŞEN:
0000-0001-6193-0525

Nasıl Atıf Yaparım / How to Cite:
Atıcı E, Şen MA. From knowledge to action: How health literacy shapes microplastic pollution awareness İn future health professionals? ESTUDAM Public Health Journal. 2026;11(2):159-170

Introduction

Today, rapid population growth and increasing industrialization are upsetting the balance of nature. Population growth has increased the amount of domestic and urban waste generated as a result of consumption, and accordingly, environmental pollution has reached gigantic dimensions. One of the most common causes of environmental pollution is garbage. Studies have shown that the most common type of garbage is plastic (1).

Worldwide, plastics are widely used in food packaging, construction and building products, automobile parts, electrical/ electronic devices, home sports and entertainment, agriculture, health, and plastic furniture (2). In general, synthetic solid particles or polymeric matrices ranging in size from 1 µm to 5 mm are called microplastics (3). Especially in the last 50 years, the last century can be called the "*plastic age*" due to the presence of plastics in every aspect of our lives. As the use of plastics has increased excessively, the amount of microplastics found in water resources has started to increase gradually (4). Microplastics can affect human health directly or indirectly by acting as physical stressors or vectors of environmental pollutants. They can act as both physical and chemical stressors in humans and enter the digestive, respiratory, and circulatory systems (5). Basically, health literacy can be defined as the ability to understand, interpret, and act in accordance with medical information when it is given to an individual. Health literacy is a holistic concept that requires not only reading and understanding the information related to this concept but also defining one's health, knowing one's disease, making appropriate decisions about one's health, knowing how to use the health system and how to benefit from this system (6). Adequate health literacy increases the quality of health, engagement with community action for health, and the quality of healthcare (7).

Environmental pollution, and microplastic pollution in particular, are increasingly recognized as emerging public health concerns because humans are exposed via ingestion, inhalation, and dermal contact, and microplastics have been linked to inflammatory and other toxicological effects (8). Understanding how people perceive these risks — and how health literacy shapes those risk perceptions — is therefore crucial for designing effective public-health interventions (9). Moreover, integrating environmental and health-literacy training into health-professional education can help future health professionals promote environmental health literacy and community behavior change (10).

In this study, the factors affecting students' awareness of microplastic pollution and the relationship between health literacy levels and awareness of microplastic pollution were examined.

Material and Method

Study design and sampling

This descriptive and cross-sectional study was carried out to examine the relationship between health literacy levels and students' microplastic pollution awareness status, along with the factors affecting their awareness of microplastic pollution. The population of the study consisted of 1800 students studying in nine active programs in the Vocational School of Health Services of a state university. In the study, a stratified sampling method was used, and the formula ($n = N\ t^2\ p\ q\ /\ d^2\ (N-1) + t^2\ p\ q$) was used, and the sample size was determined to be 384 with a 95% confidence interval and a sensitivity of 0.05. The number of students in each program was determined proportionally, and students were selected using a

simple random method. The research questionnaire was applied in a classroom environment between March and April 2024, and the response time was approximately 5–10 minutes.

Data collection tools

Descriptive information form: It consists of a total of 15 questions developed by the researchers to determine the socio-demographic status of the students.

Health Literacy Scale (HLS): Developed by Toçi et al. and translated into Turkish by Aras and Bayık Temel, the Health Literacy Scale consists of 25 items in a five-point Likert type. All items on the scale are positive. A minimum score of 1 and a maximum score of 5 is obtained from the measurement tool. Low scores indicate that the health literacy status is insufficient; high scores indicate that it is sufficient. The scale has four sub-dimensions: accessing information, understanding information, appraisal, and application. In this study, the Cronbach's Alpha coefficient of the scale was found to be 0.91 (11, 12).

Microplastic Pollution Awareness Scale (MPAS): The scale, which was prepared and validated by Güleşir and Gül, has a total of 14 items (five negative and nine positive items) and three factors. The maximum score that can be obtained from the scale is determined as 28. As the score obtained from the scale increases, the awareness level of the individual towards microplastic pollution also increases. The overall reliability coefficient of the scale was determined as 0.81 (13).

Data analysis

The distribution of demographic information of the participants was analyzed by frequency analysis. The compatibility of the scores of the scale and its sub-dimensions with normal distribution was examined by the Kolmogorov Smirnov test. The change in the scores of the scale and its sub-dimensions according to demographic information was analyzed by independent samples t-test and one-way analysis of variance. In case of a significant difference as a result of a one-way analysis of variance, the Tukey's test was performed to determine which group the difference originated from. The relationships between the measures were examined by correlation analysis, and the effect of the health literacy scale and demographic information on awareness of microplastic pollution was examined by regression analysis. Data analysis was performed with the SPSS 21.0 package program, and a 95% confidence level was used.

Ethics approval

Ethical approval for the study was obtained (Ethics Committee of the University of Dicle on November 11, 2022, under protocol number: E-14679147-663.05-392072), and written permission was obtained from the institutions.

Results

When the distribution by age is analyzed, 60.9% of the participants are aged 20 and above. In terms of gender, 60.9% are female. Additionally, 62.2% live in a city or metropolis, and 61.7% are first-grade students. The proportion of illiterate mothers was 38.8%, illiterate fathers was 9.6%, 93.0% were not employed, 53.1% had a poor economic situation, 44.8% had a moderate economic situation, and 2.1% had a good economic situation. Regarding smoking status, 71.1% never smoked, 13.3% occasionally smoked, 8.6% smoked less than one pack a day, 38.0% had good health status, and 10.4% had very good health status. The rate of those who have taken environmental courses is 27.9%, the rate of those who are sensitive/attentive to the environment is 65.1%, and none of the participants are members of any environmental association (Table 1).

The averages of the microplastic pollution awareness scale and the health literacy scale according to various information and the significance of the difference between these averages were examined with independent groups t-test and one-way analysis of variance in Table 1. There is a significant relationship between the microplastic pollution awareness scale and gender, place of residence, class, general health status, taking environmental courses, and being sensitive to the environment ($p<0.05$). The level of microplastic pollution awareness was found to be higher in females than in males, in those living in cities/metropolises than in districts and villages, in those studying in the 2nd grade than in those studying in the 1st grade, in those with good or very good general health status than in those with

moderate, bad and very bad health status, in those who took environmental courses than in those who did not, and in those who were sensitive to the environment than in those who were not sensitive to the environment (Table 1).

There was a significant difference between the total score of the health literacy scale and gender, place of residence, smoking status, general health status, taking environmental courses, and being sensitive to the environment ($p<0.05$). The level of microplastic pollution awareness was found to be higher in females than in males, in those living in cities/metropolises than in districts and villages, in those who never smoked than in those who smoke occasionally or at least one pack a day, in those whose general health status was good or very good than in those whose general health status was moderate, bad and very bad, in those who took environmental courses than in those who did not, and in those who were sensitive to the environment than in those who were not sensitive to the environment (Table 1).

Table 1: Distribution of students' scores on the HLS and MPAS scales based on their descriptive characteristics (n=384)

Parameters	n	%	MPAS Total Score	MPAS Factor 1	MPAS Factor 2	MPAS Factor 3	HLS Total Score
Age							
<20	150	39.1	21.70±5.01	8.28±1.94	7.83±1.93	5.59±1.83	103.13±14.70
≥20	234	60.9	21.56±5.09	8.28±2.07	7.72±1.98	5.56±1.99	104.04±14.20
p			0.788	0.992	0.603	0.868	0.543
Gender							
Female	234	60.9	23.91±3.73	9.06±1.38	8.61±1.50	6.24±1.73	106.94±12.65
Male	150	39.1	18.03±4.67	7.05±2.23	6.44±1.87	5.53±1.76	98.61±15.47
p			**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Place of Residence							
City/Metropolis	239	62.2	23.70±3.89[a]	9.10±1.95[a]	8.54±1.50[a]	6.06±1.94[a]	106.69±13.31[a]
District	72	18.8	18.76±4.78[b]	7.18±2.34[b]	6.61±1.97[b]	4.97±1.75[b]	99.68±14.40[b]
Village/Town	73	19.0	17.63±4.94[b]	6.69±2.84[b]	6.38±1.99[b]	4.56±1.46[b]	97.79±15.15[b]
p			**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**
Grade							
1	237	61.7	20.06±4.65	7.87±2.06	7.17±1.86	5.02±1.87	102.62±14.96
2	147	38.3	24.13±4.66	8.94±1.74	8.73±1.72	6.47±1.67	105.40±13.29
p			**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.067
Mother's Education Status							
Illiterate	149	38.9	21.99±5.13	8.34±1.99	7.80±1.99	5.85±1.86	102.06±14.92
Literate	51	13.3	20.84±5.08	7.90±2.26	7.45±1.94	5.49±1.86	104.08±13.83
Primary School	100	26.0	22.10±4.90	8.56±1.89	8.12±1.88	5.42±2.04	106.28±13.32
Middle School	38	9.9	20.55±5.00	7.79±2.20	7.37±1.89	5.39±1.76	103.87±13.43
High School	37	9.6	20.89±5.14	8.27±1.94	7.56±2.06	5.05±2.03	103.38±16.04
Associate Degree/ Bachelor's Degree	9	2.3	22.11±4.81	8.33±1.58	7.67±2.06	6.11±2.15	100.00±16.17
p			0.365	0.294	0.254	0.192	0.327
Father's Education Status							
Illiterate	37	9.6	22.92±5.13	8.59±5.13	8.13±1.91	6.19±1.70	98.46±2.48
Literate	40	10.4	20.50±4.87	8.07±4.87	7.27±1.97	5.15±2.24	103.80±2.21

Primary School	111	28.9	21.67±4.94	8.41±4.94	7.76±2.03	5.50±1.95	104.66±1.37
Middle School	91	23.7	21.33±5.13	8.24±5.13	7.63±1.89	5.45±1.92	102.18±1.57
High School	72	18.8	21.46±5.02	7.94±5.02	7.93±1.86	5.58±1.73	105.49±1.51
Associate Degree/ Bachelor's Degree	33	8.6	22.52±5.32	8.55±5.32	8.00±2.14	5.97±2.02	106.36±2.58
p			0.324	0.493	0.394	0.176	0.122
Employment Status							
Not working	357	93.0	21.62±5.00	8.29±2.00	7.79±1.95	5.54±1.93	103.65±14.43
Working	27	7.0	21.67±5.83	8.11±2.24	7.48±2.16	6.07±1.90	104.19±14.02
p			0.960	0.655	0.431	0.162	0.852
Financial Situation							
Bad	204	53.1	21.46±4.95	8.27±1.92	7.75±1.99	5.44±1.98	103.03±14.01
Medium	172	44.8	21.88±5.16	8.31±2.10	7.81±1.93	5.75±1.85	104.10±14.95
Good	8	2.1	20.13±5.41	7.88±2.48	7.13±2.03	5.13±2.23	101.50±9.43
p			0.501	0.826	0.608	0.243	0.232
Smoking							
Never	273	71.1	21.96±4.98	8.43±1.98	7.83±1.94	5.70±2.01	105.44±13.72[a]
Occasionally	51	13.3	21.04±5.51	7.88±2.13	7.82±2.10	5.33±1.75	98.33±14.77[b]
Less than one packet per day	33	8.6	20.88±4.74	8.00±1.92	7.60±1.83	5.27±1.61	103.33±12.69
One packet per day or more	27	7.0	20.19±5.12	7.82±2.31	7.22±2.03	5.15±1.68	96.44±17.87[b]
p			0.187	0.131	0.451	0.261	**<0.001**
Overall health status							
Very bad	28	7.3	13.86±1.35[a.b]	5.14±1.86[a.b]	5.04±1.14[a.b]	3.68±1.49 [a.b]	99.79±16.04[a.b]
Bad	31	8.1	15.45±2.08[a.b]	6.26±1.48[a.b]	5.55±1.18[a.b]	3.64±1.08 [a.b]	96.48±14.92[a.b]
Middle	139	36.2	21.09±4.39[b]	8.12±1.88[b]	7.58±1.74[b]	5.39±1.71 [b]	100.90±15.34[b]
Good	146	38.0	23.56±3.79[b]	9.08±1.43[a]	8.49±1.54[a]	5.99±1.82 [b]	106.09±12.57[a]
Very good	40	10.4	26.58±3.26[a]	9.65±1.00[a]	9.43±1.43[a]	7.50±1.13 [a]	112.90±8.66[a]
p			**<0.001**	**<0.001**	**0.010**	**<0.001**	**<0.001**
Taking a Course on the Environment							
No	277	72.1	20.03±4.73	7.80±2.10	7.21±1.89	5.03±1.79	102.00±14.83
Yes	107	27.9	25.73±3.19	9.52±1.00	9.22±1.30	6.99±1.50	108.05±12.18
p			**<0.001**	**<0.001**	**0.010**	**<0.001**	**<0.001**
Being Sensitive to the Environment							
I do not know, and I am not interested	134	34.9	17.36±4.78	6.68±2.10	6.32±1.93	4.36±1.92	100.83±16.48
I know, and I pay attention	250	65.1	24.60±2.42	9.39±0.88	8.78±1.19	6.42±1.42	105.68±12.37
p			**<0.001**	**<0.001**	**0.010**	**<0.001**	**<0.001**

a-b-c: groups where there is a difference

The students who were included in the research defined the most important environmental problems in the world as "*air pollution*" in the first place, "overuse of natural resources" in the second place and "*water pollution*" in the third place, and the most important environmental problems in Türkiye as "*reduction of forests*", "*lack of awareness, unplanned urbanization*" in the second place and "*air pollution*" in the third place (Figure 1-2) (One person marked more than one option).

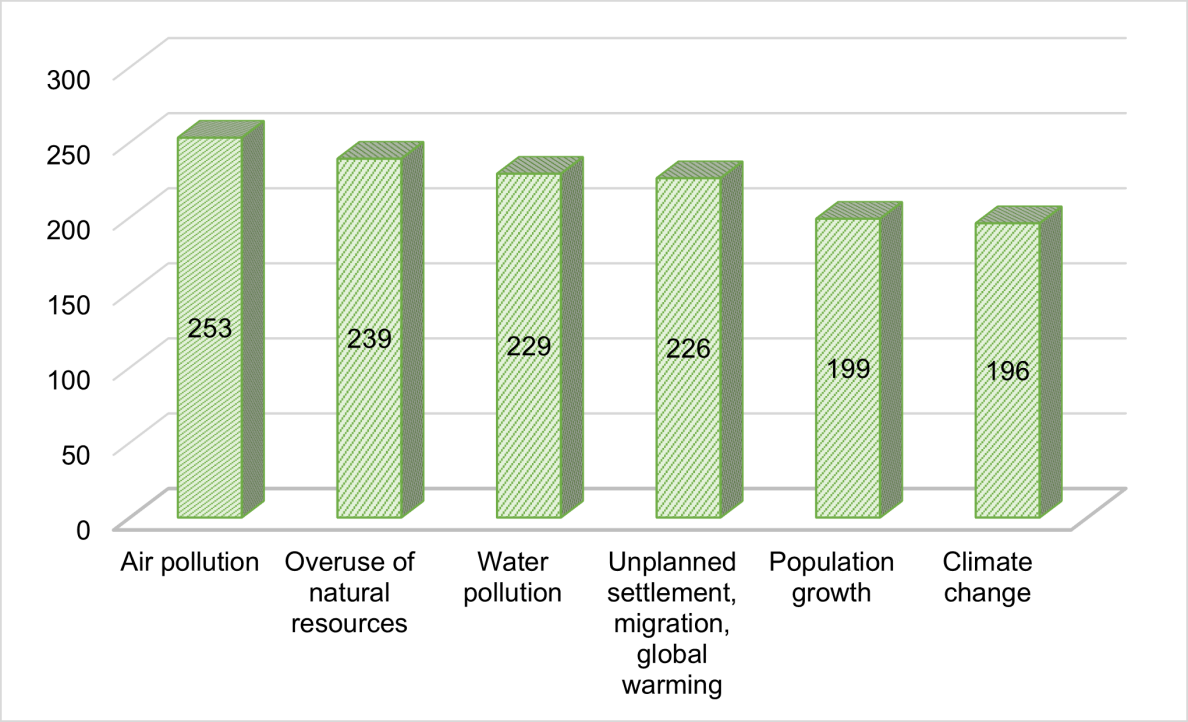


Figure 1: What is the most important environmental problem in the world?

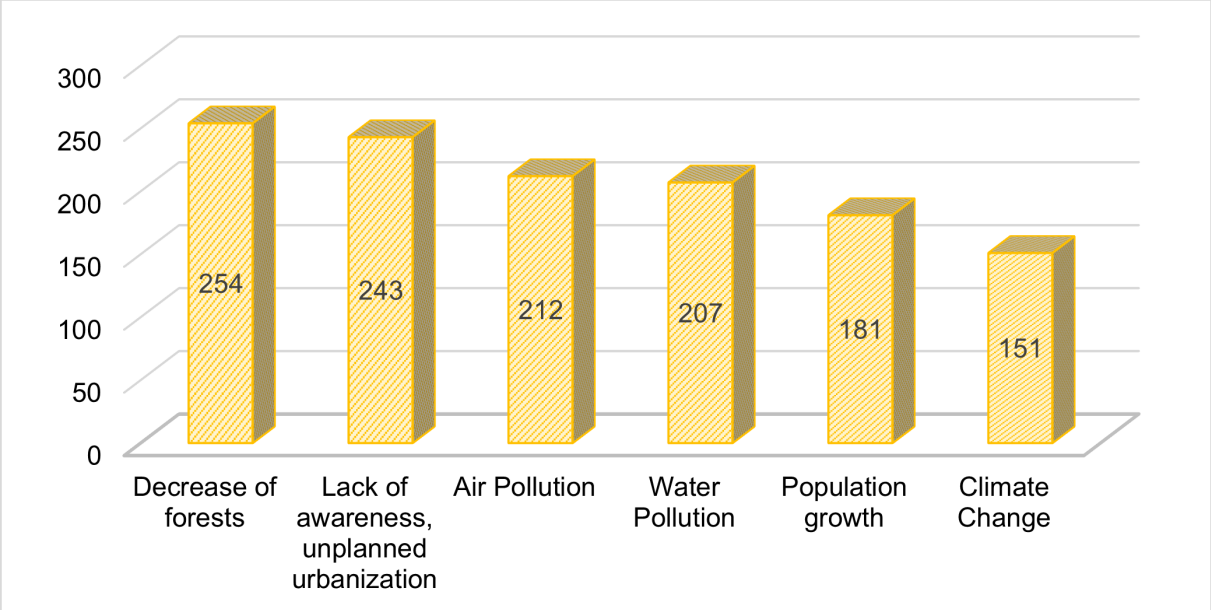


Figure 2: What is the most important environmental problem in Türkiye?

The results of the logistic regression analysis of the participants' knowledge about microplastic pollution are presented in Table 2. Among the significant variables, being a woman can increase the knowledge of microplastic pollution by 5.66 times, being a second-grade student by 3.45 times, taking an environmental course by 4.48 times, and being sensitive to the environment by 89.64 times ($p<0.05$, Table 2).

Table 2: Logistic regression analysis results on students' knowledge of microplastic pollution

Variables	B	Sig.	Exp(B)	95% C.I.for EXP(B)	
				Lower	Upper
Gender (1)	1.733	**<0.001**	5.658	2.386	13.416
Grade	1.237	**0.009**	3.446	1.371	8.664
Most lived place	-0.182	0.499	0.833	0.491	1.413
Taking a course on the environment	1.498	**0.003**	4.475	1.669	11.999
Being sensitive to the environment	4.496	**<0.001**	89.640	37.129	216.414

B: Regression coefficient, SE: Standard error, Wald: Chi-square value, df: degrees of freedom, p: Level of significance, Exp (B): Odds ratio (OR)

Table 3 shows the mean MPAS total score, sub-factors total score, and HLS total score of the participants. The mean MPAS total score and all sub-factors scores were found to be high (21.62±5.05, 8.28±2.01, 7.77±1.96 and 5.57±1.93, respectively) and the mean HLS total score and all sub-factors scores were found to be high (103.69±14.39, 20.45±3.54, 29.90±4.53, 33.49±5.25 and 20.55±3.36, respectively) (Table 3).

Table 3: MPAS and subgroups and HLS score means

Parameters	n	Min-Max Score	Score Range	Mean	Std. Deviation
MPAS total score	384	0-28	12-28	21.62	5.05
MPAS factor 1	384	0-10	1-10	8.28	2.01
MPAS factor 2	384	0-10	3-10	7.77	1.96
MPAS factor 3	384	0-8	0-8	5.57	1.93
HLS total score	384	25-125	67-125	103.69	14.39
HLS subfactor 1: Access to information	384	5-25	8-25	20.45	3.54
HLS subfactor 2: Understanding information	384	7-35	15-35	29.90	4.53
HLS subfactor 3: Appraisal/evaluation	384	8-40	18-40	33.49	5.25
HLS subfactor 4: Implementation/use	384	5-25	8-25	20.55	3.36

Min: Minimum; Max: Maximum

The relationship between the microplastic pollution awareness scale and the health literacy scale is examined in Table 4 with correlation analysis. There is a significant positive correlation between the MPAS total score and all sub-factors scores and the HLS total score and all sub-dimensions ($p<0.05$, $p<0.01$ Table 4).

Table 4: The relationship between MPAS and HLS (n=384)

Parameters		HLS Total Score	HLS Access to Information Sub-dimension	HLS Information Understanding Subdimension	HLS Appraisal/ Evaluation Subdimension	HLS Application/ Utilization Subdimension
MPAS Total Score	**r**	0.265	0.223	0.288	0.237	0.142
	p	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0.005**
MPAS Factor 1	**r**	0.267	0.183	0.303	0.232	0.181
	p	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**
MPAS Factor 2	**r**	0.218	0.186	0.230	0.200	0.116
	p	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0.023**
MPAS Factor 3	**r**	0.193	0.203	0.203	0.173	0.116
	P	**<0.001**	**<0.001**	**<0.001**	**0.001**	**0.023**

r=Pearson correlation coefficient

Discussion

Microplastics are ubiquitous, and their potential harm to human health and the environment has attracted increasing attention from the public and the scientific community. Microplastic pollution is one of the increasing types of environmental pollution today (14).

Students' knowledge of microplastic pollution will be increased by raising awareness of this issue. Therefore, it is clear that the dissemination of health literacy will be effective in protecting against microplastic pollution as well as all other environmental pollution and raising awareness. This can be achieved through educational activities, curriculum-based training, and social media campaigns that emphasize environmental and health literacy. The studies conducted so far have mostly focused on the places where microplastics are found and the routes of entry into the body. For this reason, our study can be a comparable source with the results of future years by determining the relationship between microplastic pollution and the health literacy of students.

The students who participated in the study defined the most important environmental problems in the world as air pollution, overuse of natural resources, and water pollution, respectively. In a study conducted in our country, university students stated that the most important environmental problem in the world was "*overuse or misuse of natural resources*" (15). In the study of Pirinçci et al. (16), it was stated that the most important environmental problem in the world was "*air pollution*". The study is consistent with the literature. However, variations in students' perceptions may reflect differences in their environment, education, and media exposure, highlighting the importance of targeted environmental awareness programs.

The students defined the most important environmental problem in Türkiye as the decrease in forests, followed by unplanned urbanization, air pollution, and water pollution, respectively. Similar to our study, in the study by Pirinçci et al., the most important problem was defined as the decrease in forests, followed by air pollution, lack of awareness, unplanned urbanization and water pollution, respectively (16). Accordingly, it can be considered that the most important environmental problems perceived by students in our country are those caused by easily observable physical pollutants such as litter, plastic waste, and water pollution.

In our study, it is seen that awareness of microplastic pollution is at a high level.

The average awareness score was 74.32% in a study conducted in India, while it was 74% in a study from Hungary (17, 18). In addition, in a study conducted on young people in Kenya, most of the participants stated that they considered single-use plastics as a serious environmental and health problem (19). However, Soares et al. reported

that participants were aware of plastic pollution, its sources, and its effects on the environment (20). These results indicate that high awareness is consistent across different populations, but the way this awareness influences perceptions of risk and potential action may differ, highlighting the importance of reinforcing practical environmental education alongside general knowledge.

In our study, no significant relationship was found between age and MPAS score. However, in a study conducted in Belgium, it was found that young people were more concerned about microplastics than senior citizens, and the opposite was found in Portugal (20, 21). Again, in a study in Greece, it was reported that elderly people were more conscious about environmental problems than younger generations (22). These findings indicate that the impact of age on microplastic awareness may vary across cultural and regional contexts. The fact that our study was conducted predominantly among younger age groups may explain this observed variation.

In our study, a significant relationship was found between gender and MPAS score. In a study conducted in India, women were more aware of and more concerned about plastic pollution than men, and there was a significant difference in the level of microplastic awareness according to gender (17). Buckley et al. reported that women showed more interest in environmental problems than men (23). In the study of Srinivasan et al., it was reported that there was no significant difference in the level of knowledge and practice regarding the use of plastics between genders (24). These results suggest that women may perceive environmental risks differently, possibly due to their greater involvement with environmental issues.

Similar to our study results, Johnson et al. found that those living in urban areas had a higher awareness of microplastic pollution than those living in rural areas, while Charitou et al. found the opposite result (22, 25). These differences suggest that individuals' environmental attitudes and sensitivity may also play a role in shaping their awareness of microplastic pollution, independent of their place of residence. In our study, the MPAS score of those who were sensitive to the environment was found to be significantly higher.

Karagözoğlu conducted a study with a sample group of 170 people and found that the most important cause of environmental problems was lack of education/insensitivity (42%) (26). When the participants were asked about the environmental problems they face in their neighborhood, the most common responses were littering (21%), air pollution (19%), and water pollution (15%). These findings demonstrate that environmental sensitivity and awareness can be shaped not only by individual attitudes but also by exposure to local conditions and education.

In our study, no significant relationship was found between taking environmental courses and MPAS scores and all sub-factor scores. Similar to Güleşir and Gül's study, no significant relationship was found between taking an environmental course and MPAS score and all sub-factor scores (13). Similarly, in the study conducted by Kadıoğlu Ateş and Işık Öner (27) with prospective teachers and in the study by Irmak-Kazazoğlu with university students, it was stated that the level of environmental awareness did not show a significant difference according to the status of receiving environmental education (28). This situation highlights that simply attending environmental courses may not be sufficient to significantly influence awareness levels, and emphasizes the potential importance of course content, teaching methods, and hands-on participation in shaping meaningful environmental knowledge and behaviors.

Health literacy varies from country to country, and its overall performance is unsatisfactory. The results of the recent European Health Literacy Survey show that 12% of the population surveyed had overall inadequate health literacy, and 35% had problematic health literacy. Health literacy problems are common across national population groups, with less than 2% of the population in the Netherlands and 27% in Bulgaria having low health literacy (29). A cross-sectional study on health-related knowledge among Chinese vocational college students showed that only 1.4% of students had good health-related knowledge (30). This situation demonstrates that limited health literacy is a widespread problem at the international level and highlights the urgent need for targeted education programs and interventions to improve

health awareness and promote conscious health behaviors in different populations.

In the health literacy survey conducted by the Ministry of Health (2016) across Türkiye, it was determined that the participants had limited-problematic health literacy (31).

In our study, the rate of health literacy was found to be high. Similar to our study, Soykan and Şengül also found that health students had adequate health literacy (32). The fact that the participants in our study were health students may be thought to be the reason for the higher results compared to other studies.

In our study, the health literacy level of women was found to be significantly higher than that of men. In a study conducted on university students, it was found that the health literacy score of female students was higher than that of male students (33). In a study conducted by Sezer, no significant difference was found between health literacy and gender (34). According to Akçilek's study (n=300) titled Investigation of the health literacy levels of the students of the Faculty of Health Sciences, health literacy was affected by the gender factor; the rate of having adequate or excellent health literacy level was found to be 59.4% in females and 35% in males (35). This suggests that gender may play a role in health literacy, but other social and educational factors should also be considered.

Similar to our study, the health literacy level of non-smokers was significantly higher in the study by Rababah et al. In a recent study, the importance of examining campus tobacco culture in determining health literacy among university students was emphasized (36, 37). The observed association between non-smoking status and higher health literacy may indicate that individuals with better health literacy are more capable of recognizing health risks and making informed lifestyle choices.

Limitations

This study has certain limitations. As the research was conducted with students from a single university and specific programs, the generalizability of the findings to all student populations is limited. Future studies including samples from different universities and regions may enhance the generalizability of the results.

Conclusions

In our study, participants generally exhibited high levels of awareness of microplastic pollution and health literacy. A positive relationship was observed between awareness and health literacy, and certain demographic and behavioral factors, including gender, academic grade, place of residence, environmental sensitivity, and taking environmental courses, were found to be associated with higher awareness. Conversely, no significant relationship was observed for some variables, such as age, parental education, and economic status. These findings suggest that environmental sensitivity and educational activities may be related to individuals' microplastic pollution awareness and health literacy; however, as the study was conducted in a single university with a specific student group, caution should be exercised in generalizing the results.

Funding

No financial support or funding was received for this study.

Acknowledgements

We extend our sincere thanks to all participants who contributed to this study.

Author contributions

Conceptualization: M.A.Ş. Methodology: M.A.Ş. Formal analysis: M.A.Ş. Investigation: M.A.Ş. Data Curation: M.A.Ş., E.A. Writing - Original Draft: E.A. Writing - Review & Editing: M.A.Ş., E.A. Funding acquisition: M.A.Ş. Resources: M.A.Ş., E.A. Supervision: M.A.Ş. Project administration: M.A.Ş.

Ethics approval

This study was performed in line with the principles of the Declaration of Helsinki. IRB approval was granted by the Ethics Committee of the University of Dicle on November 11, 2022, under protocol number : E-14679147-663.05-392072.

Conflict of interest statement

The authors declare no competing interests.

References

1. Vişne A, Bat L. Deniz çöplerinin değerlendirilmesi üzerine deniz stratejisi çerçeve direktifi ve Karadeniz'deki mevcut durum. J Aquacult Eng Fish Res. 2015;1(3):104-15. DOI:10.3153/JAEFR15011.

2. Plastics Europe. Plastics - the Facts 2019 [Internet]. 2019 [cited 2024 Mar 2]. 23 p. Available from: https://plasticseurope.org/knowledge-hub/plastics-the-facts-2019/
3. Frias J, Pagter E, Nash R, O'Connor I, Carretero O, Filgueiras A, et al. Standardised protocol for monitoring microplastics in sediments. Deliverable 4.2, JPI-Oceans BASEMAN Project. 2018. 24 p. DOI:10.25607/OBP-723.
4. Gabrys J, Hawkins G, Michael M, editors. Accumulation: The Material Politics of Plastic. Oxon, UK: Routledge; 2013. International Pellet Watch: Studies of the Magnitude and Spatial Variation of Chemical Risks Associated with Environmental Plastics; p. 184-207. DOI:10.4324/9780203070215.
5. Hartmann NB, Rist S, Bodin J, Jensen LH, Schmidt SN, Mayer P, et al. Microplastics as vectors for environmental contaminants: Exploring sorption, desorption, and transfer to biota. Integr Environ Assess Manag. 2017;13(3):488-93. DOI:10.1002/ieam.1904. PMID: 28440931.
6. Nutbeam D. Health promotion glossary. Health Promot Int. 1998;13(4):349-64. DOI:10.1093/heapro/13.4.349.
7. WHO. Improving Health Literacy [Internet]. 2024 [cited 2024 May 27]. Available from: https://www.who.int/activities/improving-health-literacy
8. Zhang X, Yu C, Wang P, Yang C. Microplastics and human health: unraveling the toxicological pathways and implications for public health. Front Public Health. 2025;13:1567200. DOI:10.3389/fpubh.2025.1567200.
9. Jenkins CL, Wills J, Sykes S. Settings for the development of health literacy: A conceptual review. Front Public Health. 2023 Feb 16;11:1105640. DOI:10.3389/fpubh.2023.1105640.
10. Zanobini P, Del Riccio M, Lorini C, Bonaccorsi G. Empowering sustainable healthcare: The role of health literacy. Sustainability. 2024;16(10):3964. DOI:10.3390/su16103964.
11. Toçi E, Burazeri G, Sørensen K, Jerliu N, Ramadani N, Roshi E, et al. Health literacy and socioeconomic characteristics among older people in transitional Kosovo. J Adv Med Med Res. 2013;3(4):1646–1658. DOI:10.9734/BJMMR/2013/3972.
12. Bayık Temel A, Aras Z. Evaluation of Validity and Reliability of the Turkish Version of Health Literacy Scale. Florence Nightingale J Nurs. 2017;25(2):85-94. DOI:10.17672/fnhd.94626.
13. Güleşir T, Gül A. Development of Microplastic Pollution Awareness Scale for prospective science and biology teachers. Int Online J Educ Teach. 2022;9(2):852-70.
14. Olarinmoye OM, Stock F, Scherf N, Whenu O, Asenime C, Ganzallo S, et al. Microplastic Presence in Sediment and Water of a Lagoon Bordering the Urban Agglomeration of Lagos, Southwest Nigeria. Geosciences. 2020;10(12):494. DOI:10.3390/geosciences10120494.
15. Yurtseven E, Vehid S, Köksal S, Erdoğan MS. İstanbul Üniversitesi Sağlık Hizmetleri Meslek Yüksek Okulu öğrencilerinin çevresel riskler konusundaki duyarlılıkları. Fırat Üniv Sağ Bil Tıp Derg. 2010;24(3):193-9.
16. Pirincci E, Atıcı E, Oguzoncul AF, Deveci SE, Ozan AT, Şen MA, et al. Bir Yüksekokul Öğrencilerinin Çevreye Karşı Duyarlılıklarının Değerlendirilmesi. Van Tip Derg. 2020;27(4):480. DOI:10.5505/vtd.2020.75547.
17. Dowarah K, Duarah H, Devipriya SP. A preliminary survey to assess the awareness, attitudes/behaviours, and opinions pertaining to plastic and microplastic pollution among students in India. Mar Policy. 2022;144:105220. DOI:10.1016/j.marpol.2022.105220.
18. Steven ES. Plastics and the Environment. In: Green Plastics: An Introduction to the New Science of Biodegradable Plastics. Princeton: Princeton University Press; 2002. p. 15-30. DOI:10.1515/9780691214177-005.
19. Oguge N, Oremo F, Adhiambo S. Investigating the Knowledge and Attitudes towards Plastic Pollution among the Youth in Nairobi, Kenya. Social Sciences. 2021;10(11). DOI:10.3390/socsci10110408.
20. Soares J, Miguel I, Venancio C, Lopes I, Oliveira M. Public views on plastic pollution: knowledge, perceived impacts, and pro-environmental behaviours. J Hazard Mater. 2021;412:125227. DOI:10.1016/j.jhazmat.2021.125227.
21. Herweyers L, Catarci Carteny C, Scheelen L, Watts R, Du Bois E. Consumers' Perceptions and Attitudes toward Products Preventing Microfiber Pollution in Aquatic Environments as a Result of the Domestic Washing of Synthetic Clothes. Sustainability. 2020;12(6):2244. DOI:10.3390/su12062244.
22. Charitou A, Aga-Spyridopoulou R, Mylona Z,

Beck R, McLellan F, Addamo M. Investigating the knowledge and attitude of the Greek public towards marine plastic pollution and the EU Single-Use Plastics Directive. Mar Pollut Bull. 2021;166:112182. DOI:10.1016/j.marpolbul.2021.112182.
23. Buckley PJ, Pinnegar JK, Painting SJ, Terry G, Chilvers J, Lorenzoni I, et al. Ten thousand voices on marine climate change in Europe: Different perceptions among demographic groups and nationalities. Front Mar Sci. 2017;4:206.
24. Srinivasan N, Swarnapriya V, Felix AJW, Pravin T. Assessment of knowledge and practice on plastics among the professional course students of Annamalai University, Tamil Nadu. Int J Community Med Public Health. 2019;6(2):510–4. DOI:10.18203/2394-6040.ijcmph20190099.
25. Johnson CY, Bowker JM, Cordell HK. Ethnic variation in environmental belief and behavior: an examination of the new ecological paradigm in a social psychological context. Environ Behav. 2004;36(2):157–86. DOI:10.1177/0013916503251478.
26. Karagözoğlu N. Causes and solution proposals for environmental problems: Yozgat example. Int J Geogr Geogr Educ. 2020;42:356-73. DOI:10.32003/igge.680120.
27. Kadıoğlu Ateş H, Işık Öner A. Öğretmen adaylarının çevre sorunlarına yönelik farkındalık düzeyinin incelenmesi. Kesit Akademi Derg. 2020;6(24):126-44. DOI:10.29228/ke-sit.44369.
28. Irmak Kazazoğlu T. Üniversite öğrencilerinin çevre farkındalık düzeylerinin ve çevre sorunlarına yönelik davranışlarının incelenmesi [Yüksek Lisans Tezi]. Ankara: Hacettepe Üniversitesi; 2020.
29. Sørensen K, Pelikan JM, Röthlin F, Ganahl K, Slonska Z, Doyle G, et al. Health literacy in Europe: comparative results of the European health literacy survey (HLS-EU). Eur J Public Health. 2015;25(6):1053-8. DOI:10.1093/eurpub/ckv043.
30. Wang W, Hou Y, Hu N, Zhang D, Tao J, Man Y, et al. A cross-sectional study on health-related knowledge and its predictors among Chinese vocational college students. BMJ Open. 2014;4(10):e005182. DOI:10.1136/bmjopen-2014-005182.
31. Sağlık Bakanlığı. Türkiye Sağlık Okuryazarlığı Ölçekleri Güvenilirlik ve Geçerlilik Çalışması. Ankara: Sağlık Bakanlığı Yayınları; 2016.
32. Soykan H, Şengül H. Sağlık Okuryazarlığının Sağlıklı Yaşam Biçimi Davranışlarıyla İlişkisi. Gumushane Univ Saglik Bilim Derg. 2021;10(4):691-704. DOI:10.37989/gumussagbil.905512.
33. Yılmaz M, Tiraki Z. Sağlık Okuryazarlığı Nedir? Nasıl Ölçülür? DEUHFED. 2016;9(4):142-7.
34. Adıbelli D, Olğun S, Turan GS. Hemşirelik Öğrencilerinin Sağlıklı Yaşam Biçimi Davranışları ve Etkileyen Faktörler. Cumhuriyet Hemsirelik Derg. 2017;6(1):8-17.
35. Akçilek E. Üniversite Öğrencilerinde Sağlık Okuryazarlığı ve Yaşam Kalitesinin İncelenmesi [Yüksek Lisans Tezi]. İstanbul: İstanbul Medipol Üniversitesi; 2017.
36. Rababah JA, Al-Hammouri MM, Drew BL, Aldalaykey M. Sağlık okuryazarlığı: üniversite öğrencileri arasındaki eşitsizliklerin araştırılması. BMC Public Health. 2019;19:1401. DOI:10.1186/s12889-019-7781-2.
37. Rosario C, Modeste N, Dos Santos H, Handysides D, Gamboa-Maldonado T, Boyd K. Siyah üniversite öğrencilerinde sağlık okuryazarlığının ekolojik belirleyicilerinin incelenmesi. J Am Coll Health. 2017;65(6):423-31. DOI:10.1080/07448481.2017.1341894.