



## FOCUS ON RESEARCH METHODS

# Effect of Environmental Awareness-Based Education on Environmental Attitudes of Nursing Students: A Randomized Controlled Study

Hasan Evcimen<sup>1</sup> | Necmettin Çiftçi<sup>2</sup> | Metin Yıldız<sup>3</sup>

<sup>1</sup>Vocational School of Health Services, Department of Therapy and Rehabilitation, Muş Alparslan University, Muş, Turkey | <sup>2</sup>Faculty of Health Science, Department of Nursing, Muş Alparslan University, Muş, Turkey | <sup>3</sup>Faculty of Health Science, Department of Midwifery, Sakarya University, Sakarya, Turkey

**Correspondence:** Metin Yıldız ([yildizz.metin@gmail.com](mailto:yildizz.metin@gmail.com); [metinyildiz@sakarya.edu.tr](mailto:metinyildiz@sakarya.edu.tr))

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## ABSTRACT

**Objective:** This study was conducted to determine the effect of environmental awareness-based education given to nursing students on their environmental attitudes.

**Method:** This study was designed in a parallel-group 1:1 single-blind randomized controlled experimental design. The study was conducted with 110 nursing students studying at a state university in Turkey between November 1, 2023, and March 15, 2024. Data were collected using a personal information form and the Environmental Attitude Scale. Data were analyzed using SPSS 25.0 and G Power 3.1.9.7 software.

**Results:** After the training program was applied to the students, it was found that the mean score of the environmental attitude scale of the experimental group was significantly higher than the control group ( $p < 0.05$ ). It was found that the posttest mean score of the experimental group's environmental attitude scale was higher than the pretest ( $p < 0.05$ ).

**Conclusion:** It was observed that the environmental awareness-based education program given to nursing students had a positive effect on environmental attitude. Longitudinal studies on environmental attitude are recommended.

**Trial Registration:** ClinicalTrials.gov identifier: NCT06169189

## 1 | Introduction

Increasing industrial activities, advancements in technology, depletion of the ozone layer, glacier melt, heightened storm activity, alterations in natural vegetation, insufficient environmental consciousness and education among individuals, as well as global warming and climate change, contribute to a myriad of environmental issues (Beser et al. 2017). Global warming is changing climate patterns, increasing the intensity, frequency, and duration of natural disasters and extreme weather events (Zhao, Yu, and Mahendran 2022). Climate change causes an increase

in environmental problems and has negative consequences on human health (Bakan, Aktaş, and Baysal 2020; Zhao, Yu, and Mahendran 2022).

Environmental health is an interdisciplinary field concerned with understanding, assessing, and controlling the effects of environmental factors on health so that people can lead a healthy life. In this field, factors that can affect people's health, such as air and water quality, toxic substances, noise, light pollution, and environmental risks are considered. Environmental health professionals conduct risk assessments, develop, and implement

policies and regulations to prevent people from being adversely affected by environmental conditions. Work in this field aims to improve quality of life by contributing to the protection of both individual and public health (Frumkin 2016). Environmental health has an important place in public health nursing. Nursing as a profession focuses on the protection and promotion of health (J. P. Cruz, Alshammari, and Felicilda-Reynaldo 2018). It is not possible to protect and improve health unless biological, physical, and social factors that threaten environmental health are corrected in a way that does not harm human health (Bakan, Aktaş, and Baysal 2020; Öztürk 2020). Therefore, the nurse needs to have a comprehensive knowledge of environmental health to tackle environmental problems that harm human health (Sayan and Kaya 2016). The public health nurse has to reveal the factors that affect human health positively or negatively, especially in the physical, biological, and social environment of the society it serves (Öztürk 2020). Nurses should have moral and ethical responsibility when addressing global health issues in their professional practice (J. P. Cruz, Alshammari, and Felicilda-Reynaldo 2018). In addition, in order to prevent environmental problems, all individuals need to be conscious and sensitive about protecting the environment (Sayan and Kaya 2016).

Negative behaviors cause environmental problems. An individual's attitude toward the environment affects his/her behaviors (Bakan, Aktaş, and Baysal 2020). Sayan and Kaya (2016), who reveal that attitudes have a critical role in shaping individuals' behaviors, emphasize that this situation should be examined from a psychological and sociological perspective. On the other hand, Öztürk (2020) states that it is possible to gain environmental awareness and sustainable behaviors through effective environmental education programs. These studies show that the integration of environmental awareness in educational curricula enables individuals to develop positive attitudes and behaviors that encourage them to fulfill their environmental responsibilities (Öztürk 2020). Environmental attitudes are related to individuals' values, beliefs, and feelings toward the environment. These attitudes refer to individuals' positive or negative emotional and mental reactions, preferences, and dispositions toward environmental issues. Environmental attitudes can also influence motivations and behaviors to protect the environment. Environmental knowledge is the body of information about environmental issues. This knowledge covers a wide range of topics such as the functioning of environmental systems, causes and consequences of environmental problems, environmental protection methods, and sustainable practices (Kollmuss and Agyeman 2002).

In a study, it was found that nursing students had moderate environmental attitudes and low environmental knowledge (Örs 2022). Nursing students are the future of the nursing profession (J. P. Cruz, Alshammari, and Felicilda-Reynaldo 2018). Providing environmental education to nursing students can increase the awareness of nurses about the effects of the environment on human health. It is very important for these students to develop positive attitudes toward the environment and graduate as environmentally sensitive professional members (Karahana-Okuroğlu 2012). Educating nursing students about the environment can be a tool for the success of environmental policies. It may be useful to implement environmental intervention programs for nursing

students to have positive environmental attitudes. In this context, this study was conducted to determine the effect of environmental awareness-based education given to nursing students on their environmental attitudes.

## Hypotheses of the Study

- $H_0$  Environmental awareness-based education given to nursing students has no effect on their environmental attitudes.
- $H_1$  Environmental awareness-based education given to nursing students has an effect on environmental attitudes.

## 2 | Method

### 2.1 | Type of Research

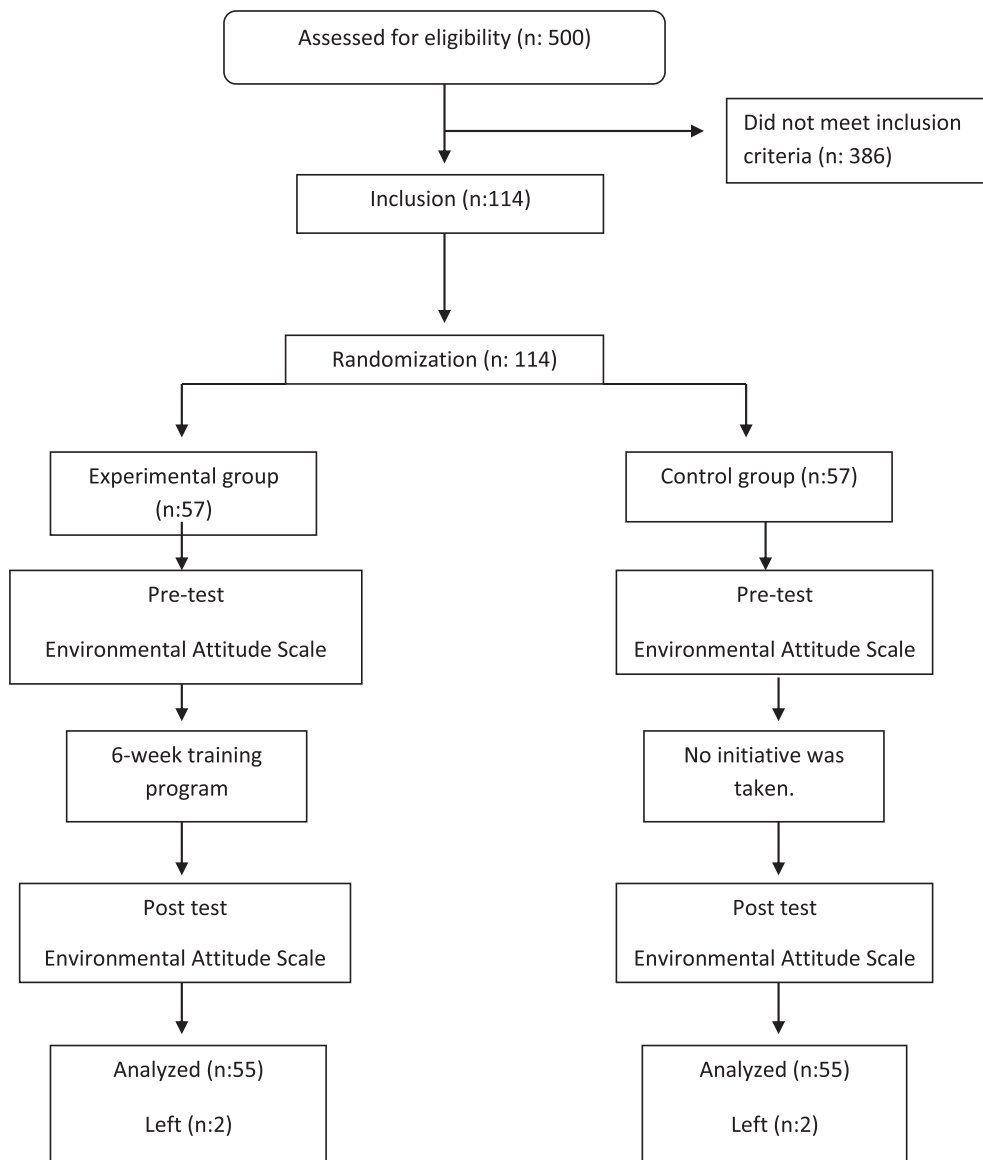
This study is a parallel-group 1:1 single-blind randomized controlled trial. The study was registered with clinical trials. The study was conducted between November 1, 2023, and March 15, 2024.

### 2.2 | Population and Sample

The population of the study consisted of 4th year nursing students studying at a state university located in the east of Turkey. Power analysis was used to determine the sample size of the study. In the study, it was determined that the sample size sufficient for a medium effect size and first type error amount ( $\alpha$ : 0.05) and 80% power of the study was 102 at a 95% confidence interval. The inclusion criteria were being a 4th year nursing student, volunteering to participate in the study, having no language barrier in communication, and not having received training on environmental awareness before. Those who left the survey data collection form incomplete were excluded from the study. Initially, 114 students (experimental: 57, control: 57) who met the inclusion criteria were included in the study. However, 4 students dropped out in the later stages of the study, and the study was completed with 110 students (Figure 1).

### 2.3 | Randomization and Blinding

Students were randomly assigned to the experimental and control groups using the OpenEpi program (Dean, 2010). Each student who met the inclusion criteria was assigned a number. Then, the total number (114) and the number of groups (2) that met the inclusion criteria were entered into the program. Then the program was run and random assignments were made. The diagram of the study is shown in Figure 1. Since the students in the study did not know which group they were in, it was conducted as a single blind study. For blinding in the study, instead of explaining to the students which group they were assigned to, they were given random numbers. In this way, only the implementers knew which group experienced which condition. It was ensured that the students did not know which questionnaire they received. Different versions of the questionnaire were used, but the content was the same to ensure confidentiality.



**FIGURE 1** | Research flow diagram.

## 2.4 | Data Collection

The data were collected using the personal information form created by the researchers involved in the study, and demographic characteristics were determined. The Environmental Attitude Scale was used to determine the attitude toward the environment.

### 2.4.1 | Personal Information Form

Statements regarding the age, gender, year (the class in which the student is studying), parental education level, and global warming and climate change of the students in the study are given below. To know the concept of global warming/climate change and to follow the developments, global warming/climate change information source, how do you see your environmental sensitivity? Climate change is an important issue for nursing (Álvarez-Nieto et al. 2022; Anâker, Spante, and Elf 2021; Felicilda-Reynaldo et al. 2018).

### 2.4.2 | Environmental Attitude Scale

It was developed by Şama to determine the environmental attitudes of university students (Şama 2003). The items of the scale are evaluated on a 5-point Likert scale. Each item is scored as “Strongly Disagree” = 1; “Disagree” = 2; “Undecided” = 3; “Agree” = 4; “Strongly Agree” = 5. The scale consists of 21 items and one sub-dimension. There are 11 reverse items in the scale. These items (1, 2, 5, 7, 8, 9, 10, 15, 16, 18, 19) are reverse coded. The lowest score to be obtained from the scale is 21, and the highest score is 105. The higher the score obtained from the scale, the higher the level of environmental attitude. The questions in the scale are “Ozone depletion threatens all human beings; people who litter or spit on the ground should be intervened; being sensitive to environmental problems does not prevent a country from developing.” The total Cronbach Alpha reliability coefficient of the scale was found to be 0.77 (Şama 2003). In this study, the total Cronbach’s alpha reliability coefficient was 0.81.

**TABLE 1** | Content of the training program.

Week	Content
1	Basic concepts related to global warming-climate change and environmental health
2	Environmental pollution (soil pollution, air pollution, water pollution, etc.) and the effects of global warming-climate change on health
3	Environmental behavior and sustainability
4	International and national conventions on environmental health
5	The role of the nurse in protecting environmental health
6	The role of the nurse in the development of environmental health

## 2.5 | Education Program

A 6-week education program was applied to the experimental group using educational brochures, PowerPoint presentations, and videos prepared by the researchers. The materials prepared within the scope of the training program were evaluated by an expert panel. The materials were finalized with the corrections from the expert panel. Students were guided throughout the whole process by the researchers who monitored the training and the effectiveness of the training. The content of the training program given to the experimental group is given in Table 1. No intervention was applied to the control group.

## 2.6 | Data Collection Process

Survey data were collected face-to-face after identifying those who volunteered to participate in the study and met the inclusion criteria. A pretest was administered to both groups before the training program started. After the 6-week training program was applied to the experimental group, a posttest was applied to both groups.

## 2.7 | Data Analysis

SPSS 25 and G Power 3.1.9.7 software were used for data analysis. Necessary normality tests were performed with kurtosis and skewness  $-1.5$  to  $+1.5$  (Tabachnick, Fidell, and Ullman 2013). It was observed that the data were normally distributed. Number, percentage, and mean were used for descriptive statistics. Chi-square test was used to analyze the demographic characteristics of the experimental and control groups and their responses to questions about global warming and climate change. An independent sample *t*-test was used to compare the scores of the experimental and control groups before and after the intergroup training. A paired sample *t*-test was used to compare within-group scores of the experimental and control groups. Data were analyzed by accepting  $p < 0.05$  significance level at 95% confidence interval.

## 2.8 | Ethical Approval

Approval for the research was obtained from the Scientific Research and Publication Ethics Committee of a State University (date and number: October 9, 2023-110941). The necessary permission was obtained from the institution where the research

was conducted. Before starting the research, all participants were informed by the researcher about the purpose of the research, the method, the time they would allocate for the research, that participation in the research would not cause any harm and that participation was completely voluntary, and their written consent was obtained. The consent form was signed by the students who participated in the study. Since individual rights should be protected in the research, the principles of the Declaration of Helsinki were followed at all stages of the study.

## 3 | Results

The sociodemographic characteristics of the students participating in the study are given in Table 2. Accordingly, 65.5% of the students in the experimental group were female, 50.9% of the students' mothers were illiterate, 32.7% of the students' fathers were middle school graduates, and 47.3% of the students lived in the city center. The average age of the students in the experimental group was  $23.20 \pm 1.63$ . In the control group, 67.9% of the students were female, 37.5% of their mothers were illiterate, 32.1% of their fathers were primary school graduates, and 46.4% of them lived in the city center. The average age of the students in the control group was  $22.57 \pm 1.46$ .

It was found that the demographic characteristics of the experimental and control groups were similar, and the groups were homogeneous ( $p > 0.05$ ) (Table 2).

The distribution of the views of the students participating in the study on global warming and climate change is given in Table 3. According to this, 96.4% of the students in the experimental group know the concept of global warming and climate change and follow the developments, 38.2% of them think that the source of information on global warming and climate change is the internet, 83.6% of them have knowledge about greenhouse gases, 56.4% of them see their environmental sensitivity at a medium level, 90.9% stated that climate change is an important issue for nursing, 70.9% stated that climate change should be included in the nursing curriculum, and 94.5% stated that environmental sustainability is an important issue and field of study for nursing. In the control group, 94.6% of the students knew the concept of global warming and climate change and followed the developments, 48.2% stated that the source of information on global warming and climate change was the internet, 75% had knowledge about greenhouse gases, and 50.1% considered environmental sensitivity at a high level, 94.6% stated that climate

**TABLE 2** | Sociodemographic characteristics of the experimental and control groups (*n*: 110).

Variables	EG <i>n</i> (%)	CG <i>n</i> (%)	Test and significance
Gender			
Male	19 (34.5)	18 (32.1)	$X^2$ : 0.07 <i>p</i> : 0.78
Female	36 (65.5)	37 (67.9)	
Mother's education level			
Illiterate	28 (50.9)	20 (37.5)	$X^2$ : 5.06 <i>p</i> : 0.40
Literate	7 (12.7)	6 (10.7)	
Primary education	14 (25.5)	14 (25)	
Middle School	3 (5.5)	6 (10.7)	
High School	1 (1.8)	3 (5.4)	
Undergraduate and above	2 (3.6)	6 (10.7)	
Father's education level			
Illiterate	8 (14.5)	6 (10.7)	$X^2$ : 4.07 <i>p</i> : 0.53
Literate	5 (9.1)	6 (10.7)	
Primary education	17 (30.9)	17 (32.1)	
Middle School	18 (32.7)	13 (23.2)	
High School	5 (9.1)	6 (10.7)	
Undergraduate and above	2 (3.6)	7 (12.5)	
Place of residence			
Village	16 (29.1)	20 (35.7)	$X^2$ : 0.82 <i>p</i> : 0.66
District	13 (23.6)	10 (17.9)	
Province	26 (47.3)	25 (46.4)	
Mean age ( $X \pm SD$ )	23.20 $\pm$ 1.63	22.57 $\pm$ 1.46	<i>t</i> : 2.134 <i>p</i> : 0.81

Abbreviations: CG, control group; EG, experimental group.

change is an important issue for nursing, 85.7% stated that climate change should be included in the nursing curriculum, and 94.6% stated that environmental sustainability is an important issue and field of study for nursing (Table 3). It was found that the difference between the groups in the distribution of students' views on global warming and climate change was not significant ( $p > 0.05$ ) (Table 3).

When the pretest and posttest mean scores of the experimental and control groups were compared, it was found that the difference between the experimental (61.78  $\pm$  6.38) and control (61.89  $\pm$  9.91) groups in the pretest was not significant ( $p > 0.05$ ), while the mean score of the experimental group in the posttest (90.23  $\pm$  12.87) was significantly higher ( $p < 0.05$ ) (Table 4).

#### 4 | Discussion

This study was conducted to determine the effect of environmental awareness-based education given to nursing students on their environmental attitudes, and in this part of the study, the findings are discussed in the light of the literature.

Global warming and climate change are reported to be the biggest health problems of the 21st century by affecting the ecosystem in which humans live. These health problems range from premature

deaths due to natural disasters to infectious diseases (Zhao, Yu, and Mahendran 2022). In our study, it was found that the environmental attitude level of the experimental group was significantly higher than the control group after the environmental awareness-based education program was implemented. In this context, hypothesis  $H_1$  was confirmed. In the studies, it is stated that the development of environmental sensitivity / awareness in individuals has a positive effect on environmental attitude (Abdallah and Wagdy Farag 2022; Okur-Berberoglu and Uygun 2012; Saricam and Sahin 2015).

It was observed that the nursing students participating in the study had adequate knowledge and awareness, such as knowing the concepts related to global warming and climate change and following the developments. This finding is similar to previous studies (J. P. Cruz, Alshammari, and Felicilda-Reynaldo 2018; Leffers et al. 2017). In contrast to this finding, Mohammed, El-Mouty, and Ameen (2022), stated that nursing students' level of knowledge about climate change was insufficient. This finding is thought to be due to the fact that students in the field of nursing have higher awareness of the issue than other professional groups. In a study conducted by Anaker et al., nursing students stated that they perceived themselves as important actors in sustainability and climate change studies. The students who participated in the study stated that the most commonly used sources of information about global warming and climate change

**TABLE 3** | Distribution of students' views on global warming and climate change (*n*: 110).

Variables	EG <i>n</i> (%)	CG <i>n</i> (%)	Test and significance
Knowing the concept of global warming/climate change and following the developments			
Yes	53 (96.4)	52 (94.6)	$X^2$ : 1.99 <i>p</i> : 0.37
No	2 (3.6)	3 (5.4)	
Global warming/climate change information source			
Press–media	17 (30.9)	16 (28.6)	$X^2$ : 1.43 <i>p</i> : 0.69
Internet	21 (38.2)	26 (48.2)	
School environment	15 (27.3)	12 (21.4)	
Family/friends environment	2 (3.6)	1 (1.8)	
State of knowledge about greenhouse gases			
Yes	46 (83.6)	41 (75)	$X^2$ : 1.260 <i>p</i> : 0.26
No	9 (16.4)	14 (25)	
How do you see your environmental awareness			
Low	0 (0)	2 (3.6)	$X^2$ : 2.73 <i>p</i> : 0.25
Middle	31 (56.4)	26 (46.3)	
Good	24 (43.6)	27 (50.1)	
Climate change is an important issue for nursing.			
Yes	50 (90.9)	52 (94.6)	$X^2$ : 0.57 <i>p</i> : 0.44
No	5 (9.1)	3 (5.4)	
Climate change should be included in the nursing curriculum.			
Yes	39 (70.9)	48 (85.7)	$X^2$ : 4.05 <i>p</i> : 0.13
No	16 (29.1)	7 (14.3)	
Environmental sustainability is an important issue for nursing.			
Yes	52 (94.5)	52 (94.6)	$X^2$ : 0.001 <i>p</i> : 0.98
No	3 (5.5)	3 (5.4)	

**TABLE 4** | Comparison of the pre- and post-training EAS scores of the experimental and control groups (*n*:110).

Test	EG ( <i>n</i> : 55)	CG ( <i>n</i> : 55)	Test -significance <sup>a</sup>	Effect size
Pretest	61.78 ± 6.38	61.89 ± 9.91	<i>t</i> : −0,07 <i>p</i> : 0.944	<i>d</i> : 0.01
Posttest	90.23 ± 12.87	61.96 ± 15.44	<i>t</i> : 10.46 <b><i>p</i>: 0.001</b>	<i>d</i> : 1.98
Test-significance <sup>b</sup>	<i>t</i> : −15.91 <b><i>p</i>: 0.001</b>	<i>t</i> : −0.31 <i>p</i> : 0.97		

Note: Significant values are in bold.

<sup>a</sup>Independent sample *t*-test.

<sup>b</sup>Paired sample *t*-test; *d*, Cohen's *d* test.

were the press–media and the internet (Anåker, Spante, and Elf 2021). In some studies, similar results were obtained with our study (Ay and Erik 2020; Biçer and Vaizoğlu 2015). This finding is in line with the literature. With the developing technology, access to and use of information through the media and the internet may cause this situation.

It was observed that a high proportion of the students participating in our study stated that they knew the concept of global warming and climate change. In some studies, it is stated that a high proportion of the participants know the concept of global

warming and climate change (Biçer and Vaizoğlu 2015; Ergin et al. 2017). Our study results are in line with similar literature. It is thought that this finding is due to the increase in the flow of news on the subject in the media and on the internet and the intensification of the discourses of policymakers in recent years with the increase in the effects of global warming and climate change. The majority of the students participating in the study knew the concept and effect of greenhouse gases, which are one of the most important causes of global warming and climate change. In their study, Biçer and Vaizoğlu (2015) stated that most of the participants did not know the greenhouse gas

and its effect. Ergin et al. (2017) reported that a high proportion of medical faculty students know about greenhouse gases. This situation is thought to be related to the changing perception of global warming and climate change over the years. Similar to the literature, a high proportion of the nursing students participating in the study stated that global warming and climate change is an important issue for nursing, that it should be included in the nursing curriculum, and that environmental sustainability is an important issue for nursing (Álvarez-Nieto et al. 2022; Chen and Price 2020; J. P. Cruz, Alshammari, and Felicilda-Reynaldo 2018). In a study, nursing students were trained with augmented reality and scenario-based learning on sustainability and climate change in the context of healthcare for 3 years, and at the end of the training, it was observed that nursing students' attitudes toward environmental awareness and climate change increased (Álvarez-Nieto et al. 2022). It is thought that nurses should act together with other health professionals, community organizations, and policymakers to integrate global warming and climate change issues into nursing education, research, and practice to assess the multiple health consequences of environmental degradation, unusual weather events, and other health problems caused by climate change.

It is reported that activities aimed at raising public awareness should be emphasized in reducing the harmful effects of global warming and climate change. In this context, current and future nurses have important duties. The International Nursing Council and the World Health Organization state that nurses have a strong potential to implement climate protective actions (Butterfield, Leffers, and Vásquez 2021). It is seen that the students in our study have a sufficient level of knowledge and perspective on global warming and climate change and have high potential. In this context, it is thought that they should use their high potential in awareness and information activities in the field.

#### 4.1 | Limitations

The limitation of the study is that the effect of the study on behavior is not proven at certain intervals. Conducting the research in a single center and generalizing the results are considered limitations for this study. Conducting the research in more than one center and conducting studies on different geographical locations and populations may increase the general validity of the results obtained. In our study conducted in a single center, attention was paid to the number of individuals and homogeneity to reflect the relevant group. Although the study was blinded, a limitation is that some participants may have provided information about the training.

#### 5 | Conclusion

It was observed that environmental attitudes improved with the education program given to nursing students. There is a need to implement intervention programs to increase students' knowledge and awareness about the environment and to gain positive attitudes. Longitudinal studies on environmental attitudes are recommended. Students who will be the nurses of the future should be given the opportunity to develop policies and discourses based on critical and analytical thinking to improve

environmental health and reduce the effects of global warming and climate change on human health.

#### Author Contributions

**Hasan Evcimen:** conceptualization, funding acquisition, conception and design of study, writing—original draft, writing—review and editing. **Necmettin Çiftci:** conceptualization, formal analysis, writing—original draft, writing—review and editing. **Metin Yıldız:** conceptualization, formal analysis, interpretation of data, writing—original draft, writing—review and editing.

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#### Ethics Statement

Before starting the study, ethics committee approval was obtained from the Scientific Research and Publication Ethics Committee (09.10.2023-110941). After ethical approval was obtained, institutional permission was obtained from the relevant faculty of health sciences (01.11.2023-115321). In addition, the purpose of the study was explained to each student and informed verbal and written consent was obtained. The study was conducted in accordance with the principles of the Declaration of Helsinki.

#### Consent

The students were informed about the purpose of the study. Informed consent has been approved by all participants.

#### Conflicts of Interest

The authors declare no conflicts of interest.

#### Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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