

# Anxiety for the planet, health for the body: the relationship between eco-anxiety and the Mediterranean diet in Turkish young adults

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## Abstract

**BACKGROUND:** Eco-anxiety is a psychological state that expresses concerns about climate change and is thought to affect individuals' adherence to the Mediterranean diet; however, no study has examined this relationship. This study aimed to examine the relationship between eco-anxiety and adherence to the Mediterranean diet in young adults, one of the age groups most affected by eco-anxiety.

**RESULTS:** Of the 736 individuals who participated in the study, 70.5% were female, and the mean age was  $20.9 \pm 1.8$  years. Higher levels of eco-anxiety were found in females and in those studying in health-related departments ( $P < 0.05$ ). The eco-anxiety score tends to be higher in individuals with a higher Mediterranean diet adherence scale score ( $\beta = 0.322$ , 95% CI: 0.129–0.503,  $P = 0.001$ ) and in those in health-related departments ( $\beta = 4.541$ , 95% CI: 3.729–5.317,  $P < 0.001$ ), while it tends to decrease with higher income levels ( $\beta = -0.622$ , 95% CI:  $-1.171$  to  $-0.072$ ,  $P = 0.027$ ).

**CONCLUSION:** The study results indicate that eco-anxiety is not entirely negative. Moderate levels of eco-anxiety may enhance awareness of environmental issues and support adherence to the Mediterranean diet.

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**Keywords:** eco-anxiety; Mediterranean diet; young adults; climate change; environmental issues

## INTRODUCTION

Climate change is one of the greatest challenges of the 21st century, leading to an increase in negative events such as drought, soil degradation, hunger, and migration caused by global warming, all of which adversely affect mental health.<sup>1</sup> The belief that climate change originates from human activities and the notion that it could harm both individuals and future generations may lead to the emergence of complex emotional states.<sup>2</sup> Eco-anxiety is described as a feeling of discomfort, worry, anxiety, and stress in response to ecological threats such as climate change, and it is increasingly experienced as a frequent emotion.<sup>3,4</sup> As an individual learns about the expected and potential impacts of the climate crisis, this information can be perceived as threatening, potentially causing stress and triggering emotions such as fear, anxiety, sadness, hopelessness, anger, and guilt.<sup>5</sup> Moreover, experiencing eco-anxiety related to the climate crisis is viewed as a positive sign of being aware of this reality, and it is considered an opportunity for engaging in beneficial behaviors.<sup>6,7</sup> It has been reported that individuals with high eco-anxiety may adopt dietary habits that are beneficial to the environment or cause less harm.<sup>8</sup>

Agricultural activities and the food supply chain are key factors contributing to climate change, and this can affect production

systems, leading to a decrease in food quality. Therefore, it is believed that there is a bidirectional relationship between climate change and food.<sup>9</sup> Foods are one of the factors causing climate change and significantly affecting anthropogenic greenhouse gas emissions, with reports indicating that 15–46% of total greenhouse gas emissions in the atmosphere originate from food production and consumption.<sup>10</sup> Greenhouse gas emissions vary significantly depending on factors such as food production, consumption, and transportation.<sup>11</sup> The livestock sector is responsible for 14.5% of total greenhouse gas emissions and significantly contributes to the increase in greenhouse gas

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emissions. As a result, animal products (such as lamb and beef) have more negative effects on climate change compared to plant-based products.<sup>12,13</sup> Climate change can lead to changes in the composition of foods, negatively affecting the quality of nutrients, which in turn may lead to malnutrition. Even when adherence to a healthy diet is achieved, the benefits of healthy eating may be diminished due to the low quality of food.<sup>14</sup> High atmospheric CO<sub>2</sub> levels can reduce nutrients such as zinc, iron, and protein in foods. Adverse weather events resulting from climate change cause crop losses, negatively impact agricultural productivity, trigger food scarcity, and lead to increased food prices, thereby reducing the accessibility of fresh fruits and vegetables, which are vital for human health.<sup>9,15</sup>

Diet composition, through food systems, is one of the largest contributors to climate change, and it is reported that the impact of diet composition on climate change will continue to increase with population growth.<sup>16</sup> Dietary changes can reduce greenhouse gas emissions by 50–84%,<sup>17</sup> and sustainable dietary patterns are among the proposed dietary changes aimed at reducing greenhouse gas emissions.<sup>16–18</sup> The Mediterranean diet, which is recommended as a dietary pattern to improve health and prevent diseases, is characterized by higher consumption of plant-based foods (fruits, vegetables, nuts, and grains) and olive oil; moderate consumption of fish and poultry; and low consumption of dairy products (particularly yogurt and cheese), red meat, processed meat, and sweets (often replaced by fresh fruit).<sup>18</sup> In addition, this diet is defined as a sustainable dietary model, emphasizing the consumption of plant-based foods, with a carbon footprint ranging from 0.9 to 6.88 kg CO<sub>2</sub> per day per person, a water footprint ranging from 600 to 5280 m<sup>3</sup> per day per person and an ecological footprint ranging from 2.8 to 53.42 m<sup>2</sup> per day per person, which is considered beneficial for climate change mitigation.<sup>19,20</sup> A study has reported that increasing adherence to the Mediterranean diet could reduce greenhouse gas emissions by 72%, land use by 58%, energy consumption by 52%, and water use by 33%.<sup>21</sup> Another study has found that a 40% reduction in meat and dairy consumption could lead to a 20–30% reduction in greenhouse gas emissions.<sup>22</sup>

In studies investigating the relationship between climate change and diet, it has been found that among young adults there is no association between the EAT-Lancet diet and eco-anxiety,<sup>8</sup> while a population-based cross-sectional study identified that concerns about climate change were associated with an increase in the Climate-Friendly Diet Score.<sup>23</sup> In adult individuals, adherence to the Mediterranean diet has been found to be associated with higher sustainable eating behaviors and greater awareness of reducing ecological footprints.<sup>24</sup> Yardimci and Demir<sup>25</sup> reported that as adherence to the Mediterranean diet increased in adults, so did their awareness of ecological footprints. Although previous studies have examined the relationship between climate change awareness or ecological footprint and various diets,<sup>24–26</sup> the relationship between eco-anxiety and adherence to the Mediterranean diet has not been assessed. Eco-anxiety is reported to predominantly affect young adults.<sup>2,27</sup> This study aimed to investigate the relationship between eco-anxiety and adherence to the Mediterranean diet in young adults.

## MATERIALS AND METHODS

### Study design, participants

The sample of this study consisted of young adults enrolled at a public university in Türkiye. Relevant literature<sup>8,25</sup> was reviewed

to calculate the sample size for the study, and the sample size was determined to be at least 600 using the G\*Power program with a 90% confidence interval and a 5% margin of error. A total of 780 individuals were reached for the study; however, some were excluded for various reasons. As a result, the final sample consisted of 736 individuals who met the inclusion criteria.

Exclusion criteria:

- Individuals aged <19 or >35 years
- Those without signed informed consent
- Individuals with eating disorders
- Those following specific dietary treatments (e.g., low-calorie, low-protein, gluten-free)
- Pregnant or lactating individuals

The study data were collected through face-to-face interviews using a questionnaire developed by the researchers. The questionnaire included general information about the participants, the Eco-Anxiety Scale, and the Mediterranean Diet Adherence Scale (MEDAS). Prior to data collection, ethical approval was obtained from the Niğde Ömer Halisdemir University Ethics Committee (No. 22504254-050.04). The study was conducted in accordance with the Declaration of Helsinki, and voluntary informed consent was obtained from all participants.

### General information

The general information section of the questionnaire form included questions to determine information such as age, sex, education level, cigarette and alcoholic beverage consumption, and monthly income. Additionally, participants' body weight and height measurements were obtained, and their body mass index (BMI) was calculated. According to the World Health Organization (WHO), individuals with a BMI below 18.5 kg m<sup>-2</sup> are classified as underweight, 18.5–24.99 kg m<sup>-2</sup> as normal weight, 25.0–29.99 kg m<sup>-2</sup> as overweight, and 30 kg m<sup>-2</sup> or above as obese.<sup>28</sup>

### Eco-anxiety scale

The eco-anxiety scale, developed by Hogg *et al.*<sup>29</sup> to assess individuals' psychological responses to environmental issues, was used in this study. The Turkish version of the scale was validated and tested for reliability by Uzun *et al.*<sup>30</sup> This 4-point Likert scale consists of 13 items. The scale yields a score range from 0 to 39, with no reverse-coded items. The internal consistency of the scale, as indicated by the Cronbach's alpha coefficient, was found to be 0.91. An increase in the total score indicates a higher level of eco-anxiety.

### Mediterranean diet adherence scale

The Mediterranean diet adherence scale, developed by Martínez-González *et al.*<sup>31</sup> to assess adherence to the Mediterranean diet, was used in this study. The Turkish version of the scale was validated and tested for reliability by Bekar and Goktas.<sup>32</sup> This scale consists of 14 items, and each question is scored 1 or 0 according to the amount of consumption. These scores are summed up. A total score between 7 and 9 indicates moderate adherence to the Mediterranean diet, while a score higher than 9 indicates high adherence.

### Statistical analysis

The data obtained from the study were analyzed using the Statistical Package for the Social Sciences (SPSS) 26.0 software (IBM,

Armonk, NY, USA). The normality of the variables in the dataset was assessed using the Kolmogorov–Smirnov/Shapiro–Wilk tests, skewness–kurtosis, and histogram curves, with all variables found to be normally distributed. Descriptive data are presented in frequency and percentage tables. The variables are presented with means and standard deviations. The significance of differences between the two groups was determined using an independent two-sample *t*-test. A linear regression model was used to identify the variables affecting eco-anxiety and adherence to the Mediterranean diet. The results were evaluated with a 95% confidence interval and a significance level of 0.05.

## RESULTS

The general characteristics of the participants are presented in Table 1. Of the individuals who participated in this study, 70.8% were aged between 19 and 21 years, with a mean age of  $20.9 \pm 1.8$  years. The majority of the participants were female (70.5%), enrolled in health-related departments (44.0%), and reported that their income was equal to their expenses (44.4%). Non-smokers and non-drinkers constituted 63.6% and 74.9% of

the sample, respectively. 68.9% of the participants had a normal body weight, with a mean BMI of  $22.5 \pm 3.8 \text{ kg m}^{-2}$ . The mean eco-anxiety score was  $13.4 \pm 5.9$ , and the mean Mediterranean diet score was  $5.8 \pm 2.1$ .

Information regarding eco-anxiety and MEDAS based on certain variables is summarized in Table 2. A statistically significant difference in eco-anxiety scores was observed according to sex and department ( $P < 0.05$ ). Higher eco-anxiety scores were reported among females and those studying in health-related departments ( $P < 0.05$ ). MEDAS scores were also higher among those studying in health-related departments ( $P < 0.05$ ). No significant differences were found in either eco-anxiety or MEDAS scores based on age, income, or BMI classifications ( $P > 0.05$ ).

The level of the Mediterranean diet and its components according to eco-anxiety classification is illustrated in Table 3. MEDAS score was found to be higher in individuals with high eco-anxiety ( $P < 0.05$ ). Individuals with high eco-anxiety exhibited significantly higher scores in the Mediterranean diet components of vegetable and fruit consumption, olive oil for cooking, and lower red meat and butter consumption ( $P < 0.05$ ).

The results of the linear regression analysis for factors influencing eco-anxiety and MEDAS scores are presented in Table 4. The analysis revealed that both models were significant. The department of study (health-related vs. others), income status, and MEDAS score were found to have a significant effect on eco-anxiety scores ( $P < 0.05$ ). Factors influencing MEDAS scores included the department of study and eco-anxiety score ( $P < 0.05$ ).

## DISCUSSION

This study was conducted to determine the relationship between eco-anxiety and adherence to the Mediterranean diet among young adults. The results of this study revealed that eco-anxiety scores tend to be higher in young adults with greater adherence to the Mediterranean diet and those studying in health-related departments, whereas higher income levels tend to reduce eco-anxiety scores.

Our study results indicate that eco-anxiety is higher in females. Among demographic factors, sex has been associated with eco-anxiety, and it has been reported that females are more sensitive to eco-anxiety.<sup>33</sup> A study conducted on adults in Canada found that females had higher levels of eco-anxiety compared to males.<sup>34</sup> In a study examining eco-anxiety in adolescents (ages 11–19), it was reported that female students exhibited higher levels of eco-anxiety.<sup>35</sup>

In this study, it was determined that young adults studying in health-related departments exhibited higher levels of eco-anxiety and greater adherence to the Mediterranean diet. This may be associated with the higher environmental awareness and greater knowledge of sustainable dietary models among young adults in health-related departments. The inclusion of topics such as sustainability, sustainable food systems, and the relationship between environment and health through various approaches in the curricula of health-related departments may enhance young adults' awareness of climate change.<sup>36,37</sup> In a study examining anxiety levels related to climate change, it was found that young adults studying in nursing, social work and physiotherapy departments had higher anxiety-related scores.<sup>38</sup> Studies have shown that young adults studying in medical faculties have a high level of awareness regarding the negative impacts of climate change on both the planet and human health.<sup>39,40</sup> Another study

**Table 1.** General information on participants

Parameter	<i>n</i> (%)
Age classification	
19–21 years	521 (70.8)
22–35 years	215 (29.2)
Sex	
Male	217 (29.5)
Female	519 (70.5)
Department	
Health-Related	324 (44.0)
Others	412 (56.0)
Income status	
Less than expenses	289 (39.3)
Equal to expenses	327 (44.4)
More than expenses	120 (16.3)
Smoking	
Yes	229 (31.1)
No	468 (63.6)
Quit	39 (5.3)
Alcohol	
Yes	141 (19.2)
No	551 (74.9)
Quit	44 (6)
BMI classification	
Underweight	84 (11.4)
Normal weight	507 (68.9)
Overweight	113 (15.4)
Obese	32 (4.3)
	Mean $\pm$ SD
Age	$20.9 \pm 1.8$
BMI	$22.5 \pm 3.8$
Eco-anxiety score	$13.4 \pm 5.9$
MEDAS score	$5.8 \pm 2.1$
Abbreviations: BMI, body mass index; MEDAS, Mediterranean diet adherence scale; SD, standard deviation.	

**Table 2.** Eco-anxiety and Mediterranean diet adherence scores according to some variables

	Eco-anxiety score	<i>P</i>	MEDAS score	<i>P</i>
Age classification				
19–21 years	13.3 ± 5.8	0.565	5.8 ± 1.9	0.159
22–35 years	13.6 ± 5.9		5.5 ± 2.1	
Sex				
Male	12.6 ± 6.3	0.026*	5.6 ± 2.2	0.535
Female	13.7 ± 5.6		5.7 ± 1.9	
Department				
Health-related	16.0 ± 6.2	<0.001*	6.1 ± 2.2	0.001*
Others	11.8 ± 5.0		5.6 ± 2.0	
Income status				
Less than expenses	13.9 ± 5.8	0.110	5.6 ± 2.0	0.431
Equal to expenses	13.1 ± 5.7		5.7 ± 2.0	
More than expenses	12.9 ± 6.3		5.9 ± 2.0	
BMI classification				
<25 kg m <sup>2</sup>	13.3 ± 5.8	0.347	5.7 ± 2.0	0.940
≥25 kg m <sup>2</sup>	13.8 ± 6.1		5.7 ± 2.1	

Abbreviations: BMI, body mass index; MEDAS, Mediterranean diet adherence scale.

\**P* < 0.05, independent samples *t*-test for two groups and one-way ANOVA for three groups.

**Table 3.** Adherence to the Mediterranean diet and its components according to the eco-anxiety classification

	Eco-Anxiety classification		<i>P</i>
	Low	High	
Olive oil for cooking	0.66 ± 0.47	0.71 ± 0.45	0.183
+4 Tablespoons olive oil per day	0.36 ± 0.48	0.41 ± 0.49	0.162
+2 Servings of vegetables per day	0.22 ± 0.41	0.36 ± 0.48	<0.001*
+3 Fruit per day	0.22 ± 0.41	0.34 ± 0.47	<0.001*
–1 Red meat per day	0.68 ± 0.47	0.76 ± 0.43	0.020*
–1 Butter or cream day	0.65 ± 0.48	0.55 ± 0.50	0.005*
–1 Sugary drinks per day	0.39 ± 0.38	0.33 ± 0.33	0.129
+7 Wine per week	0.05 ± 0.22	0.08 ± 0.27	0.133
+3 Legumes per week	0.42 ± 0.49	0.42 ± 0.49	0.932
+3 Fish-seafood per week	0.13 ± 0.33	0.10 ± 0.30	0.195
–2 Commercial pastries per week	0.48 ± 0.50	0.48 ± 0.50	0.918
+3 Nuts per week	0.31 ± 0.46	0.29 ± 0.45	0.561
Preferably white meat	0.50 ± 0.50	0.52 ± 0.50	0.515
+2 Vegetables cooked in olive oil per week	0.56 ± 0.50	0.68 ± 0.47	<0.001*
MEDAS score	5.6 ± 2.1	6.0 ± 2.1	0.009*

Note: Eco-anxiety score was classified based on the median value (13).

Abbreviations: BMI, body mass index; MEDAS, Mediterranean diet adherence scale.

\**P* < 0.05, independent samples *t*-test.

reported that young adults in the nursing department with higher climate change awareness exhibited higher levels of eco-anxiety.<sup>41</sup> Although anxiety is generally considered a negative condition, eco-anxiety may serve as an intrinsic motivational factor that enhances individuals' awareness of environmental issues and encourages action. It has been emphasized that anxiety can positively influence engagement in climate change-related actions.<sup>42</sup> However, excessively high levels of eco-anxiety among young adults studying in health-related departments – the future professionals expected to play an active role in combating climate change – may negatively impact their psychological well-being

and hinder their participation in sustainable practices. Therefore, it is important for young adults studying in health-related departments to assess their own levels of anxiety and develop coping strategies to manage these emotions effectively.

The impact of people's dietary patterns on the environment is significant and cannot be ignored, and adopting sustainable eating behaviors is crucial in combating climate change.<sup>43</sup> Studies focusing on reducing the negative environmental impacts of diets recommend reducing the consumption of animal-based foods and increasing the intake of plant-based foods, which aligns with adherence to a typical Mediterranean diet.<sup>44–46</sup> In our study, it was

**Table 4.** Linear regression analyses for the prediction of Mediterranean diet adherence and eco-anxiety

Model	Beta	95% CI	P
<b>Eco-anxiety score</b>			
Age, year	-0.077	-0.285 to 0.141	0.477
Sex	0.372	-0.403 to 1.369	0.408
Department	4.541	3.729 to 5.317	<0.001*
Income	-0.622	-1.171 to -0.072	0.027*
BMI (kg m <sup>2</sup> )	0.092	-0.015 to 0.197	0.088
MEDAS score	0.322	0.129 to 0.503	0.001*
$R^2 = 0.288; P < 0.001$			
<b>MEDAS score</b>			
Age, year	-0.033	-0.115 to 0.049	0.424
Sex	0.098	-0.244 to 0.440	0.573
Department	0.519	0.190 to 0.849	0.002*
Income	0.148	-0.065 to 0.361	0.174
BMI (kg m <sup>2</sup> )	0.008	-0.033 to 0.049	0.688
Eco-anxiety score	0.048	0.020 to 0.076	0.001*
$R^2 = 0.225; P < 0.001$			
Note: Variables values: Sex (male = 1, female = 0); Department (health-related =1, others = 0), Income status (less than expenses =1, equal to expenses = 2, more than expenses =3). Abbreviations: BMI, body mass index; MEDAS, Mediterranean diet adherence scale; CI, confidence interval. * $P < 0.05$ , linear regression analyses.			

found that young adults with high eco-anxiety showed greater adherence to the Mediterranean diet, with higher daily consumption of vegetables and fruits and a preference for cooking vegetables in olive oil, while consumption of meat and butter-margarine was lower. A study conducted on Portuguese young adults (ages 18–25) found that individuals with higher eco-anxiety scores exhibited more environmentally friendly behaviors.<sup>47</sup> A study covering 32 countries, including Türkiye, examined the responses to negative emotions related to climate change and observed that individuals with high climate change anxiety had higher awareness and engagement in eco-friendly activities.<sup>4</sup> A study involving 1797 adults aged 19–65 found that individuals with high climate change awareness reduced their meat consumption and showed greater adherence to the Mediterranean diet.<sup>27</sup> Similarly, in Italy, individuals with a high awareness of climate change were found to consume meat less frequently than those without this awareness.<sup>48</sup> Studies conducted on young adults have shown that individuals with high awareness of ecological footprints and eco-anxiety tend to reduce their meat consumption.<sup>26,49</sup> The higher adherence to the Mediterranean diet and the increased consumption of plant-based foods while reducing animal-based food intake among individuals with high eco-anxiety supports the existing literature on environmental sustainability.

The results of this study show that the department of study, income, and MEDAS score are associated with eco-anxiety. Among young adults studying in health-related departments and those with higher MEDAS scores, eco-anxiety tends to be higher, whereas it tends to decrease with increasing income levels. There is limited information in the literature regarding the relationship between income level and eco-anxiety. In one study, individuals with lower socioeconomic status were described as those who contribute the least to climate change but are the most affected by its consequences due to their lack of resources. The same study also reported that individuals with

higher income levels may be less sensitive to environmental issues due to their greater purchasing power and thus have lower eco-anxiety.<sup>50</sup> Another study conducted on adults found that individuals with lower income levels (below minimum wage) had higher eco-anxiety.<sup>51</sup> While our findings suggest that eco-anxiety may be related to income level, further comprehensive studies should be conducted on this topic. It is recommended that climate change awareness be raised among individuals with higher income levels and that they be guided towards sustainable behaviors according to their socioeconomic conditions, while developing programs to mitigate the negative effects of eco-anxiety among individuals with lower income levels.

In the study, an increasing tendency in MEDAS scores was observed among individuals studying in health-related departments and those with higher levels of eco-anxiety. Individuals experiencing anxiety related to climate change have been noted to reduce their consumption of processed foods and meat while increasing the consumption of local foods.<sup>7</sup> Studies have shown that individuals with higher awareness of climate change and sustainable, healthy eating behaviors tend to have higher adherence to the Mediterranean diet.<sup>24,26,52</sup> Moderate levels of eco-anxiety may guide individuals toward more conscious attitudes and behaviors regarding climate change.

This study has some limitations. Since the study sample consists of young adults, the results may not be generalizable to all age groups. The scale used to determine participants' eco-anxiety levels was based on responses to information encountered in the past 2 weeks related to climate change, which may lead to variations in individual thoughts and reactions depending on the frequency of exposure. Lastly, the cross-sectional design of our study prevented the establishment of causal relationships between the variables. Therefore, it is recommended that this study be replicated with a larger sample and across various age groups.

## CONCLUSIONS

The results of this study indicate that eco-anxiety levels are higher among females and studying in health-related departments. Among individuals with high eco-anxiety, greater adherence to the Mediterranean diet was observed, as evidenced by increased consumption of vegetables, fruits, and vegetables prepared with olive oil, alongside decreased consumption of meat and butter-margarine. In addition, the department of study, income level, and MEDAS score were found to influence eco-anxiety levels significantly. In fact, eco-anxiety is not entirely negative; moderate levels of eco-anxiety may enhance environmental awareness and promote the adoption of a healthy diet. Therefore, appropriate management of eco-anxiety is essential.

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## AUTHOR CONTRIBUTIONS

**CMİ:** writing – review and editing, writing – original draft, visualization, supervision, project administration, methodology, investigation, conceptualization. **ÇŞK:** writing – review and editing, writing – original draft, visualization. **İT:** writing – original draft, investigation, data curation. **ST:** writing – original draft, investigation, data curation.

## CONFLICT OF INTEREST

The authors report there are no competing interests to declare.

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## DATA AVAILABILITY STATEMENT

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

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