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The relationship between sustainable nutrition and healthy food choice: a cross-sectional study

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ABSTRACT

Objectives: The aim of this study was to evaluate university students' attitudes toward sustainable nutrition, their level of knowledge in this area, and the associations between these variables and food preferences.

Methods: This study was conducted with university students between the ages of 19-45. The study data were collected between May 2022 and July. In the study, the Scale of sustainable nutrition knowledge was used for the sustainable nutrition knowledge level of individuals. The food choice scale was used to determine the food preference and the Sustainable and Healthy Eating Behaviors scale was used to determine the health food choice preference.

Results: The study involved 467 participants, and female made up 64.67% of the study's participants. The mean age of the group was 23.21 ± 6.13 years. Knowledge of sustainable nutrition increases by 1.365 for every 0.821 increase in educational level. The sustainable nutrition knowledge score increased by 1.529 points, the scale score for sustainable and healthy eating behaviors increased by 0.651 points, and the monthly income to the model increased by 1.611 times for every 1.109 unit ($p = 0.005$).

Conclusions: Our survey shows that most college students believe eating sustainably is important. As people's education and knowledge about sustainable nutrition rise, so do their healthy eating habits. Expand sustainable nutrition education, add it to the curriculum, and create nutrition guides to promote this novel concept in our country.

Keywords: Sustainable nutrition, university student, food preference, food-choice

More than 10 billion people are projected to live on the planet in 2050 [1]. In a world with limited resources, feeding a growing population is a significant challenge. The world's current food systems are unable to feed everyone, putting both the ability of the present generation and that of future generations to fend for themselves in danger [2, 3].This results in food insecurity, detrimental health effects, and environmental harm. The current food system is to blame for 20 to 30% of anthropogenic greenhouse gas emissions that contribute to climate change, in addition to biodiversity loss, deforestation, and altered land use [2]. Agriculture uses more than one-third of the world's arable land and 70% of its fresh water [4]. The entire food system uses a significant amount of natural resources. The environment is impacted by every step that food takes in the food system before it reaches your plate. Agriculture that produces both crops and

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livestock is more likely to use harmful practices. Livestock is a significant cause of climate change, contributing 14.5 percent of global greenhouse gas emissions, mostly from the production of meat, milk, and eggs [5]. The agricultural sector, which produces food for the population, is under pressure due to the need to find resources to feed a growing global population, and the problems brought on by climate change make this pressure even greater [2, 6]. The current food system needs to be changed for the benefit of the health of the planet and people. By 2050, there will likely be an increase in environmental pressure from the food system of 50-92% due to predictions that the world's population will reach 10 billion people and that the global income will triple [7]. If we want to avoid this environmental pressure, the global food system needs to be healthier and more environmentally friendly [3]. People are becoming more interested in sustainable nutrition because issues brought on by population growth and climate change may endanger our natural resources [8]. Our current diet contributes to an increase in disease burden. Obesity is on the rise on a global scale [9]. As a result, one in three people are obese or overweight [10]. Even though obesity is a serious health concern on the one hand, the fact that one in nine people worldwide experience hunger is a significant indicator of the injustice of the current food system and illustrates the importance of sustainable nutrition Because environmentally friendly nutrition is just, inexpensive, sufficiently nutritive, and has few unfavorable effects. A diet that is good for your health and the environment consists of eating more plants and less animal products [10, 119.

The aim of this study was to evaluate university students' attitudes toward sustainable nutrition, their level of knowledge in this area, and the associations between these variables and food preferences.

METHODS

Participant and Approval of the Ethics Committee

This study received approval from the Malatya Turgut Ozal University non-interventional studies Ethics Committee at its meeting on November 29, 2021, with meeting number 2021/16. The study's voluntary consent is included in the first section of the questionnaire that needs to be filled out. Volunteers who agreed to participate in the study were added to the list after they signed the consent form. Ethics dictate that no private information about people will be disclosed, that data will only be used for research, and that personal privacy will be respected when the results of the study are shared and published. The Declaration of Helsinki was followed when conducting the study.

Data Collection

General participant information (gender, age range, enrollment status (full- or part-time), program of enrollment, and level of the university courses) was divided into four sections of the questionnaire used to collect the data. Other sections covered a food selection test, behaviors related to sustainable nutrition, and a knowledge level data form for sustainable nutrition. The self-reported familiarity, perceived importance, and perspectives of university students on sustainability were also examined in this study for potential applications using a descriptive design. The following were rated on a Likert scale of 1 to 5: (1) Have you ever heard of the following terms? Environmental sustainability, social sustainability, and economic sustainability; sustainability (not at all familiar, very familiar); (2) How familiar are you with sustainability concepts? [12] cross-cutting issues, such as the use of food and agricultural policies, social development (for instance, social justice in the food system), environmental integrity (for instance, the use of synthetic chemicals and pesticides), economic resilience (for instance, resilience to economic risk); (3) How big of a problem do you generally think sustainability is? (4) The extent to which sustainability influences their daily decisions (not always); and, as a fifth person, the significance of sustainability for future practice (from very insignificant to very important). How would you characterize your attitude toward sustainability? was the final query, and there were five possible responses. (A) I have a strong advocacy. B) I think it's a good idea C) I don't care too much D) It's okay if other people want to do it.

Scale of Sustainable Nutrition Knowledge

A questionnaire consisting of 22 questions was created using a 5-point Likert scale to assess students' knowledge of sustainable nutrition (Strongly Disagree, Disagree, Undecided, Agree, Totally Agree). Students were asked to offer the most appropriate response to

each of these statements. Points were assigned in the following order: 1, 2, 3, and 4, from the most inappropriate criterion for sustainable nutrition knowledge (I strongly disagree) to the most appropriate criterion (I completely agree). For questions 18, 19, and 20, the results are flipped. The highest score possible for this section is 105. Since there is no scale for evaluating sustainable nutrition behavior and knowledge level, the researcher combed through the literature to create the questionnaire that will be used to evaluate this information.

Food-Choice Evaluation Scale

Health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern were the four dimensions that Steptoe *et al*. created for this study. The test involved choosing foods in a Likert-style manner. The construct validity of the Turkish validation study was determined using confirmatory factor analysis, and factor loadings were found to be similar to those of the original questionnaire. Test-retest reliability was examined using the infraclass correlation coefficient (ICC), which had values between 0.89 and 0.95. The results show that the Turkish FCQ is a valid and reliable research tool [12].

Sustainable and Healthy Eating Behaviors Scale

In order to evaluate sustainable and healthy eating behaviors for the idea of sustainable diet, Gazi University Nutrition and Dietetics students used the Turkish version of the "Sustainable and Healthy Eating Behaviors" scale. This scale was created in accordance with the FAO definition, the LiveWell approach, and the principles of sustainable and healthy eating habits [13]. This scale has eight factors and a total of 34 items. The eight factors mentioned above are: a healthy and balanced diet, quality marks (local and organic), less meat consumption, local foods, low fat, preventing food waste, animal health, and seasonal foods. A Likert-type scale was used to ask the participants to rate each of the scale's 34 items as either never, very rarely, rarely, sometimes, often, or very often, or always. Never = 1, Always = 7, and vice versa.

Statistical Analysis

All survey data were imported into IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp. Armonk, NY, USA) to prepare the data for statistical analysis. The analyzes used all available survey data. All analyzes had a significance level of 0.05. The summaries of all sociodemographic variables were proportions and frequencies and were either nominal or ordinal. Progress was made in a retrospective procedure in which variables were removed in order of importance until the model included only variables with $p < 0.05$ (for any level). Interaction terms between covariates were not considered in the model.

RESULTS

Table 1 displays the general characteristics of the people. 64.67% of the participants in the study were female. The group's mean age was 23.21 ± 6.13 years and 46.68% of the study participants had undergradu-

Table 1. General characteristics participants of study (n = 467)

	n	%
Gender		
Female	302	64.67
Male	165	35.33
Age(years) (mean ± SD)	23.21 ± 6.13	
Education level		
Associate degree	102	21.84
Licence	218	46.68
Masters	99	21.20
Doctorate	48	10.28
Department of study		
Health	145	31.05
Education	111	23.77
Liberal arts	108	23.13
Engineering	103	22.06
Monthly income		
1000 TL and below	215	46.04
1001-2000 TL	125	26.77
2001-3000 TL	78	16.70
3000 TL and above	49	10.49

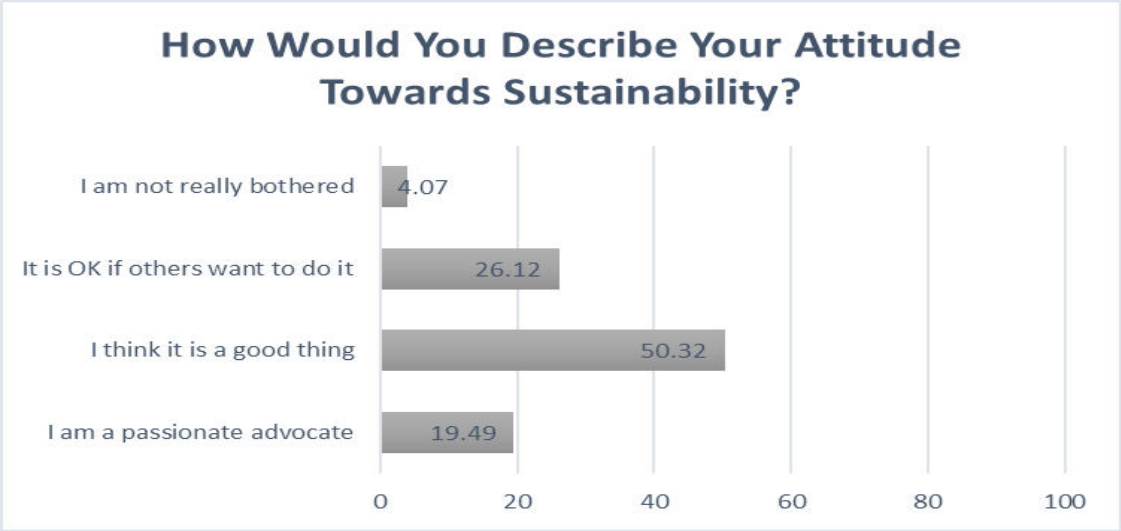

Fig. 1. Demonstrates 'how students feel about sustainability.

ate degrees, according to an analysis of the participants' educational backgrounds. However, it was discovered that 31.05% of the population had health-related education. It has been found that 46.04% of the study participants earn no more than 1000 TL per month.

One question was posed to respondents, and Fig. 1 displays their responses regarding sustainability. The percentages of responses provided by the respondents were looked at in relation to the four options for the question. The response "I think it is a good thing" received the highest response (50.23%).

The factors influencing people's knowledge of sustainable nutrition were looked at (Table 2). Individuals' food preferences, sustainable behavioral patterns, and knowledge of sustainable nutrition all showed a positive and significant correlation ($p < 0.05$).

It was found that using logistic regression models can assist in determining a person's level of familiarity with sustainable nutrition (Table 3). The following model was created: years of education, score on a scale measuring sustainable and healthy eating practices, and monthly income (TL). The analyses made use of the high-level LR model. Every 0.821 increase in education level results in a 1.365 increase in knowledge of sustainable nutrition. The sustainable and healthy eating behaviors scale score increased by 0.651, the sustainable nutrition knowledge score increased by 1.529, and the monthly income to the model increased by 1.611 times for every 1.109 unit ($p = 0.005$). The sustainable nutrition knowledge score is influenced by factors such as monthly income, educational attainment, and the Sustainable and Healthy Eating Behaviors scale score.

The relationship between the scale measuring sus-

Table 2. Analysis of the relationships between the food-choice evaluation scale, the sustainable and healthy eating behaviors scale, and an individual's level of knowledge about sustainable nutrition

	Food-choice evaluation scale	The sustainable and healthy eating behaviors scale
The sustainable nutrition knowledge level	r	r
	0.345*	0.571**

r = spearman correlation coefficients, $^{**}p < 0.001$ $^{*}p < 0.05$

Table 3. Regression analysis of factors that determine a person's knowledge of sustainable nutrition

		B	*p* value	OR	95% CI	
Model					**Lower**	**Upper**
Sustainable nutrition knowledge score	Education level (years)	0.821	0.064	1.365	1.000	1.790
	Sustainable and Healthy Eating Behaviors scale score	0.651	**0.002**	1.529	1.211	3.230
	Monthly income(TL)	1.109	**0.032**	1.611	1.003	3.102

CI = confidence interval, OR = Odds Ratio, TL = Turkish Lira.

tainable and healthy eating behaviors and the degree of sustainable nutrition knowledge was mediated by the food selection scale score. The major premise of the study is supported by this finding. Fig. 2 shows the statistical significance of the standardized regression coefficients ($p < 0.01$) between the food choice scale score and the level of sustainable nutrition knowledge as well as between the food choice scale score and the scale of sustainable and healthy eating behaviors. The sustainable nutrition knowledge level is influenced by the significant food selection scale score, and both are significantly influenced by the sustainable and healthy eating behaviors scale. The coefficient values between the food selection scale score and the sustainable nutrition knowledge level (B = .45, $p < 0.01$) and between the food selection scale score and the sustainable and healthy eating behaviors scale (B = .54, $p < 0.01$) show the positive significance of the relationships. Beta values and standard error results were obtained after standardized regression analyses were evaluated using the Sobel Test (Sobel, 1982). The Sobel Test results showed that the food selection

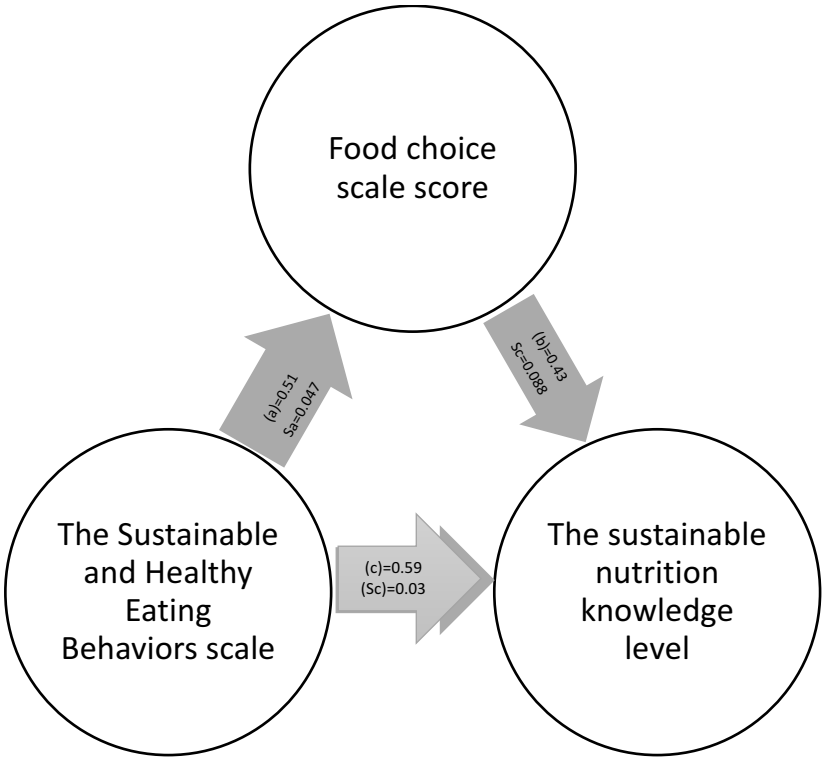

Fig. 2. Beta coefficients for analyzing the food selection scale score's mediating role in figuring out how much a person knows about nutrition and how to make sustainable and healthy eating choices. .

scale score ($p < 0.01$) was statistically significant. Here, a mediating factor is the score on the food choice scale.

DISCUSSION

Sustainable nutrition aims to maintain low negative environmental impacts while ensuring that all people have access to enough, safely, and basic nutrients for their health and the health of present and future generations. University education is a crucial phase in preparing students for adult life. It is crucial at this time for young people to become more environmentally conscious and to acquire life skills that will enhance their level of health.

Education is a potent force for personal and societal change. Education, which raises people's awareness, is crucial for promoting environmental awareness and developing sustainable eating practices. Studies on education and environmentally friendly consumption patterns also demonstrate the influence of education on environmental attitudes. According to Haanpää [14] there is a link between education level and environmental anxiety. According to the research by Barone *et al*. [15] people with higher education levels are more likely to practice sustainable nutrition and resource conservation. Rejman et. al [16] in contrast to other studies, found that education level had no bearing on sustainable eating habits and food preferences. In this study, it was discovered that a rise in education level of 0.821 units resulted in a rise in sustainable nutrition knowledge scale of 1.365 units. It has been found that knowledge of sustainable nutrition is influenced by education level.

Sustainable consumption behavior rises along with sustainability knowledge [17]. Sustainable behaviors are affected by knowledge levels. People will pay more attention to sustainable nutrition if their level of knowledge can be raised. In a study by Torabian-Riasati *et al*. [18] on undergraduate students, it was discovered that attitudes toward sustainable food practices and knowledge of food sustainability are positively and significantly related. According to a study, switching people to a sustainable diet will reduce their risk of developing obesity, one of the non-communicable diseases [19]. People who switch to a sustainable diet will consume fewer processed and packaged foods that contribute to obesity, consume less animal-based food, which will reduce their intake of saturated fat, and prefer more plant-based foods, which will result in a decrease in the amount of energy they obtain from food will lower the likelihood of obesity.

The food choice assessment scale, the sustainable healthy eating behaviors scale, and the level of sustainable nutrition knowledge were all found to be positively and significantly correlated in this study. It was found that a rise in the sustainable nutrition knowledge score of 1.529 units resulted in a rise in the sustainable healthy eating behavior scale score of 0.621 units. With the help of this study, it can be said that understanding sustainable nutrition has an impact on sustainable behaviors.

According to Burkhart *et al*. [20] 97.00% of nutrition and dietetics students had heard of the term "sustainability" before, and the majority of them believed that it was a significant concern in terms of dietary practices. According to Heidelberger *et al*. [21] 47.00% of dietitians address environmental concerns in their work. Only 38.00% of dietitians were found to consider diet to be a factor in climate change when Hawkins *et al*. [22] evaluated the attitudes and behaviors of dietitians regarding climate change. According to Truckner [23] 80% of medical professionals think that environmental degradation brought on by humans has a negative impact on human health, but 93% do not discuss this topic with their patients. According to a study by Sarfaty *et al*. [24] on physicians, 88% of participants believed that climate change had a direct impact on patient care, but 71% had no idea how to talk to patients about it. The majority of people in this study believe that sustainability is a good idea, but 122 people do not think that it is a problem that others want to implement it.

It is well known that students' eating habits and their available income have a connection. Personal disposable income and nutrition and food security are inversely correlated [25]. In this study, it was found that an increase in monthly income of 1.611 units was followed by an increase in sustainable nutrition knowledge scale of 1.109 units. The FAO defined sustainable diets in 2010; it is defined as diets that are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economical, and affordable, nutritionally adequate, and reliable. Sustainable diets use nature and human resources in

the best possible ways. From this perspective, it's crucial that sustainable nutrition is affordable [26].

CONCLUSION

Our findings indicate that the majority of the university students we surveyed think it's critical to eat sustainably. It has been found that as people's levels of education and knowledge about sustainable nutrition rise, so do their sustainable healthy eating behaviors and practices. Sustainable nutrition education should be expanded, added to the curriculum, and nutrition guides should be created in this regard in order to promote sustainable nutrition, which is a novel concept in our nation.

Authors' Contribution

Conception: HA, NA; Study Design: HA, NA; Supervision: HA, NA; Funding: HA, NA; Materials: NA; Data Collection and/or Processing: NA; Statistical Analysis and/or Data Interpretation: HA, NA; Literature Review: NA; Manuscript Preparation: NA and Critical Review: NA.

Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

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