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Determination of Teachers' Sustainable and Healthy Eating Behaviors and Ecological Footprint Awareness

Öğretmenlerin Sürdürülebilir ve Sağlıklı Yeme Davranışları ile Ekolojik Ayak İzi Farkındalıklarının Belirlenmesi

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ABSTRACT

This study aims to determine the sustainable and healthy eating behaviors and ecological footprint awareness of teachers from different branches.

For this purpose, 270 teachers from different branches participated in the study. The research data were collected in the internet environment through the online survey link sent to the participants. The survey includes individual characteristics, a sustainable and healthy eating (SHE) behaviors scale, and an awareness scale for reducing ecological footprint (ASREF). While 64.8% of the participants are female, 35.2% are male teachers. The total mean score of the teachers' SHE behaviors scale was 4.1±1.15, and no significant difference was found according to gender. It was determined that the highest score in the sub-dimensions was in avoiding food waste, and the lowest was in reducing meat consumption and local food sub-dimensions. The total score of the teachers' ASREF was 3.9±0.88. There was no significant difference in total score and sub-dimensions according to gender. When the SHE behaviors scale was evaluated according to the branch, it was determined that the basic education and sports branches were higher than the verbal, language arts, and numerical branches (p=0.031). The total score of the SHE behaviors scale of the teachers was found to be higher in those who received nutrition education (4.4±1.15) than those who did not (4.0±1.12) (p=0.001). It was determined that the reduction of meat consumption and low-fat sub-dimension were statistically significantly negatively correlated with body mass index (p<0.05).

The status of teachers receiving training on the subject affects their awareness of sustainable nutrition and ecological footprint. To provide teachers, who are of great importance in raising future generations, with more information, educational curricula can be developed to include these issues.

Keywords: Ecological footprint awareness, Sustainable and healthy eating behaviors, Teacher

ÖZ

Bu çalışmanın amacı farklı branştaki öğretmenlerin sürdürülebilir ve sağlıklı beslenme davranışlarını ve ekolojik ayak izinin azaltılmasına yönelik farkındalıklarını belirlemektir.

Bu amaçla araştırmaya farklı branşlardan 270 öğretmen katılmıştır. Araştırma verilerinin toplanması katılımcılara gönderilen çevrimiçi anket linki aracılığı ile internet ortamında yapılmıştır Anket, bireysel özellikleri, sürdürülebilir ve sağlıklı beslenme (SSB) davranışları ölçeğini, ekolojik ayak izinin azaltılmasına yönelik farkındalık (EAAFÖ) ölçeğini içermektedir. Katılımcıların %64,8'i kadın, %35,2'si erkek öğretmenlerden oluşmaktadır. Öğretmenlerin SSB davranışları ölçeği toplam puanı (4,1±1,15) cinsiyete göre anlamlı fark göstermemiştir. Alt boyutlarında en yüksek gıda israfından kaçınmada, en düşük puanın ise et tüketiminin azaltılması ve yerel gıda alt boyutlarında olduğu belirlenmiştir. Öğretmenlerin EAAFÖ toplam puanı 3,9±0,88'dir. Toplam puan ve alt boyutlarda cinsiyete göre anlamlı fark olmadığı belirlenmiştir. Branşa göre SSB davranışları ölçeği toplam puanları değerlendirildiğinde temel eğitim ve spor branşlarında sözel, dil ve sanat ve sayısal branşlardan daha yüksek olduğu belirlenmiştir (p=0,031). Öğretmenlerin SSB davranışları ölçeği toplam puanı beslenme konusunda eğitim alanlarda (4,4±1,15) almayanlardan (4,0±1,12) yüksek bulunmuştur (p=0,001). Alt boyutlardan et tüketiminin azaltılması ve düşük yağ alt boyutunun beden kütle indeksi ile istatistiksel olarak anlamlı düzeyde negatif ilişkili olduğu belirlenmiştir (p<0,05).

Öğretmenlerin konu ile ilgili eğitim alma durumları sürdürülebilir beslenme ve ekolojik ayak izi farkındalıklarını etkilemektedir. Gelecek nesillerin yetiştirilmesinde büyük öneme sahip olan öğretmenlerin daha fazla bilgilerinin olması için eğitim müfredatları bu konuları kapsayacak şekilde geliştirilebilir.

Anahtar Kelimeler: Ekolojik ayak izi farkındalığı, Sürdürülebilir ve sağlıklı yeme davranışı, Öğretmen

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INTRODUCTION

In many parts of the world, people's needs such as food and energy are increasing, but our planet's ability to meet these needs is increasingly eroded by the excessive use of plants, animals and natural resources. Sustainability is quite important for the uninterrupted continuation of life. Economy, society and environment constitute three important dimensions of sustainability.[1] Environmental sustainability is only possible by protecting natural resources, achieving sustainable urbanization, reducing environmental pollution, increasing the use of renewable energy sources, recycling waste and minimizing the ecological footprint.[2,3] Ecological footprint is defined as the ecological impact caused by human activities such as agriculture, fishing, animal husbandry and infrastructure construction. A high ecological footprint index is associated with high consumption of natural resources that have a negative impact on the environment.[4]

Globally, food systems contribute significantly to environmental degradation, negatively impacting the health of the planet. Food systems are responsible for significant amounts of fresh water use and greenhouse gas emissions. As population growth and other trends continue to increase, the environmental footprint of the global food systems is expected to intensify, with potentially irreversible consequences.[5] Therefore, adopting a production system that is beneficial to nature and opting for healthy, sustainable nutrition helps prevent food losses and protect the food, nature and life of today and tomorrow.[6]

Adopting sustainable diets is a primary requirement for a sustainable life. In the Biodiversity and Sustainable Diets Symposium organized by the Food and Agriculture Organization (FAO) in 2010, sustainable nutrition was defined as "diets with low environmental impacts that contribute to food and nutritional security for healthy life in present and future generations".[7] Sustainable and healthy diets are accepted as nutritional models that support health and well-being and have low environmental impact, are economical, accessible, safe, equitable and culturally acceptable. Sustainable healthy diets aim to ensure optimum growth and development of all individuals and to support functionality and physical, mental and social well-being at all stages of life for present and future generations. In addition, sustainable healthy nutrition contributes to the prevention of malnutrition, reduces the risk of noncommunicable diseases related to diet and supports the protection of biodiversity and global well-being.[8] While food choices directly affect health, nutrition in general also affects the environment.[9,10]

Education is a critical part of creating changes in conscious production, consumption and disposal systems. However, research shows that traditional, information-intensive teaching about sustainability alone does not motivate behavior change and a transition to sustainability. Schools provide an ideal environment for developing sustainable social norms because of the many opportunities teachers have to model and positively reinforce sustainable behaviors.[11,12] The importance of education was emphasized in the European Commission's Brussels 2001 report, stating that ''the education system has a vital role in providing a better understanding of the purpose of sustainable development. The education system promotes behavior change by developing a sense of individual and collective responsibility''.[13] Teachers' nutritional behaviors shape children's food intake and eating behaviors. Therefore, teachers' understanding and implementation of sustainable and healthy nutritional behaviors facilitates children's development of healthy eating patterns and making healthy choices.[14]

When the literature is examined, the ecological footprint awareness of teachers or teacher candidates in different branches has been examined separately, but the differences between them have not been determined.[15, 16] In addition, no study has been found on teachers' sustainable eating behaviors, which are a part of sustainability. It has been reported

that biology teachers generally have high ecological footprint awareness, but their scores in the food sub-dimension are at a moderate level.[17] In another study, it was stated that science and technology teacher candidates have a moderate ecological footprint awareness, but they received the lowest score from the food sub-dimension.[18]

For environmental sustainability and sustainable nutrition to take place in society, individuals must first become aware of this issue. In this context, teachers who are involved in the education and training function, who ensure the raising of conscious generations and who have significant effects on society have a major role. The aim of this study is to determine the sustainable and healthy eating behaviors and awareness for reducing ecological footprint of teachers, who are the most important professional group that will create sustainability awareness in future generations.

MATERIALS AND METHODS

Universe and Sample of the Research

The universe of the study consists of teachers in Turkey. The sample of the study was calculated using the Power Analysis and Sample Size (PASS) Package Program, with an effect size of 0.2, a type 1 error level of α=0.05 and a type 2 error level of β=0.05, and the power of the test was taken as 1-β=0.95. Accordingly, a 10% margin of error was added to the number calculated with the power analysis, and it was determined that at least 270 individuals who met the inclusion criteria should participate in the study.

The collection of research data was conducted on the internet via the online survey link sent to the participants. The surveys were delivered to the participants via social media tools. The volunteers who agreed to participate in the study were asked to fill out a survey form consisting of three sections. The survey included individual characteristics in the first section, a sustainable and healthy nutrition behavior scale in the second section, and an ecological footprint awareness scale in the third section. Before starting the survey, individuals were asked to approve the voluntary consent form.

The participants' anthropometric measurements (height and body weight) were taken based on their declarations, and their body mass index (BMI) [body weight/(height)^2] was calculated from these measurements. Individuals are divided into four classes according to the World Health Organization classification: underweight (<18.5 kg/m^2), normal (18.5-24.9 kg/m^2), overweight (25-29.9 kg/m^2) and obese (≥30 kg/m^2).[19]

Data Collection Tools

To assess the sustainable and healthy nutritional behaviors of individuals, the Sustainable and Healthy Eating (SHE) Behaviors Scale, developed by Zakowska-Biemans et al. (2019) and validated in Turkish by Köksal et al. (2023), was used. This scale consists of 34 items and 8 factors: Healthy and Balanced Nutrition, Quality Signs (Local and Organic), Reducing Meat Consumption, Local Food, Low Fat, Avoiding Food Waste, Animal Welfare and Seasonal Foods.[20,21] The questions in the scale were evaluated with a Likert-type scale and participants were expected to mark each item as never, very rarely, rarely, sometimes, often, very often or always. Never = 1 and Always = 7 points. As the total score and sub-dimension scores increase, it shows that sustainable nutritional behaviors are high.

Individuals' awareness of their ecological footprint was determined by the Awareness scale for reducing ecological footprint (ASREF) developed by Tekindal et al. (2021) and whose validity and reliability in Turkish were made.[22] The Likert-type, five-point scale consists of six sub-dimensions, namely energy, being within the scope of the law, recycling, transportation, water consumption and food, and a total of 30 questions. It is determined that awareness levels are high as the total and sub-dimension scores are high.

Ethical Aspect of the Research

Ethical permission for this study was obtained from Burdur Mehmet Akif Ersoy University Non-Interventional Clinical Research Ethics Committee (Decision No: GO 2023/214). Permission was obtained from the scale developers for the use of all scales. This study was supported by the Scientific and Technological Research Council of Turkey (TUBITAK)-2209-A University Students Research Projects Support Program (Project no:1919B012308075).

Statistical Analysis

Data analysis was performed using Statistical Pacage for Social Sciences (SPSS)-20.0 statistical package program. The suitability of variables for normal distribution was examined using Kolmogorov-Smirnov test. Body mass index, sustainable and healthy nutrition scale total score and sub-dimensions score, ecological footprint awareness scale total score and sub-dimensions score are shown with mean±standard deviation. The evaluation of scale scores by gender of teachers was analysed using Mann-Whitney U test while evaluation by branches was analysed using the Kruskal Wallis test. Statistical relationship between age and BMI and SHE behavior scale and ASREF was determined using Spearman Correlation Coefficient. All statistical tests were evaluated at $p<0.05$ significance level.

RESULTS AND DISCUSSION

This study was conducted with 270 teachers ages of 21-65 (37.0±9.0 years) with an average of 13.0±9.0 years in the profession. 175 (64.8%) of the participants were female and 95 (35.2%) were male teachers. The majority of the teachers (71.4%) were married and mostly resided in the city center (63.3%). When the teachers were divided into groups according to their branches, it was determined that 29.3% were in numerical, 24.4% in verbal, 23.0% in basic education, 14.4% in language and art, and 8.9% in sports (Table 1).

The teachers' SHE behavior scale total score average was 4.1±1.15 and no significant difference was found according to gender ($p>0.05$). In similar studies, it was reported that the average SHE behavior scale scores of adult individuals were 4.0±0.97 and 4.1±0.90 with no significant difference by gender. The lowest score was obtained from the reduction of meat consumption and local foods sub-dimensions.[23,24] In another study, it was reported that the lowest score was in the reduction of meat consumption and the highest average score was in the avoidance of food waste sub-dimension.[20] In this study, it was determined that the highest average score in the SHE behavior scale sub-dimensions was in avoidance of food waste (4.7±1.49), the lowest scores were in the reduction of meat consumption and local foods sub-dimensions for both female and male (Table 2). In addition to being the lowest score in both genders, the score for reducing meat consumption was found to be higher in female (3.7±1.57) than in male (3.2±1.64) ($p=0.009$). No significant difference was found in terms of other sub-dimensions according to gender ($p>0.05$) (Table 2).

Table 1. Sociodemographic Characteristics of Teachers

	N	%
Gender		
Female	175	64.8
Male	95	35.2
Marital Status		
Married	192	71.4
Single	77	28.6
Where does the province reside		
Provincial center	171	63.3
District	87	32.2
Country/village	12	4.4
Branch		
Basic education	62	23.0
Numerical field	79	29.3
Verbal field	66	24.4
Language and art	39	14.4
Sports	24	8.9
Age (years) ($\bar{x}$±SD)	37.0±9.00	
Years in the profession ($\bar{x}$±SD)	13.0±9.00	

$\bar{x}$: Mean, SD: Standard deviation

Table 2. Teachers' Sustainable and Healthy Eating Behaviors and Awareness Scale for Reducing Ecological Footprint by Gender

	Female	Male	Total	
	$\bar{x}$±SD	$\bar{x}$±SD	$\bar{x}$±SD	p
SHE Behaviors Scale Total Score	4.2±1.11	4.0±1.22	4.1±1.15	0.298
Healthy and balanced diet	4.5±1.25	4.4±1.43	4.5±1.31	0.816
Quality marks (local and organic)	4.4±1.29	4.3±1.43	4.4±1.33	0.908
Reducing meat consumption	3.7±1.57	3.2±1.64	3.5±1.61	**0.009**
Local food	3.5±1.49	3.5±1.47	3.5±1.48	0.811
Low fat	4.4±1.55	4.3±1.81	4.4±1.65	0.634
Avoiding food waste	4.7±1.45	4.8±1.57	4.7±1.49	0.607
Animal welfare	4.1±1.69	3.9±1.66	4.0±1.68	0.211
Seasonal foods	4.2±1.19	4.0±1.43	4.1±1.23	0.232
ASREF Scale Total Score	4.0±0.81	4.0±1.00	3.9±0.88	0.331
Energy	4.2±0.88	4.2±1.05	4.2±0.94	0.557
Legal assessment	4.4±0.92	4.3±1.11	4.4±0.99	0.388
Recycling	3.8±1.00	3.8±1.20	3.8±1.08	0.388
Transportation	3.3±1.12	3.5±1.15	3.4±1.13	0.058
Food	4.0±0.95	3.9±1.06	4.0±0.99	0.611
Water consumption	3.8±1.00	3.8±1.09	3.8±1.03	0.541

$\bar{x}$: Mean, SD: Standard deviation, SHE: Sustainable and Healthy Eating, ASREF: Awareness for Reducing Ecological Footprint

In this study, the fact that most of the teachers (63.3%) lived in the city center may have made it difficult to access local products. One of the United Nations Sustainable Development Goals is to 'end hunger, ensure food security and quality nutrition, and promote sustainable agriculture'.[25] It has been reported that supporting short food supply chains can be one of the solutions to achieve this goal. Short food supply chains are considered to be the driving forces of sustainable development because they increase sustainability in all its dimensions, reduce economic uncertainties, ensure fairness and trust between consumers and producers, and minimize pollution. Short supply chains are often associated with the concepts of 'local food' and 'local food systems'.[26] Therefore, awareness is needed to increase interest in the consumption of local products.

According to the Turkey Nutrition and Health Survey, 24.5% of male between the ages of 19-64 consume beef, 11.5% lamb/mutton, 33.2% chicken and 9.9% fish 2-3 times a week. In female, 19.5% consume beef, 7.2% lamb/mutton, 25.2% chicken and 7.3% fish 2-3 times a week. The average daily red meat consumption of male is 52.2±59.37 g, while that of female is 28.9±38.95 g.[27] Considering the nutritional habits of our country, it is expected to receive a low score from reducing meat consumption. However, it is very important to increase teachers' awareness on this issue to improve sustainability and health. It has been reported that a nutritional model that is predominantly plant-based and reduces meat consumption both improves health outcomes (reduction in cardiovascular risk and obesity) and has less impact on the environment (reduction in greenhouse gas emissions, land and irrigation water use).[28]

The teachers' total ASREF score was 3.9±0.88. It was determined that the lowest sub-dimension score was in transportation and then recycling and water consumption, and there was no significant difference in the total score and sub-dimensions according to gender ($p>0.05$) (Table 2). Similarly, in a study conducted in Turkey, it was reported that the average ASREF of adult individuals was 3.9±0.52, there was no significant difference according to gender, and the lowest sub-dimension scores were in transportation and then recycling and water consumption.[24] Similar results were obtained in another study. The study also evaluated the ecological footprints of individuals, and it was reported that 60.8% had a moderate ecological footprint, while 4.9% had a high level.[29] Environmental sustainability is possible by

protecting natural resources, reducing environmental pollution, increasing the use of renewable energy sources, reducing resource use, recycling waste and minimizing the ecological footprint.[3]

When the total scores of SHE behavior scale were evaluated according to the branch, it was determined that it was higher in the basic education (4.5±1.15) and sports (4.2±1.32) branches than in the verbal (4.0±1.07), language and arts (3.9±1.13) and numerical (4.0±1.13) branches (p=0.031). In the sub-dimensions, the healthy and balanced nutrition was found to be higher in the basic education and sports branches, while the low fat and food waste avoidance sub-dimensions were found to be higher in the basic education branch than in the others (p<0.05) (Table 3). When the levels of receiving nutrition education in these branches were evaluated, it was found that there was a similar trend, with the highest rate in the basic education and sports branches (p<0.001). The total score of the SHE behavior scale of the teachers was found to be higher in those who received nutrition education (4.4±1.15) than in those who did not (4.0±1.12) (p=0.001). When looking at the sub-dimensions, it was determined that the healthy and balanced diet, quality signals, reduction of meat consumption, local food, low fat and seasonal foods sub-dimensions were higher in those who received education than those who did not (p<0.05) (Table 4). This situation shows that nutritional education can affect sustainable and healthy eating behavior. The healthy and balanced diet sub-dimension includes questions about healthy nutrition such as avoiding sugary drinks, limiting salt consumption, choosing additive-free and natural foods and foods with high nutritional value, containing vitamins and minerals.[20]

It has been reported that sustainable nutrition education should include the transition to a plant-based diet, reducing food waste, reducing ultra-processed food consumption, participating in local food systems, and choosing sustainable seafood.[30] A study has determined that nutrition education has an effect on sustainable and healthy eating behaviors. It has been stated that the mean scores of the healthy and balanced nutrition, seasonal food, and low fat sub-dimensions in the sustainable and healthy eating behaviors scale are significantly higher in students studying in the nutrition and dietetics department than in other students.[31]

Table 3. Sustainable and Healthy Eating Behaviors and Awareness for Reducing Ecological Footprint according to Their Branches

	Basic Education ($\bar{x}$±SD)	Verbal ($\bar{x}$±SD)	Language and Arts ($\bar{x}$±SD)	Numerical ($\bar{x}$±SD)	Spors ($\bar{x}$±SD)	p
SHE Behaviors Scale Total Score	4,5±1,15[a]	4,0±1,07[b]	3,9±1,13[b]	4,0±1,13[b]	4,2±1,32[ab]	**0,031**
Healthy and balanced diet	4,9±1,29[a]	4,2±1,23[b]	4,3±1,29[b]	4,4±1,28[b]	4,5±1,56[ab]	**0,044**
Quality marks (local and organic)	4,7±1,33	4,2±1,28	4,3±1,27	4,2±1,34	4,6±1,50	0,099
Reducing meat consumption	4,0±1,72	3,3±1,57	3,5±1,67	3,3±1,54	3,3±1,34	0,060
Local food	3,6±1,65	3,6±1,47	3,3±1,56	3,3±1,31	3,9±1,44	0,398
Low fat	5,0±1,64[a]	4,1±1,55[b]	4,2±1,72[b]	4,3±1,57[b]	4,2±1,74[b]	**0,011**
Avoiding food waste	5,4±1,39[a]	4,5±1,39[b]	4,4±1,61[b]	4,6±1,39[b]	4,6±1,74[b]	**0,002**
Animal welfare	4,3±1,63	4,0±1,63	3,5±1,65	4,0±1,68	4,3±1,90	0,197
Seasonal foods	4,3±1,29	4,1±1,04	3,9±1,22	4,1±1,31	4,1±1,39	0,421
ASREF Scale Total Score	4,1±0,92	3,9±0,88	4,0±0,62	3,9±0,91	3,8±1,03	0,243
Energy	4,3±0,99	4,1±0,94	4,3±0,73	4,2±0,96	4,1±1,11	0,431
Legal assessment	4,5±1,06	4,4±0,98	4,5±0,72	4,4±1,03	4,2±1,12	0,588
Recycling	3,9±1,12	3,7±1,12	3,9±0,79	3,9±1,11	3,6±1,17	0,538
Transportation	3,5±1,22	3,2±1,11	3,4±1,00	3,4±1,13	3,5±1,20	0,526
Food	4,2±0,95	3,9±1,00	4,0±0,72	3,9±1,08	4,0±1,11	0,187
Water consumption	4,0±1,08	3,7±1,01	3,7±0,91	3,8±1,03	3,6±1,11	0,067

Differences between groups with different superscripts in the same row are statistically significant (p<0.05). SHE: Sustainable and Healthy Eating, ASREF: Awareness for Reducing Ecological Footprint

Considering the importance of nutrition education on the health of individuals and the sustainable environment, it is of great importance for public health that teachers, who are the fundamental building blocks of education.

No statistically significant difference was found in terms of the total score and sub-dimensions of ASREF according to the teachers' branch (Table 3). In a study conducted with classroom teachers, it was reported that the ecological footprint awareness score was 3.90±0.43 and the lowest score was obtained from the food and transportation and harbouring sub-dimensions, and there was no significant difference according to gender.[16] In studies conducted with teacher candidates, it was reported that the ecological footprint levels of awareness classroom teacher candidates, Turkish and science teacher candidates were at medium and high levels.[18,32,33] The results of the studies can be explained by the fact that they were conducted with university students and their knowledge is fresh since their education is still ongoing. It may cause teachers who have been in the profession for a long time to forget the concepts of sustainability and related issues over time. For this reason, teachers need to be supported with in-service training on issues such as sustainable environment and nutrition.

Table 4. Distribution of Scale Scores by Status of Receiving Education on Nutrition and Sustainability

	Nutrition education					**Sustainability education**				
	Yes		**No**			**Yes**		**No**		
Branch group	**n**	**%**	**n**	**%**	**p**	**n**	**%**	**n**	**%**	**p**
Basic Education	27	43.5	35	56.5		17	27.4	45	72.6	
Verbal	17	25.8	49	74.2		7	10.6	59	89.4	
Language and Arts	4	10.3	35	89.7	**<0.001**	4	10.3	35	89.7	**<0.001**
Numerical	27	34.2	52	65.8		19	24.1	60	75.9	
Spors	20	83.3	4	16.7		12	50.0	12	50.0	
Total	95	35.2	175	64.8		59	21.9	211	78.1	
SHE Behavior Scale Total Score	4.4±1.15		4.0±1.12		**0.001**	4,3±1.30		4.1±1.11		0.311
Healthy and balanced diet	4.8±1.35		4.3±1.26		**0.001**	4,5±1.54		4.5±1.24		0.765
Quality marks (local and organic)	4.7±1.32		4.2±1.31		**<0.001**	4,6±1.38		4.3±1.32		0.106
Reducing meat consumption	3.8±1.55		3.4±1.63		**0.037**	3,6±1.63		3.5±1.61		0.495
Local food	3.8±1.50		3.3±1.44		**0.008**	3,9±1.59		3.4±1.43		**0.024**
Low fat	4.7±1.73		4.2±1.57		**0.004**	4,4±1.74		4.4±1.62		0.964
Avoiding food waste	5.0±1.43		4.6±1.51		0.074	4,8±1.57		4.7±1.47		0.741
Animal welfare	4.3±1.75		3.9±1.62		0.053	4,3±1.70		3.9±1.67		0.162
Seasonal foods	4.3±1.26		4.0±1.21		**0.009**	4,1±1.29		4.1±1.23		0.782
ASREF Scale Total Score	3.9±0.91		4.0±0.87		0.980	4,0±0.91		4.0±0.88		0.499
Energy	4.2±0.98		4.3±0.93		0.648	4,3±1.06		4.2±0.91		0.103
Legal assessment	4.4±0.99		4.4±0.99		0.703	4,4±1.06		4.4±0.97		0.945
Recycling	3.7±1.16		3.9±1.03		0.392	3,9±1.05		3.8±1.09		0.703
Transportation	3.4±1.17		3.4±1.11		0.765	3,4±1.07		3.4±1.15		0.964
Food	4.1±1.01		4.0±1.04		0.213	4,0±0.97		4.0±1.00		0.737
Water consumption	3.8±1.03		3.8±1.04		0.791	3,8±1.03		3.8±1.04		0.653

SHE: Sustainable and Healthy Eating, ASREF: Awareness for Reducing Ecological Footprint

Environmental education programs in the world have reported that environmental education, global goals and values are given at the first level of primary education, especially in all European Union countries.[34] In a study examining the views of classroom teacher candidates on education for sustainable development (ESD), reported that ESD should be given starting from the pre-school period. Teachers stated that sustainability should be taught from a multidisciplinary perspective within different courses.[35]

In another study, classroom teachers stated that ecological footprint practices should start from primary school. It was determined that the practices carried out by teachers to reduce

the ecological footprint cover the components of the ecological footprint. It has been reported that the activities contribute to the development of environmental awareness, a sense of responsibility and cooperation, a love of nature and animals, and a sense of protection and ownership in children.[36]

In this study, the majority of teachers in the basic education branch group are classroom teachers, and the rates of taking courses on both nutrition and sustainability are high.

No significant difference was found in the total score and sub-dimensions of the teachers' ecological footprint awareness scale according to their education status on nutrition ($p>0.05$). Except for the local food sub-dimension ($p=0.024$), no significant difference was found in the scores and sub-dimensions of the sustainable healthy nutrition scale and ecological footprint awareness scale according to their education status on sustainability ($p>0.05$) (Table 4). The small number of people taking the lesson may have affected this situation, and since it is not known how much sustainability and ecological footprint are addressed in the nutrition lesson, it is thought that a broader course program is needed for these subjects and the number of teachers taking lesson on this subject should increase.

In a study conducted with classroom teacher candidates in Spain, it was reported that when individuals were given multidisciplinary education on ecological agriculture and healthy nutrition, creating green areas and cities, and water and energy consumption, the attitudes of teachers candidate measured using the ecological footprint changed after the training.[12] In order for future generations to be able to live in a healthy world, it is of great importance to be a suitable role model for children from an early age and to organize educational environments for them where sustainability elements are taken into account.

The SHE behavior score was found to be negatively correlated with BMI, although not statistically significant (Table 5). The same results were obtained in a similar study.[23] It was determined that the reduction of meat consumption ($p=0.013$) and the low fat ($p=0.025$) sub-dimension were negatively correlated with BMI.

In a study, it was reported that the amount of dietary fat intake, the percentage of energy from fat, and high-fat diet (>30% of energy) were positively correlated with body weight, BMI, overweight, and obesity risk in both genders ($p<0.001$).[37] It has been reported that high consumption of red meat and processed meat products is associated with obesity independently of other negative health behaviors.

Animal foods generally have a greater environmental impact than plant-based foods, and among these, red meat, which is mostly ruminant meat, constitutes the greatest climate burden. Therefore, it has been stated that changing unhealthy diets with high ecological load can help reduce both health outcomes and the effects of climate change.[38] In light of this information, it was expected that individuals who did not show an attitude towards reducing dietary fat and meat consumption would have higher BMI.

Similar to the recent studies, a positive statistically significant relationship was found between the ecological footprint awareness scale score and age ($p=0.016$).[29,39] No statistically significant relationship was found between BMI and the ecological footprint awareness scale score (Table 5). Yardimci and Demirer (2022) and Mengi-Çelik et al. (2024) also reported that they obtained similar results in their studies.[39,40] When the literature was examined, no studies were found on the sustainable healthy eating behaviors and ecological footprint awareness of teachers in different branches, and this study was the first in this field.

Table 5. Relationship between Age and BMI and Sustainable and Healthy Eating Behaviors and Ecological Footprint Awareness

	BMI (kg/m^2)		Age (years)	
	r	**p**	**r**	**p**
SHE Behavior Scale Total Score	-0.067	0.275	0.171	**0.005**
Healthy and balanced diet	-0.050	0.411	0.219	**<0.001**
Quality marks (local and organic)	-0.011	0.851	0.179	**0.003**
Reducing meat consumption	-0.151	**0.013**	0.071	0.251
Local food	0.021	0.733	0.089	0.147
Low fat	-0.136	**0.025**	0.118	0.054
Avoiding food waste	0.048	0.435	0.100	0.103
Animal welfare	-0.107	0.079	0.134	**0.029**
Seasonal foods	0.011	0.855	0.193	**0.002**
ASREF Scale Total Score	-0.008	0.898	0.148	**0.016**
Energy	-0.001	0.991	0.165	**0.007**
Legal assessment	-0.031	0.615	0.059	0.342
Recycling	0.027	0.656	0.121	**0.048**
Transportation	-0.047	0.442	0.004	0.952
Food	-0.044	0.471	0.121	**0.049**
Water consumption	-0.001	0.989	0.169	**0.006**

BMI: Body Mass Index, SHE: Sustainable and Healthy Eating, ASREF: Awareness for Reducing Ecological Footprint

CONCLUSION AND RECOMMENDATIONS

The basic principle of sustainability is to meet the needs of today while also protecting the needs of future generations. The teachers, who are of great importance in raising future generations, should have knowledge about both sustainability and healthy nutrition and should apply these in their own lives and transfer them to their students. The fact that different branches have different educational curricula and whether or not they have received education in nutrition and sustainability affects teachers' knowledge and attitudes on these issues. It has been determined that very few teachers have received education on sustainability. Therefore, arrangements are recommended to include both sustainable nutrition and environmental sustainability-related issues in the education-training curricula of all teacher candidates.

REFERENCES

1. Wackernagel, M, Hanscom L. and Lin D. (2017). ‘‘Making the Sustainable Development Goals Consistent with Sustainability’’. Frontiers in Energy Research, 5, 18. http://doi.org/10.3389/fenrg.2017.00018.

2. Galli, A, Wackernagel, M, Iha, K. and Lazarus, E. (2014). ‘‘Ecological Footprint: Implications for Biodiversity’’. Biological Conservation,; 173, 121-132. https://doi.org/10.1016/j.biocon.2013.10.019.

3. Wackernagel, M, Lin, D, Evans, M, Hanscom, L. and Raven, P. (2019). ‘‘Defying the Footprint Oracle: Implications of Country Resource Trends’’. Sustainability, 11 (7), 2164. https://doi.org/10.3390/su11072164.

4. Zambrano-Monserrate, M.A, Ruano, M.A, Ormeño-Candelario, V. and Sanchez-Loor, D.A. (2020). ‘‘Global Ecological Footprint and Spatial Dependence Between Countries’’. Journal of Environmental Management, 15 (272), 111069. http://doi.org/10.1016/j.jenvman.2020.111069

5. James Martin, G, Baird, D.L, Hendrie, G.A, Bogard, J, Anastasiou, K. and Brooker, P.G. et al. (2022). ‘‘Environmental Sustainability in National Food-Based Dietary Guidelines: A Global Review’’. The Lancet Planetary Health, 6 (12), e977-e986. http://doi.org/10.1016/S2542-5196(22)00246-7.

6. Rampalli, K.K, Blake, C.E, Frongillo, E.A. and Montoya, J. (2023). ‘‘Why Understanding Food Choice is Crucial to Transform Food Systems for Human and Planetary Health’’. BMJ Global Health, 8 (5), e010876. https://doi.org/10.1136/bmjgh-2022-010876.

7. Food and Agriculture Organization. (2010). ‘‘Sustainable Diets and Biodiversity Directions and Solutions for Policy, Research and Action’’. Accessed: https://www.fao.org/4/i3004e/i3004e.pdf. (Access date: 29.09.2024).

8. Food and Agriculture Organization and World Health Organization (2019). ‘‘Sustainable healthy diets- Guiding principles’’. Accessed: https://www.who.int/publications/i/item/9789241516648. (Access date: 29.09.2024).

9. Dornhoff, M, Hörnschemeyer, A. and Fiebelkorn, F. (2020). ‘‘Students’ Conceptions of Sustainable Nutrition’’. Sustainability, 12(13), 5242. http://doi.org/10.3390/su12135242.

10.Willett, W, Rockström, J, Loken, B, Springmann, M, Lang, T, Vermeulen, S. and Murray, C.J. (2019). ‘‘Food in the Anthropocene: The EAT–Lancet Commission on Healthy Diets from Sustainable Food Systems’’. The Lancet, 393 (10170), 447-492. http://doi.org/10.1016/S0140-6736(18)31788-4.

11. Redman, E. and Redman, A. (2014). ‘‘Transforming Sustainable Food And Waste Behaviors by Realigning Domains of Knowledge in Our Education System’’. Journal of Cleaner Production, 64, 147-157.

http://doi.org/10.1016/j.jclepro.2013.09.016.

12. Fernández, M, Alférez, A, Vidal, S, Fernández, M. Y. and Albareda, S. (2016). ''Methodological Approaches to Change Consumption Habits of Future Teachers in Barcelona, Spain: Reducing Their Personal Ecological Footprint''. Journal Of Cleaner Production, 122, 154-163. http://doi.org/10.1016/j.jclepro.2016.02.026.

13. Europian Council. (2001). ''A Sustainable Europe for A Better World: A European Union Strategy for Sustainable Development Communication from The Commission, Brussels''. Accessed: https://aei.pitt.edu/42719/1/COM_(2001)_264_final.pdf. (Access date: 29.09.2024).

14. Sleet, K, Sisson, S.B, Dev, D.A, Love, C, Williams, M.B, Hoffman, L.A. and Jernigan, V.B.B. (2020). ''The Impact of Responsive Feeding Practice Training on Teacher Feeding Behaviors in Tribal Early Care and Education: The Food Resource Equity and Sustainability for Health (FRESH) Study''. Current Developments in Nutrition, 4 (Supplement 1), 23-32. http://doi.org/10.1093/cdn/nzz105.

15. Weber, A, Büssing, A.G, Jarzyna, R. and Fiebelkorn, F. (2020). ''Do German Student Biology Teachers Intend to Eat Sustainably? Extending The Theory of Planned Behavior with Nature Relatedness and Environmental Concern''. Sustainability, 12 (12), 4909. https://doi.org/10.3390/su12124909.

16. Demirkol M. and Aslan, İ. (2021). ''Ecological Footprint Awareness Levels of Classroom Teachers''. Journal of Computer and Education Research, 9 (18), 904-928. https://doi.org/10.18009/jcer.901915.

17. Çıkrık, S. and Yel M. (2019). ''Biyoloji Öğretmen Adaylarının Ekolojik Ayak İzi Farkındalık Düzeylerinin Belirlenmesi''. Social Sciences, 14 (6), 2999-3008. https://doi.org/10.29228/TurkishStudies.39703

18. Yıldız, E. (2014). ''Fen ve Teknoloji Öğretmen Adaylarının Ekolojik Ayak Izi Farkındalık Düzeylerinin Belirlenmesi ve Değerlendirilmesi''. Yüksek Lisans Tezi. Gazi Üniversitesi Eğitim Bilimleri Enstitüsü, Ankara.

19. World Health Organization. (2010). ''Body Mass Index-BMI''. Accessed: https://www.who.int/europe/newsroom/fact-sheets/item/a-healthy-lifestyle---who-recommendations. (Access date: 27.09.2024).

20. Żakowska Biemans, S, Pieniak, Z, Kostyra, E. and Gutkowska, K. (2019). ''Searching for a Measure Integrating Sustainable and Healthy Eating Behaviors''. Nutrients, 11 (1), 95. https://doi.org/10.3390/nu11010095.

21. Köksal, E, Bilici, S, Çıtar Dazıroğlu, M.E. and Erdoğan Gövez, N. (2023). ''Validity and reliability of the Turkish version of the Sustainable and Healthy Eating Behaviors Scale''. British Journal of Nutrition, 129 (8), 1398-1404. https://doi.org/10.1017/S0007114522002525.

22. Tekindal, M.A, Zabzun, G, Özel, Z, Demirsöz, M. and Tekindal, M. (2021). ''Awareness Scale for Reducing Ecological Footprint: A Validity and Reliability Study''. European Journal of Science and Technology, (27), 439-445. https://doi.org/10.31590/ejosat.944221

23. Yeşildemir, Ö. (2023). ''Yetişkin Bireylerde Sürdürülebilir ve Sağlıklı Yeme Davranışları ile E-Sağlıklı Beslenme Okuryazarlığı ve Beslenme Bilgi Düzeyi Arasındaki İlişkinin Değerlendirilmesi''. Celal Bayar Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi, 10 (3), 250-260. https://doi.org/10.34087/cbusbed.1307125.

24. Kocaadam-Bozkurt, B. and Bozkurt, O. (2023). ''Relationship Between Adherence to The Mediterranean Diet, Sustainable and Healthy Eating Behaviors, and Awareness of Reducing The Ecological Footprint''. International Journal of Environmental Health Research, 33 (4), 430-440. https://doi.org/10.1080/09603123.2023.2172384.

25. United Nations (2015). ''Transforming Out World: The 2030 Agenda for Sustainable Development''. Accessed: https://sdgs.un.org/2030agenda. (Access date: 27.09.2024).

26. Cappelli, L, D'Ascenzo, F, Ruggieri, R. and Gorelova, I. (2022). ''Is Buying Local Food A Sustainable Practice? A Scoping Review of Consumers' Preference for Local Food''. Sustainability, 14 (2), 772. https://doi.org/10.3390/su14020772.

27. Turkiye Beslenme ve Sağlık Araştırması (TBSA), T.C. Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü, Yayın no:1132, Ankara, 2019.

28. Ruini, L.F, Ciati, R, Pratesi, C.A, Marino, M, Principato, L. and Vannuzzi, E. (2015). ''Working toward Healthy and Sustainable Diets: The Double Pyramid Model Developed by The Barilla Center for Food and Nutrition to Raise Awareness about The Environmental and Nutritional Impact of Foods''. Frontiers in Nutrition, 2, 9. https://doi.org/10.3389/fnut.2015.00009.

29. Ünal, M. and Ünal, F. (2022). ''Ecological Footprint Reduction Behaviors of Individuals in Turkey in The Context of Ecological Sustainability''. Sustainability, 15 (1), 63. https://doi.org/10.3390/su15010063.

30. Bastian, G.E, Buro, D. and Palmer Keenan, D.M. (2021). ''Recommendations for Integrating Evidence-Based, Sustainable Diet Information into Nutrition Education''. Nutrients, 13 (11), 4170. https://doi.org/10.3390/nu13114170.

31. Yolcuoğlu, İ.Z. and Kızıltan, G. (2022). ''Effect of Nutrition Education on Diet Quality, Sustainable Nutrition and Eating Behaviors Among University Students''. Journal of The American Nutrition Association, 41 (7), 713-719. https://doi.org/10.1080/07315724.2021.1955420.

32. Coşkun, I.Ç. and Sarıkaya, R. (2014). ''Sınıf Öğretmeni Adaylarının Ekolojik Ayak İzi Farkındalık Düzeylerinin Belirlenmesi''. Journal of Turkish Studies, 9 (5), 1761-1787. http://dx.doi.org/10.7827/TurkishStudies.6598.

33. Sivrikaya, Ş. (2018). ''Fen bilgisi ve Türkçe öğretmen adaylarının ekolojik ayak izi farkındalık düzeylerinin belirlenmesi''. Yüksek Lisasns Tezi. Akdeniz Üniversitesi. Eğitim Bilimleri Enstitüsü. Antalya.

34. Stokes, E, Edge, A. and West, A. (2001). ''Environmental Education in The Educational Systems of The European Union''. Synthesis Report Commissioned by the Environment Directorate-General of the European Commission.

35. Uğraş, M. ve Zengin, E. (2019). ''Sınıf Öğretmeni Adaylarının Sürdürülebilir Kalkınma için Eğitim ile İlgili Görüşleri''. Kuramsal Eğitimbilim Dergisi, 12 (1), 298-315. https://doi.org/10.30831/akukeg.442751.

36.Aslan, İ. and Demirkol, M. (2022). ''Classroom Teachers' In-Class Ecological Footprint Awareness Raising Practices''. Kastamonu Education Journal, 30 (3), 633-644. https://doi.org/10.24106/kefdergi. 933901.

37. Wang, L, Wang, H, Zhang, B, Popkin, B.M. and Du, S. (2020). ''Elevated Fat Intake Increases Body Weight and The Risk of Overweight and Obesity Among Chinese Adults: 1991–2015 Trends''. Nutrients, 12 (11), 3272. https://doi.org/10.3390/nu12113272.

38. Sares-Jäske, L, Tapanainen, H, Valsta, L, Haario, P, Männistö, S. and Vaalavuo, M. (2024). ''Meat Consumption and Obesity: A Climate-Friendly way to Reduce Health Inequalities''. Public Health Challenges, 3(1), e163. https://doi.org/10.1002/puh2.163.

39. Mengi Çelik, Ö, Köksal, E, Akpinar, Ş, Kocaadam Bozkurt, B, Erdoğan Gövez, N, Çıtar Dazıroğlu, M.E., Karaçil Ermumcu M.Ş. and Acar Tek, N. (2024). ''Association Between Ecological Footprint Awareness and Health Literacy in Adults: A Population-Based Study from Turkey''. International Journal of Environmental Health Research, 34 (1), 295-304. https://doi.org/10.1080/09603123.2022.2147906.

40. Yardimci, H., and Demirer, B. (2022). ‘‘Is high adaptation to the Mediterranean diet effective in increasing ecological footprint awareness? A cross-sectional study from Turkey’’. Journal of the Science of Food and Agriculture, 102(9), 3724-3729. https://doi.org/10.1002/jsfa.11720.