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ORIGINAL ARTICLE

Predicting Students' Ecological Footprint Awareness Using Sustainability Awareness

Munise Seckin Kapucu[1*], Ahmet Aypay[2] & Burcu Uysal Atalay[3]

[1] Department of Mathematics and Science Education, Eskisehir Osmangazi University, Türkiye.
ORCID: 0000-0002-9202-2703

[2] Graduate School of Education, Nazarbayev University. Kazakhstan
ORCID: 0000-0003-0568-8409

[3] Faculty of Education, Eskisehir Osmangazi University, Türkiye.
ORCID: 0000-0002-3520-4324

Ethical Statement
The authors collected the research data with the permission of Eskişehir Osmangazi University Ethics Committee with the decision numbered E-64075176-050.01.04-2300044529 dated 27.02.2023.

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No conflict of interest is present in the conduction or the reporting of this study.

ABSTRACT

Universities are the stepping stones to shift the mindset of future generations towards a greener and cleaner perspective. It is essential for higher education institutions to integrate the topics of sustainability and reduction of ecological footprint into their curricula. The purpose of this study is to examine the relationship between university students' sustainable development awareness and ecological footprint awareness and to determine whether the sub-dimensions of sustainable development awareness (economy, society, environment) predict ecological footprint awareness. Correlational research design was used in the study. 262 senior students from different faculties of Eskişehir Osmangazi University participated in the study in the spring semester of the 2022-2023 academic year. Ecological Footprint Awareness and Sustainable Development Awareness scales were used as data collection tools. University students' sustainable development awareness was found to be related to their ecological footprint awareness. There were also moderate correlations among ecological footprint awareness (energy, legislation, environment, and food) subdimensions. Finally, these three independent variables together explain approximately 32% of the total variance in ecological footprint.

Keywords: Sustainable development, ecological footprint, higher education, university

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***Corresponding Author:** Prof. Dr. Munise Seckin Kapucu, Department of Mathematics and Science Education, Eskisehir Osmangazi University, Türkiye.
Email: muniseseckin@hotmail.com

INTRODUCTION

The environment is defined as where living and non-living beings exist together, interacting with each other. This interaction is in balance. Since the world's creation, natural disasters have disturbed this balance occasionally, but the natural balance has been restored. Humans have been changing and evolving since their emergence on Earth, changing their environment to suit their goals. With each passing day, humankind explores more and more, making inventions and discoveries. As a result, technology advances. This development gained momentum with the Industrial Revolution after the invention of the electric motor by Michael Faraday. With the Industrial Revolution, the use of fossil fuels increased.

The use of fossil fuels releases some atmospheric gases into the environment. These gases, especially water vapor, methane, carbon dioxide, ozone and others, cause the greenhouse effect. In addition, these gases reflect some of the sun's energy and absorb some of it, reflecting it back to the Earth's surface. This reflection transfers energy to the Earth's surface and controls surface temperature. As the amount of greenhouse gases in the atmosphere increases due to human activities, the greenhouse effect gradually worsens, and the average global temperature rises, called global warming, leading to severe environmental and social problems such as climate change. The greenhouse effect traps the sun's rays in the atmosphere, which in turn traps heat in the atmosphere, leading to global warming. Global warming is defined as an increase in average global temperature caused by increasing greenhouse gases in the atmosphere. The most common greenhouse gases are carbon dioxide, methane, nitrous oxide, and nitrogen oxides, which deplete the ozone. Instead of reflecting energy from the atmosphere outward, these greenhouse gases reflect energy coming from the Earth's surface inward. As a result of this reflection, the Earth's temperature increases. This global warming leads to effects such as rising water levels, less snow and ice, climate change, and increased climate and natural phenomena. Increasing emissions of greenhouse gases from human activities are the primary cause of global warming. Energy production, agriculture, industry, transportation, and deforestation significantly increase greenhouse gas emissions. Steps can be taken to negate global warming, such as reducing greenhouse gas emissions, using renewable energy sources, increasing energy efficiency, and protecting forests. As a result of global warming, the glaciers at the poles are melting, the Earth's freshwater reserves are mixing into the oceans, the life of living creatures at the poles is being endangered, and the ocean's water level has risen. As a result, many land masses are flooded. Drinking water diminishes. Soil fertility declines. The Intergovernmental Panel on Climate Change (IPCC) predicts a temperature increase of 1.1-6.4 degrees in the current century and notes that the projected temperature increase will not be evenly distributed worldwide. The 2007 IPCC report found that a 1-degree increase would put 30 percent of all species at risk of extinction, highlighting that high temperatures will affect the ecosystem (Brown, 2008). The result is the deterioration of the natural balance. In this case, urgent measures must be taken to prevent the natural balance's deterioration and ensure a sustainable world. These measures are explained by the concept of "sustainable development."

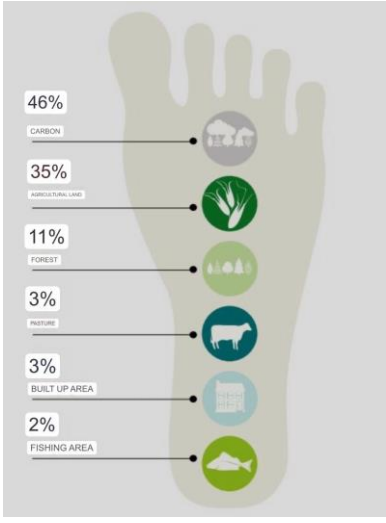
The concept of sustainable development dates back nearly two centuries. The idea of sustainable development was first born in 1713 with Carlowitz's first book on forestry (Keiner, 2005). It was first defined in the Brundtland Report in 1987 as "meeting the needs of the present without compromising the ability of future generations to meet their own needs." It became a primary goal of the European Union (EU) with the Treaty of Amsterdam in 1997 (Altınok et al., 2015). The proposed sustainable development refers to an understanding that preserves the current state of natural resources and works to pass them on to future generations. Preserving natural resources for future generations is one of the fundamental principles of sustainability. According to this idea, we should not forget that natural resources are bequeathed to us by our children (Şahinöz, 2019). The word "sustainability," which comes from the Latin word "sustinere,"

is used in the sense of maintaining, providing, continuing, supporting, and existing (Onions, 1964). Development is defined as "the process of improving the economic, cultural, and environmental conditions of countries, regions, and communities in a locally and socially stable manner; structural development" (Liu et al., 2021). Sustainable development is the approach that production and consumption activities designed to meet people's needs should also consider future generations' needs. According to this approach, production and consumption activities to meet people's needs should not pollute the environment, deplete natural resources, or violate human rights. In order to protect human rights, various measures are taken within the framework of sustainable development. In this context, development projects are designed to consider the needs of all segments of society. For sustainable development, non-renewable energy sources (fossil fuels, etc.) should be phased out, and the use of renewable energy sources should be expanded. Renewable energy sources are classified as hydroelectric, wind, solar, geothermal, and biomass. The difference from fossil fuels is that they are constant, do not run out, and, most importantly, do not cause carbon emissions. With this feature, they are also called "clean energy sources."

Energy requirement increases with the increase in human population. Most of this energy is obtained from fossil fuels. This energy used for production increases carbon emissions. This situation brings the concept of carbon footprint. (Caro, 2018; Oktay et al., 2024). The carbon footprint is an indicator measuring the amount of carbon dioxide (CO2) and other greenhouse gas emissions a person or organization produces through energy use, manufacturing, and waste generation (Bahçeci, 2021). The carbon footprint is usually expressed in metric tons and calculated annually. The carbon footprint can be used to understand the extent of the carbon emissions and to reduce them. For example, calculating a person's or organization's carbon footprint allows them to understand better their energy consumption and the materials they use to manufacture and transport products. This information can help people and organizations take more effective action to reduce carbon emissions. There are many methods and standards for calculating carbon footprints. Examples include the Greenhouse Gas Protocol and the Carbon Trust Standard. These standards define the methods, rules, and processes organizations can use to calculate their carbon footprint. With the worsening environmental problems and the depletion of natural resources, a scale has been developed to raise awareness by calculating each person's carbon footprint to prevent this situation. People can use this scale to calculate their carbon footprint.

In Turkiye's Ecological Footprint Report (2012), the ecological footprint is "the area of biologically productive land and water required to produce the resources consumed and to dispose of the generated waste by an individual, community, or activity under the current resource management and technology." The ecological footprint is measured in global hectares (gha). This includes the infrastructure and the area needed for vegetation that will absorb carbon dioxide (CO2). The ecological footprint is an indicator measuring the extent to which human activities of an individual or community impact the environment. Specifically, it measures the environmental impact of a person's or community's activities, such as energy consumption, production, and waste generation. The ecological footprint typically expresses the annual environmental impact of a person or community in square meters. This indicator can identify the actions people should take to reduce their environmental impact and create a greener lifestyle.

Fig1. Turkiye's Ecological Footprint Components (Source: Turkiye's Ecological Footprint Report, 2012)

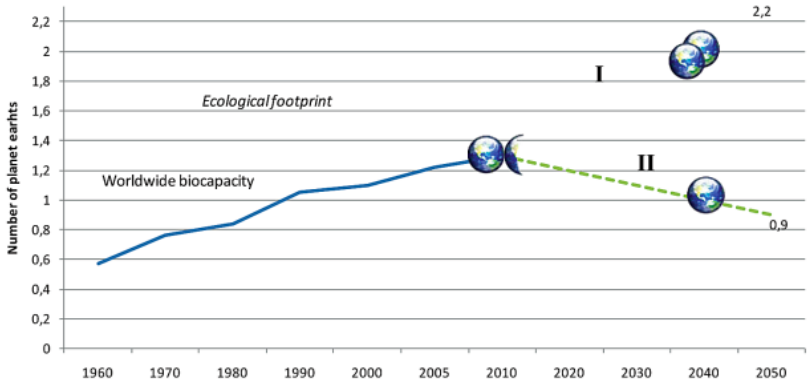


According to Turkiye's Ecological Footprint Report (2012), Turkiye is the country with the highest increase in carbon emissions compared to 1990. The main suggestion for sustainability is to encourage people to increase their awareness of this issue (Turkiye's Ecological Footprint Report, 2012). Environmental issues and awareness should be taught to children from an early age. Being aware of problems, being interested in problems, being sensitive to problems, and being active in problem-solving should be successive elements (Şimşekli et al., 2001). According to the report, this situation can only be avoided if all parts of society act together; public institutions, the private sector, nongovernmental organizations, universities, and other interest groups should work together to address environmental issues. Future generations must be educated to ensure sustainable development and sustainable living (Qablan, 2005).

There is a statistically significant relationship between the ecological footprint and sustainable development (WWF, 2012). The ecological footprint is a concept that measures how much an individual or society depletes natural resources and how much environmental impact it causes (Wackernagel et al., 1999). On the other hand, sustainable development seeks to develop in an environmentally, socially, and economically balanced way, preserving sufficient resources for future generations while meeting the needs of people. Reducing the environmental footprint is vital for sustainable development (Moffatt, 2000). Sustainable development requires using natural resources within environmental limits, and the ecological footprint measures the amount of natural resources used and the environmental impact. For a sustainable future, we must reduce our environmental footprint, use natural resources more efficiently, and reduce our environmental impact (Mızık & Avdan, 2020). Especially today, reducing the carbon footprint, an essential part of sustainable development, is vital in fighting against climate change to minimize environmental impact and leave a healthy world for future generations (Tıraş, 2012) .

The ecological footprint and sustainable development are among the most widely studied topics in any field due to their up-to-dateness. However, it is evident that although studies are being conducted and targets are being set, it is not enough to raise public awareness. The use of resources is still excessive, and it is said that we need at least two more Earths to satisfy our consumption needs (Ruževičius, 2011). Raising people's awareness of these issues is therefore urgent.

Fig2. Comparison of ecological footprint with the Earth's natural resource capacity (Source: Ruževičius, 2011)



Regarding the relevant literature, the number of studies analyzing the relationship between ecological footprint awareness and sustainable development awareness in education is limited. However, when considered separately, sustainable development and ecological footprint are among the most widely studied topics in conceptual terms. Studies on sustainable development have been conducted on the "2030 Sustainable Development Goals" published by the United Nations (Bogers et al., 2022; Goubran et al., 2023; Serafini et al., 2022) and related to the environment and natural resources (Khan et al., 2023).

Fig3. United Nations' 2030 Sustainable Development Goals (Source: United Nations, 2015).

There are studies on the concept of sustainable development at all levels of education with students from different educational levels (Aleixo et al., 2021; Dudek, 2022; Flament & Kovesi, 2020; Günther, 2022; Joy & Dhiksha, 2022; Nousheen et al., 2019). In addition, pre-service teachers from different fields (science, social studies, physical education, preschool) have been cooperated with (Çobanoğlu & Türer, 2015; Uğraş & Zengin, 2019). Regarding the studies on sustainable development in higher education (Giannetti, 2023; Novo-Corti et al., 2018; Rodríguez-Solera &, Silva-Laya; 2017; Verbitskaya, 2002; Wee et al., 2017), the study by Novo-Corti et al. (2018), which tried to show how economics courses offered in higher education institutions can influence sustainable development in general and Romania's

sustainable development in particular, showed that the higher education system in the field of economics in Romania has started to take small steps to adapt to environmental demands. Research by Rodríguez-Solera (2017), which presents the experience in a Central American university that has successfully developed a sustainability-oriented education model, found that the majority of agronomists studying at EARTH University have positive economic, social, and environmental impacts that appear to be closely linked to their university education. A study by Verbitskaya (2002) focused on attempts to introduce sustainable development education into the curriculum of one of the largest Russian universities. Over the past decade, 14 out of 20 faculties at St. Petersburg State University have introduced mandatory courses on sustainable development or revised existing ones. Russia emphasized that the sustainable development of education is one of the most important prerequisites of the sustainable development of society. A model for reforming the national higher education system illustrates possible ways of achieving sustainability in education.

Literature review and research questions

Most studies on ecological footprint have been conducted to calculate carbon footprint. (Gurbuz et al., 2021; Hooi & Hassan, 2010). Although there are studies on ecological footprint awareness in education in Turkiye, mainly conducted with teachers and pre-service teachers, some studies were conducted with students (Güngör & Cevher-Kalburan, 2022; Karaarslan-Semiz & Çakır Yıldırım, 2018; Karakaş et al. 2016; Simsar, 2021). Some studies on the relationship between sustainable development and ecological footprint concepts focused on the use of ecological footprint as an educational tool for sustainable living (Collins et al., 2018; Demirtaş & Çinici, 2019; Gottlieb et al., 2012; Karakaş, 2021; Keleş & Aydoğdu, 2010; Lambrechts & Liedekerke, 2014; Meyer, 2004; Ryu & Brody, 2006).

Regarding the studies on the relationship between ecological footprint and sustainable development awareness, studies in higher education are usually conducted on a single department (Eren et al., 2016) or faculty, and the number of studies covering all university students is limited. For this reason, this study focused on higher education.

Purpose and Research Questions

Protecting nature and natural resources for a sustainable world is an obligation for every person on Earth. Higher education institutions are charged with shaping the minds of the future. Universities are the stepping stones to shift the mindset of future generations towards a greener and cleaner perspective. It is essential for higher education institutions to integrate the topics of sustainability and reduction of ecological footprint into their curricula (Ruzevinicus, 2011). Furthermore, a study found that higher education enables the growth of the intellectual potential of the human community, contributes to the achievement of sustainable development goals, and reinforces certain moral principles (Popelo et al., 2022). This study aims to raise ecological (carbon) footprint awareness and promote sustainable development. Therefore, this study aims to examine the relationship between university students' sustainable development awareness and ecological footprint awareness and to determine whether the sub-dimensions of sustainable development awareness (economy, society, environment) predict ecological footprint awareness. To that end, the following questions were addressed:

1. Is there a significant relationship between university students' sustainable development awareness and their ecological footprint awareness?

2. Is there a significant relationship between university students' sustainable development awareness and their ecological footprint awareness in social, economic, environmental, energy, legislation, recycling, transportation, water

consumption, and nutrition?

3. Do the sustainable development awareness scale and its sub-dimensions (economy, society, environment), along with gender and discipline variables significantly predict the ecological footprint awareness of university students?

METHOD

Research Design

Correlational research design was used in the study. The correlational survey model is to reveal the relationship or effect between two different quantitative variables through a correlation coefficient (Fraenkel et al., 2012). According to Neuman (2006), correlational research does not intervene in the variables involved in multiple relationships. During data collection in this model, there must be no other influences in the process when researchers administer the necessary scales (Büyüköztürk et al., 2016). Correlational research looks only at the variables that are changing together (Büyüköztürk et al., 2009). The study aims to determine whether there is a correlation between sustainable development awareness and ecological footprint awareness variables or the extent of the correlation (Fraenkel & Wallen, 2012; Karasar, 2005).

Sample Group

The population of the study consisted of 5756 senior students studying at Eskişehir Osmangazi University in the 2022-2023 academic year. Senior students from different faculties of Eskişehir Osmangazi University (Faculty of Dentistry, Faculty of Education, Faculty of Natural Sciences, Faculty of Economics and Administrative Sciences, Faculty of Theology, Faculty of Humanities and Social Sciences, Faculty of Engineering and Architecture, Faculty of Health Sciences, Faculty of Medicine, Faculty of Agriculture) participated in this study. Students from different faculties were grouped as follows: social sciences (Faculty of Economics and Management, Faculty of Humanities and Social Sciences), health sciences (Faculty of Dentistry, Faculty of Health Sciences, Faculty of Medicine), natural sciences (Faculty of Natural Sciences, Faculty of Engineering and Architecture, Faculty of Agriculture) and educational sciences (Faculty of Education). Maximum variation sampling, one of the purposive sampling techniques, was used in this study. In the selection of the participants determined by maximum diversity sampling, the status of studying in different faculties and departments was taken into consideration. A total of 303 students from different faculties of Eskişehir Osmangazi University were reached. After data cleaning, 262 students were included in the sample. The demographic information of the students in the study group is shown in Table 1.

Table 1. Student Demographic Information

Independent Variable		Frequency (f)	Percentage(%)
Gender	Female	176	67.2
	Male	86	32.8
Disciplines	Educational Sciences	61	23.3
	Sciences	83	31.7
	Health Sciences	79	30.2
	Social Sciences	39	14.9

Of the students who participated in the study, 67% were female, and 33% were male. Regarding the age variable, the highest age of the participating students was 45, and the lowest was 19, with a mean age of 23.14 and a standard deviation of 2.74. Regarding student's fields of study, 32% were in natural sciences, 30% in health sciences, 23% in

education and 15% in social sciences.

Data Collection Tool

Sustainable Development Awareness Scale: This scale, developed by Atmaca et al. (2018), is a 5-point Likert-type scale with three sub-dimensions (economy, society, and environment) and 37 items. The 26th item is the control item. Items 1, 8, 10, 24, 31, 35 are in reverse order. In the study conducted by Atamaca et al. (2018), the Cronbach's alpha (α) coefficient of the whole scale was 0.91, and the sub-dimensions were 0.77, 0.87, and 0.82, respectively.

The Ecological Footprint Awareness Scale: This scale developed by Tekindal et al. (2021) is a 5-point Likert scale and consists of 24 items and six sub-dimensions: energy, legislation, recycling, transportation, water consumption, and food. In the study conducted by Tekindal et al. (2021), the Cronbach's alpha (α) coefficient of the sub-dimensions were 0.940, 0.920, 0.909, 0.819, 0.886, 0.814, and the whole scale's alpha (α) was calculated as 0.960.

Data Collection Process

First, the necessary permissions were obtained from the scale owners for the data collection tools to be used in this study. These guidelines were followed by acquiring legal and ethical permissions during the implementation process. The data were collected through web-based Google Forms from senior students from different faculties of Eskişehir Osmangazi University during the spring semester of the 2022-2023 academic year.

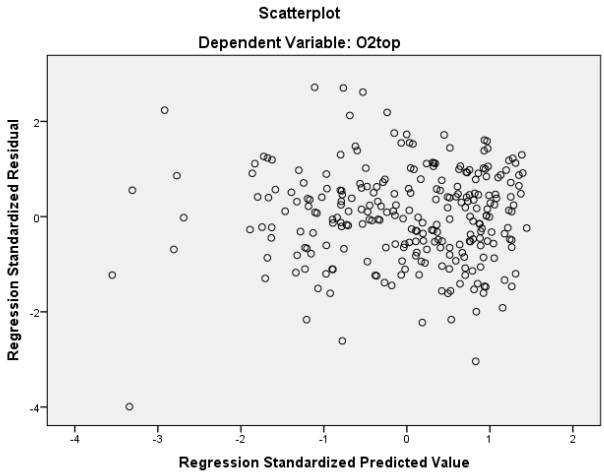
Data Analysis, Validity and Reliability

SPSS (IBM SPSS Statistics 24) was used to analyze the data. Descriptive statistics (percentages, frequencies, means and standard deviations) were used to determine the distribution of sustainable development awareness and ecological footprint awareness scores of university students. Scores were calculated for the subdimensions and the whole scales. First, a normality analysis was performed to test whether the assumptions of the parametric test were met. The skewness-kurtosis coefficients were checked for normality, and they were not in the range -1 and +1 (Tabachnick & Fidel, 2015) (the skewness value for the Sustainable Development Awareness Scale was -.667, the kurtosis value was 2.154, the skewness value for the ecological footprint. Awareness Scale was -.967, the kurtosis value was .986). Kolmogrov-Smirnov and Shapiro-Wilks normality tests were performed, and the test results were statistically significant ($p < 0.05$). Considering the normality tests and the skewness-kurtosis values, it was determined that the data did not have a normal distribution (Tabachnick & Fidell, 2013). Spearman correlation coefficient is used to test the relationship between variables with a continuous but not normal distribution (Büyüköztürk, 2023). Thus, the Spearman correlation coefficient was used to analyze the relationship between sustainable development awareness and ecological footprint awareness scores. A correlation coefficient less than 0.30 indicates a weak relationship; between 0.30-0.70 indicates a moderate relationship; higher than 0.70 indicates a strong relationship (Büyüköztürk et al., 2009; Roscoe, 1975). For Sustainable development awareness, the Cronbach's Alpha (α) coefficients of the overall scale were 0.91 and sub-dimensions 0.75, 0.87, and 0.82, respectively. For ecological footprint awareness, the Cronbach's alpha (α) coefficients of the sub-dimensions were 0.81, 0.63, 0.83, 0.81, 0.71, 0.71, and the whole scale was s 0.93. The scales were found to be reliable (Büyüköztürk et al., 2009; Roscoe, 1975).

Multiple linear regression analysis was conducted to reveal how the sub-dimensions of the sustainable development awareness scale (economy, society, environment) predict ecological footprint awareness. Since the data is not normally distributed, Bootstrap 2000 was used for the analysis (Stoffer & Wall, 1991). In order to ensure the preliminary

assumptions of the analysis, normal distribution and multicollinearity were evaluated. Least Squares method was used for parameter estimation of multiple regression analysis. Firstly, the assumptions of this estimation method were checked. The first one is that there is a linear relationship between the independent variables and the dependent variable. Independent variables should not have multicollinearity (multicollinearity) among themselves. Different methods have been developed to detect multicollinearity. In this context, correlation coefficient between independent variables, VIF, tolerance value close to VIF value and condition indicies were analysed. In order to detect outliers that affect the power of the tests to be performed and the results of the prediction models, the Cook distance value should be greater than 1 and the standardized residual value should not be within ±3.29 (Field, 2009). The Cook distance values obtained in this study are between .000 and .262. In the homoscedasticity assumption, the errors corresponding to the independent variables are expected to have equal variance. Within this scope, this assumption was examined using the graphical method (figure 4). It was observed that the observation values in the graph were spread over the graph and took the form of a rectangle. Durbin-Watson coefficient was used to test for autocorrelation. Durbin-Watson values vary between 2.00 and 2.02. Durbin Watson values less than 1 and greater than 3 are indicators of a problematic situation (Field, 2009). The Durbin-Watson values obtained in this study are within acceptable limits. Whether there was multicollinearity was evaluated by examining the correlation values between variables and VIF and tolerance values. Relationship values between independent variables were found to be between 0.64 and 0.72. Multicollinearity problem occurs when the correlation between variables is greater than 0.90, VIF values are greater than 10, and tolerance values are less than 0.10 (Büyüköztürk, 2023). Tolerance values are between 0.41 and 0.49 and VIF values are between 2.03 and 2.44.

Fig4. Scatter Plot



FINDINGS

Spearman correlation analysis was conducted to determine the relationship between university students' sustainable development awareness and ecological footprint awareness, and the data is shown in Table 2.

Table 2. Correlation between sustainable development awareness and ecological footprint awareness.

Variables	1	2

1. Sustainable Development Awareness	-	.522**
2. Ecological Footprint Awareness	.522**	-

Notes: *p< .05, ** p< .01

As can be seen in Table 2, there is a moderate, positive, statistically significant relationship between the scores (r=.556; p<.01). Accordingly, it can be said that university students' ecological footprint awareness increases with the increase of their sustainable development awareness.

The Spearman correlation matrix was used to determine the relationship between sustainable development awareness sub-dimensions (economy, society, and environment) and ecological footprint awareness sub-dimensions (energy, legislation, recycling, transportation, water consumption, and nutrition). The results are presented in Table 3.

Table 3. Correlation matrix between sustainable development awareness and ecological footprint awareness sub-dimensions

Scale	Sub-dimension	1	2	3	4	5	6	7	8	9
Sustainable Development Awareness	1. Economy	-	.601**	.621**	.381**	.505**	.233**	.241**	.236**	.301**
	2. Society		-	.664**	.453**	.514**	.275**	.285**	.264**	.293**
	3. Environment			-	.492**	.571**	.328**	.340**	.335**	.385**
Ecological Footprint Awareness	4. Energy				-	.518**	.581**	.471**	.548**	.541**
	5. Legislation					-	.308**	.296**	.415**	.407**
	6. Recycling						-	.565**	.567**	.615**
	7. Transportation							-	.443*	.610**
	8.Water Consumption								-	.578**
	9. Food									-

Notes: *p< .5, ** p< .01

The relationships between the sub-dimensions of the two scales were analyzed in this part of the study. As can be seen in Table 3, there are statistically significant moderate positive relationships between energy and environment (r=.492), energy and society (r=.453), and energy and economy (r=.381) sub-dimensions.

There is a statistically significant, moderate, positive relationship between the legislation and environment (r=.571), legislation and society (r=.514), and legislation and economy (.505) sub-dimensions.

A statistically significant, moderate, positive relationship was found between the recycling and environment sub-dimensions (r=.328). In addition, statistically significant, weak, positive relationships were found between recycling and society (r=.275) and recycling and economy (r=.233) sub-dimensions.

A statistically moderate positive relationship exists between transportation and environment sub-dimensions (r=.340). Moreover, a statistically significant, weak, positive relationship was found between transportation and society (r=.285) and transportation and economy (r=.241) sub-dimensions.

A statistically significant, moderate, positive relationship was revealed between water consumption and environment sub-dimension scores (r=.335). However, statistically significant, weak, positive relationships were found between water consumption and society (r=.264) and water consumption and economy (r=.236) sub-dimensions.

There were statistically significant, moderate, positive relationships between food and environment (r=.385) and food and economy (r=.301) sub-dimensions. On the other hand, a statistically significant, weak, positive relationship was found between food and society sub-dimension scores (r=.293).

The results of the multiple regression analysis on the prediction of ecological footprint awareness by the sub-dimensions (economy, society, environment) of the sustainable development awareness scale of university students are presented in Table 4. According to the results of the multiple regression analysis, the model in which the economy, society and environment variables, which are the sub-dimensions of the sustainable development scale, predict ecological footprint was found to be statistically significant ($F(258,3)= 41.84$, $p < .05$). In addition, it was determined that the economy, society, and environment, which are the sub-dimensions of the sustainable development awareness scale of university students, significantly predicted the ecological footprint. When the standardized regression coefficients (β) are examined, it is seen that the society and environment variables are more important than the economy variable. Finally, these three independent variables together explain approximately 32% of the total variance in ecological footprint.

According to the results of multiple regression analysis, the regression equation for the prediction of ecological footprint awareness is as follows:

ECOLOGICAL FOOTPRINT = .746 + .046 ECONOMY + .216 SOCIETY + .470 ENVIRONMENT

Regresyon eşitliğinden görülebileceği gibi, diğer değişkenler sabit tutulduğunda ekonomideki bir birimlik artış ekolojik ayak izinde 0.046 birimlik artışa yol açmaktadır. Diğer değişkenler sabit tutulduğunda toplumdaki bir birimlik artış ekolojik ayak izinde 0.216 puanlık artışa neden olmaktadır. Diğer değişkenler sabit tutulduğunda çevredeki bir birimlik artış ise ekolojik ayak izinde 0.470 birimlik artış oluşturmaktadır.

Table 4. Multiple regression analysis results on the prediction of the sub-dimensions of the sustainable development awareness scale (economy, society, environment) according to ecological footprint awareness.

Variables	B	SE B	β	*t*	*p*
Constant	.746	.328		2,277	.024
Economy	.046	.103	.033	.452	.652
Society	.216	.096	.178	2.234	.026
Environment	.470	.091	.403	5.176	.000

Note. $R=.569$, $R^2=.324$, $F_{(258,3)}= 41.184$, $p < .05$

RESULTS AND CONCLUSIONS

This study was conducted in a correlational research design to analyze the relationship between university students' sustainable development and ecological footprint awareness. The findings indicated that the university students' sustainable development awareness is positively related to their ecological footprint awareness. In the literature, sustainable development and ecological footprint awareness have been analyzed separately, and the studies primarily focused on determining their levels; however, the relationship between the two has not received attention. Therefore, it is important to reveal the relationship between sustainable development awareness and ecological footprint awareness of university students. This study may potentitally contribute to the literature because it was conducted on a topic that has received limited empirical attention.

A positive moderate statistically significant relationship was found between sustainable development awareness and ecological footprint awareness scores. Accordingly, it can be said that as the sustainable development awareness of university students increases, their ecological footprint awareness increases. Ecological footprint, accepted as one of the indicators of sustainability, quantitatively expresses how much the planet's biocapacity is being depleted by human activities (Wackernagel & Rees, 1996). The ecological footprint is an indicator that makes people aware of the damage that they are causing to the planet on which we are living. It is possible to ensure sustainability by measuring the damage people are causing to nature (Sivrikaya, 2018). Ecological footprint is a practical concept for ensuring sustainability (Akıllı et al., 2008). From this perspective, this theoretical explanation supports the findings of this study. Environmental awareness is of great importance for each individual to recognize the opportunities offered by the environment in which they live, to know how the traces they leave in the world will be reflected on themselves and future generations, and to take responsibility for their actions. Almost half the world's population is under 25 (Gadotti, 2009). Young people's sustainable development and ecological footprint awareness will contribute to the environment, society, and economy.

A statistically significant positive relationship was found between university students' sustainable development awareness (economy, society, environment) and the scores obtained from all sub-dimensions of ecological footprint awareness (energy, legislation, recycling, transportation, water consumption, and nutrition). In light of these data, it can be said that it is a determining factor in people's environment, behavior, and awareness. In this regard, it is consistent with the study of Atmaca (2018). The value and sustainability of sustainable development depend on the strength of the bonds between economic, social, and environmental elements (Sivrikaya, 2018). Environmental problems bring along societal and economic problems. In order to minimize this threat, the ecological footprint awareness of society should be increased worldwide (Tekindal et al., 2021). In the current study, regarding sustainable development and ecological footprint awareness among university students, a significant relationship was found between the legislation and environment sub-dimensions. These findings may be because university students believe that environmental protection measures to be secured by laws. Making students understand the importance of the legislative regulations may increase environmental awareness. A significant relationship was found between the legislation and the society sub-dimension. Similarly, increasing the awareness of legislative regulations may increase awareness in society. Courses on legislative regulations for sustainable development may be taught at colleges and universities both within required courses or voluntary activities. In other words, educating students on sustainable development at the macro level will increase both environmental and social awareness. This is because sustainable development may be achieved by addressing the society, economy, and environment holistically (Özsoy & Dinç, 2016). Regarding sustainable development and ecological footprint awareness of university students, the current study found that a low relationship was found between recycling and the economy sub-dimensions. These findings may suggest a lack of awareness among university students on the impact of recycling on the economy. Sustainable universities can minimize adverse social, economic, and environmental impacts by guiding students' lifestyles toward a sustainable path (Velazquez et al., 2006) and promoting more sustainable practices (Nejati & Nejati, 2013). At this point, the lifestyle of university students should be shaped with recycling awareness. This recycling awareness would also directly contribute to the economy.

The results of multiple regression analysis regarding the prediction of the sub-dimensions of the sustainable development awareness scale (economy, society, environment) of university students on their ecological footprint awareness provided significant results. Society and environment variables, which are the sub-dimensions of the sustainable development scale, predict students ecological footprint awareness. When the standardized regression coefficients (β) are examined, both society and environment were found to be equally important variables. Finally, these

three independent variables together explain about 32% of the total variance in ecological footprint. It can be said that this value has a great effect (Alpar, 2016).When the standardized regression coefficients are examined, it is seen that the society and environment variables were important while economy was not a significant variable. Sustainable development aims to develop in an environmentally, socially and economically balanced way in order to leave sufficient resources for future generations while using the natural resources needed to meet human needs. For sustainable development, it is important to minimize the ecological footprint. Based on this, it is thought that informing university students on the economic dimension of sustainable development will be effective in terms of university students' ecological footprint awareness.

The goal of qualified education, one of the 17 goals adopted by the United Nations Sustainable Development Summit in 2015, includes providing all students with the knowledge and skills necessary to achieve global citizenship and sustainable development. In order to realize this goal, the concept of sustainability should be presented in various courses with an interdisciplinary approach (Arslan & Yağmur, 2022). There are studies in the literature suggesting that integrating sustainable development into interdisciplinary curricula will have a positive effect on raising awareness about sustainable development (Alexio et al., 2021; Çobanoğlu & Türer, 2015; Eren et al., 2016; Flament & Kovesi, 2020). Thus, it aims to raise future generations as individuals equipped with sustainability awareness and contribute to sustainable development (Hopkins & Kohl, 2019). Furthermore, individuals act more responsibly in environmental issues as they learn about the positive and negative factors on the continuity of the ecosystem (Kiziroğlu, 2001). Therefore, introducing the concept of ecological footprint to students from elementary school and organizing in-class and out-of-class practices that emphasize this concept can effectively create the desired awareness and reduce the average ecological footprint (Karakaş, 2021). Regarding some studies in the literature, active participation practices are effective in creating ecological footprint and sustainable development awareness (Alagöz, 2007; Benzer & Şahin 2012; Meyer 2004; Özgen & Aksoy 2017; Weinberg & Quesenberry 2010). In addition, faculty members need to be environmentally aware in order to train conscious individuals. As Lozano et al. (2013) and Lambrechts and Van Liedekerke (2014) pointed out, it would only be possible by instructing the instructors first. In order to do this, it is recommended that the universities be included in the Green Campus Program. Hooi and Hassan (2010) state that the Green Campus Program provides legitimacy to environmental education programs that can help staff and students implement sustainability initiatives. The ISO 14000 series of environmental standards can be of great use to campuses in embarking on an environmental audit, as its standards provide methodological support to organizations, including academic institutions. In this way, environmental and economic sustainability can yield significant returns, such as recognition as an exemplary leader, financial benefits, and improved quality of life on campus.

In conclusion, this study found that university students' sustainable development awareness is related to ecological footprint awareness. In addition, this study concluded that the legislative regulations is likely to increase environmental and social awareness. Moreover, it was found that recycling has little effect on the economy. Training programs can be organized to raise awareness among university students about the impact of recycling on the economy, and hands-on activities can be performed in courses as well as voluntary activities. It was found that society and environment, which are the sub-dimensions of the sustainable development awareness scale of university students, explained a significant part (32%) of the change in ecological footprint awareness scores. The concepts such as environment, environmental awareness, recycling awareness may also be investigated on sa sample of university students. In addition to the existing courses or electives, different courses such as nature conservation or natural science courses may be included in undergraduate programs to teach environmental education topics, which can increase sustainable development

awareness. In addition, university programs may include practical applications, courses, and extra-curricular activities aimed at raising sustainable development awareness. This study is limited to 262 senior students from different faculties at Eskişehir Osmangazi University in the 2022-2023 academic year. Future studies can train university students on legislative regulations. In addition, posters, images, stories may be created and shared with short videos highlighting the relationship between recycling and the economy in social media.

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