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Fen Bilgisi Öğretmen Adaylarının Sürdürülebilir Tüketim Davranışlarının Planlanmış Davranış Teorisi Kullanılarak Belirlenmesi: Bir Fast-Food Örneği[1]

Determination of Sustainable Consumption Behaviors of Pre-service Science Teachers Using the Theory of Planned Behavior: A Case of Fast-Food[1]

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ÖZ: Bireylerin tüketim davranışlarının çevre üzerinde önemli bir etkisi vardır. Özellikle fast food tüketimi sürdürülebilir bir yaşamın önünde önemli bir engel olarak yer almaktadır. Bu nedenle, fast food tüketim davranışının öncüllerini anlamak, sürdürülebilir kalkınma sürecinde eğitimsel uygulamalarının geliştirilmesine yardımcı olabilecektir. Bu çalışma, planlanmış davranış teorisini kullanarak fast food tüketim davranışlarını etkileyen faktörleri sürdürülebilirlik çerçevesi çerçevesinde incelemeyi amaçlamaktadır. Bu doğrultuda kavramsal bir model önerilmiştir. Araştırmaya 270 fen bilgisi öğretmen adayı katılmıştır. Araştırmanın verileri araştırmacılar tarafından geliştirilen inanç ölçeği ve literatürden elde edilen ölçekler yardımıyla toplanmıştır. Verilerin analizi hiyerarşik çoklu regresyon analizi yardımıyla yapılmıştır. Araştırmadan elde edilen sonuçlar incelendiğinde kavramsal modelin fast food tüketim niyeti üzerindeki varyansın %19'unu ve davranıştaki varyansın %33'ünü açıkladığını ortaya koymuştur. Ayrıca, model içindeki yapılar arasında önerilen ilişkiler geniş çapta desteklenmiştir. Ayrıca niyetin önemli bir aracı değişken olduğu bulunmuştur. Son olarak, çalışma önemli teorik ve pratik çıkarımların yanı sıra gelecekteki araştırmacılar için öneriler sunmaktadır.

Anahtar sözcükler: Fast food tüketimi, fen eğitimi, sürdürülebilirlik, planlanmış davranış teorisi

ABSTRACT: Individuals' sustainable consumption has a substantial effect on the environment. In particular, fast-food consumption is an important obstacle to a sustainable life. Therefore, understanding antecedents of fast-food consumption behavior helps to develop sustainable education interventions. The study aims to examine factors affecting fast food consumption behaviors within the framework of the sustainability framework using the theory of planned behavior. The sample data of 270 participants were from pre-service science teachers. The data of the

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study were collected several scales. A belief scale was developed by researchers. Other scales were adapted from the previous studies. The analysis was performed using hierarchical multiple regression analysis. The results revealed that the conceptual model explained 19 % of the variance in intention and 33 % of the variance in behavior. Besides, the proposed relationships among the constructs within the model were broadly supported. Further, intention was found to be a significant mediating variable. Finally, the study provides important theoretical and practical implications as well as suggestions for future researchers.

Keywords: Fast food consumption, science education, sustainability, theory of planned behavior

1. INTRODUCTION

Environmental issues including pollution, climate change, over-population, resource depletion, and biodiversity loss are among the biggest recurring questions in the world today (Varah, Mahongnao, Pani & Khamrang, 2020). Sustainability is one of the most important global problems of the 21st century (World Health Organization, 2015). Especially after the industrial revolution, the increase in industrial production, resource use and private consumption exacerbated the harmful effect on the environment (Thøgersen, 2009). In the literature, studies conducted within the scope of behavioral sciences such as behavior analysis, organizational psychology, environmental psychology, and environmental education focus on revealing the impact of people on the environment (Casas et al., 2021; Edgerton et al., 2021; Lehman & Geller, 2004; Norton et al., 2015). Numerous studies showed that the most important reason for these environmental problems is human behavior arising from economic, social, and political actions (e.g., Dunlap, Van Liere, Mertig & Jones, 2000; Stern, 2000). Among the human actions, various types of unsustainable behaviors such as travel (Meng, Chua, Ryu & Han, 2020), recycling (Raghu & Rodrigues, 2020), energy-saving (Liobikienė & Minelgaitė, 2021), and food consumption (Funk, Sütterlin & Siegrist, 2020) are often discussed in the literature. In particular, unsustainable food consumption behaviors contribute greatly to environmental problems (Shi, Visschers, Bumann & Siegrist, 2018; Siegrist & Hartmann, 2019). For example, Tukker and Jansen (2006) noted that sustainable food consumption contributes approximately 20-30% to environmental effects caused by households. In addition, demands for food consumption bring also some other problems such as foods with low nutritional value, food crisis, animal feed, obesity, and bioenergy crops (Food and Agriculture Organization, 2014; World Wildlife Fund, 2016). Previous studies revealed that some people prefer sustainable consumption (Han, Hsu & Lee, 2009) and try to adopt a sustainable lifestyle (Thogersen, 2010), while a majority of them do not have enough awareness about sustainable food consumption (Hartmann & Siegrist, 2017).

Particularly, fast food consumption poses a big hurdle in preventing such a lifestyle. Fast food, invented in the early 20th century, refers to food and drinks that are consumed immediately after they are purchased anywhere (Gallego-Schmid, Mendoza & Azapagic, 2019). Fast food is quick to prepare, easy to access, moderately inexpensive, and favored by people of most age groups (Bahadoran, Mirmiran, Golzarand, Hosseini-Esfahani & Azizi, 2012). They are typically served in large portions and contain high levels of energy, sugar, and salt, along with low levels of micronutrients and fiber (Feeley, Pettifor & Norris 2009). In addition, fast food isn't suitable for the sustainable eating sensation of consumers (Rydell, Harnack, Oakes, Story, Jeffery & French, 2008; Watkins & Jones, 2015) since it can cause sustainability concerns such as food safety (Meldrum, Little, Sagoo, Mithani, McLauchlin & de Pinna, 2009) and labor issues (Schmitt & Jones, 2013). Moreover, the fast-food system is managed by big and global companies around the world and this situation affects domestic and small manufacturers calamitously in terms of economy (TechNavio, 2016). Further, fast food chains use non-reusable containers with a low recyclability potential and a lot of packaging (MacKerron, 2015) in several food types including candy, chips, beverages, and other snacks, and use Styrofoam which takes many years in landfill to dissolve (Nguyen, Nguyen, Schumacher & Tran, 2020; Satimanon & Weatherspoon, 2010). Considering the harmful effects of fast food, its consumption causes obesity (Offer, Pechey & Ulijaszek, 2010) which is one of the important problems of sustainability (United Nations Development Programme, 2016). Obesity is one of the main problems that countries have been struggling with for years (Chou, Grossman & Saffer, 2004). Similarly, the problem of obesity encountered in both children and adults in Türkiye has increased significantly in the last twenty years (Erem, 2015). Therefore, adult

and child obesity is one of the most important health issues in Türkiye (Bereket & Atay, 2012). In the recently announced European Cardiovascular Disease Statistics Report, the rates reported for Turkish men and women are 35.8% and 22.9%, respectively (Timmis et al., 2018). For these reasons, the Healthy Nutrition and Active Life Program, which was implemented by the government in Türkiye, aimed to ensure that the society has a balanced diet and engages in regular physical activity, thus reducing obesity and obesity-related diseases (Egemen, 2019).

Considering the previous research results emphasizing the impact of fast food on sustainability, it is often highlighted that a decrease in fast food consumption would make a very important contribution to sustainable consumption (e.g., Gallego-Schmid et al., 2019; Shokri, Oglethorpe & Nabhani, 2014). In particular, considering that younger people consume fast food products more than older ones, to prevent fast food consumption, some precautions are taken across the world. For example, in school meals, all the food alternatives consist of dairy, fruit, vegetables, protein, and starch rather than fast food in England (Evans, Greenwood & Thomas & Cade, 2010). Similarly, in Türkiye, unsustainable foods aren't sold in school canteens such as fries, chips, chocolate, wafer, sugar, cakes, and sweet drinks. Taking precautions in the school environment is not the only solution. For example, earlier studies revealed that 31% of Turkish university students consume fast food once or twice a week and 95% of them go to fast-food restaurants with their friends, especially at the weekends (35%) (Yardimci, Ozdogan, Ozcelik & Surucuoglu, 2012).

However, the studies on fast food consumption are still at an emerging stage in the world in comparison to other sustainable consumption types (e.g., Lassen et al., 2016). Therefore, understanding determinants of people's fast-food consumption behaviors is important for academicians and researchers since it can help develop appropriate strategies to provide a sustainable lifestyle. In particular, it is of great importance to understand the behavior of pre-service science teachers who have an important role in the education of future generations and are closely related to the individual, society, environment, and science in order to reach a sustainable world.

There are many other important reasons for choosing pre-service science teachers as younger citizens, undergraduates, and educators responsible for the education of individuals in the future. As part of the youth of society, university students are important stakeholders since they bear the burden of the past and experience problems with sustainability today (de Leeuwet al., 2015). At the same time, they are possibly important people who have the technical and high-quality knowledge required to develop appropriate solutions to change environmental behavior (Vicente-Molina, Fernandez-Sainz & Izagirre-Olaizola, 2018). However, their environmental perspectives are considerably ignored (Wray-Lake, Flanagan & Osgood, 2010). Apart from all these, pre-service science teachers have an important place in the education of individuals in the future as science education aims to educate science-literate individuals who use science to solve personal and societal problems (Lederman & Niess, 1998). Moreover, Orr (1992) stated that science teachers must develop students' scientific literacy to make decisions for sustainability and to know how to live in harmony with their environment. Further, it was frequently stated that science teaching plays an essential role in promoting sustainability (Solís-Espallargas & Morón-Monge, 2020; Trott & Weinberg, 2020) and the science teaching process should be organized around problematic issues for society such as food, consumption, and sustainability (Hodson, 2014). Therefore, science teachers have great importance for the solutions to environmental problems (Gough, 2008). One of the other reasons why this sample group is involved in the current study is that if pre-service science teachers are well equipped to educate future generations during their university education, they can help students on how to make sustainable food consumption (Ateş, 2021).

Based on the study needs outlined above, the current study attempts to reveal factors affecting pre-service science teachers' fast-food consumption behaviors within the framework of sustainability. Although earlier studies conducted to understand pre-service science teachers' general sustainable behaviors (Ateş & Gül, 2018; Ateş, 2020a; Sahin, Alper & Öztekin, 2021; Yıldırım & Semiz, 2019) and sustainable food consumption behaviors (e.g., Ateş, 2020b, 2021), to the best of our knowledge, none of the studies have examined their fast food consumption behaviors with regards to sustainability using any pro-social or pro-environmental model. Moreover, a comprehensive theoretical or empirical explanation about pre-service science teachers' sustainable food consumption behaviors hasn't been investigated. Given these deficiencies, examining the factors affecting pre-service science teachers' sustainable food consumption behaviors can help further thought into their decision-making processes that are important to contribute to a more sustainable world. Previous empirical studies in the pro-environmental context were interested in rational choice theories to understand the younger people's decision-making periods that specify how pro-environmental behaviors take place (Han, 2015). Thus, the conceptual framework for the present study was based on theory of planned behavior (TPB) which was developed to understand and predict human behaviors (Ajzen, 1991). The theory may provide underlying volitional and non-volitional determinants of fast-food consumption and thus, reveals the importance of this behavior in the context of sustainability. Therefore, the current study employed the TPB as its theoretical framework. In addition, previous attempts in sustainability literature examined how the effect of personal characteristics such as age, gender, income, and educational background on sustainable behaviors (e.g., Ahmad et al., 2021; Han et al., 2017; Mi et al., 2020; Pienaar et al,. 2015). Earlier studies based on social role theory and evolutionary psychology showed that gender plays an important role in individuals' behaviors since males and females are socialized differently (Buss, 1996). In particular, women involved in sustainable behaviors pay more attention to interpersonal relationships than men (Han et al., 2009). Similarly, Laroche et al. (2001) stated that females are more worried about the future of the environment than males. On the other hand, age is another important determinant of sustainable behaviors. Therefore, the effect of age on these behaviors was examined in earlier studies (e.g., Keith et al., 2021; Jia et al., 2021). However, the findings in the earlier studies about the effect of age on individuals' sustainable behaviors are different. Further, some researchers emphasized the important role of income and education level on sustainable behaviors since people who have higher income and education level have high pro-ecological views and are more likely to behave pro-environmentally (Hawcroft & Milfont 2010; Pienaar et al., 2015). Accordingly, the present study also examined how personal characteristics have an effect on pre-service science teachers' sustainable behaviors in a fast-food consumption context. Overall, this study aimed to 1) test the feasibility, effectiveness, and extensiveness of the TPB framework, 2) determine the relative importance of constructs including salient beliefs, attitude, subjective norm, and perceived behavioral control in the research model to explain intention and behavior, and 3) examine the mediating influence of intention on behavior.

1.1. Sustainability in Science Education

Global problems have become more prominent with the development of industry, science, and technology (Stern, Young & Druckman, 1992). Therefore, environmental issues such as natural resources, climate change, pollution, and energy can be integrated into the earth and environmental topics involved in science curriculum and are closely associated with sciences topic areas including biodiversity, endangered species, and genetic engineering (Bodzin, Klein & Weaver, 2010). The inclusion of sustainability issues in the education curriculum and the fact that they are an important part

of our daily life means that science teachers are an indispensable part of this subject (Kim, Wagner & Jin, 2021) since teachers' knowledge affects what and how they teach to students (Walshe 2008). In addition, teachers help students to become conscious in terms of sustainability and change their behaviors (United Nations Educational, Scientific and Cultural Organization, UNESCO, 2005). Further, integrating environmental topics into the context of science teacher preparation, pre-service and in-service teachers can become aware of teaching and learning strategies and assist their students with becoming environmentally literate (Bodzin et al., 2010). Thus, raising awareness of science teachers on sustainability will help them to understand and adopt this issue more deeply and design efficient sustainability education programs (Birdsall, 2014; Skamp & Preston, 2020; Stratton et al., 2015).

Accordingly, in recent years, researchers have emphasized the importance of developing the interaction between science education and sustainability in order to educate responsible individuals for a sustainable future (Burmeister & Eilks, 2012; Hestness, McGinnis & Breslyn, 2015; Tippins, Pate, Britton & Ammons, 2015). Sustainability topics may be involved in existing science classes to raise sustainable awareness among students (Ateş, 2020a). By adding real-world concerns to science courses, it has been argued for years that students find the content more interesting and more relevant to their experience (Feldman & Nation, 2015). Further, in the last few decades, two documents were presented to provide science teachers' professional development as environmental educators (McDonald & Dominguez, 2010). A first document provided by The National Science Education Standards (NSES) (National Research Council, 1996) explains the professional development of science teachers as environmental educators: *"…Becoming an effective science teacher is a continuous process that stretches from pre-service experiences in undergraduate years to the end of a professional career. Science has a rapidly changing knowledge base and teachers will need ongoing opportunities to build their understanding …*" (p. 55). The second document called The Guidelines for the Initial Preparation of Environmental Educators developed by the North American Association for Environmental Education (NAAEE, 2000) includes a series of recommendations on the basic knowledge and skills that educators need to provide good environmental education (NAAEE, 2000).

1.2. Theory of Planned Behavior and Research Framework

TPB is an extended version of the theory of reasoned action (Ajzen, 1991) that aims to explain people's behavior by adding a non-volitional construct called perceived behavioral control. According to TPB, behavioral intention is the strongest predictor of specific behavior (Ajzen, 2005) and attitude, subjective norm, and perceived behavioral control strongly influence intention (Ajzen, 2006). The first construct in the model is attitude, which indicates the degree of a people's positive or negative evaluations regarded to a particular behavior. The more positive the attitude toward the behavior of a person, the more he/she will be likely to engage in a particular behavior (Yadav & Pathak, 2016). People tend to hold a positive attitude when the outcomes are positive and, therefore, they are likely to perform that certain behavior (Ajzen, 1991). Attitude toward a particular behavior is specified by behavioral beliefs, which refer to the perceived positive or negative results of performing the behavior and the subjective values or evaluations of these results (Ajzen & Fishbein, 1980). These beliefs are considered positive or negative attitudes towards behavior and are examined in two parts: Behavioral belief strength and outcome evaluation (Ajzen, 2006). Subjective norm can be defined as perceived social forces to engage in a particular behavior (Ajzen, 1991). In other words, it is about the individuals' feelings about ideas of people who are important to him/her around them related to carrying out a behavior (Ajzen & Fishbein, 1980). The second construct is subjective norm concerned with the perceived expectations and behaviors

of importantly motivated persons or groups (e.g., family, relatives, friends), as well as the motivation of the people to follow the stated directions (Ajzen & Fishbein, 1980). Subjective norm is based on normative beliefs which are related to perceived social pressure about the performing of behavior (Ajzen & Driver, 1991). These beliefs are divided into two parts: Normative belief strength and motivation to comply (Ajzen, 2006). The last construct is perceived behavioral control which refers to the perceptions about the ease or difficulty of engaging in a particular behavior and reflects individuals' perceptions that they can face difficulties and obstacles (Ajzen & Fishbein, 1980). Perceived behavioral control is believed to be a function of control beliefs that is the existence of factors that can influence the ability of someone to act (Ajzen, 2002). These beliefs are divided into two parts as well: control belief strength and power of control factor (Ajzen, 2006).

The TPB was used to understand a variety of behaviors in a sustainable consumption context and was applied successfully to reveal factors affecting sustainable food consumption behavior in past studies (e.g., Vassallo, Scalvedi & Saba, 2016; Vermeir & Verbeke, 2008; Yazdanpanah & Forouzani, 2015). In addition, the TPB has been used to be appropriate in explaining fast-food consumption intentions and behaviors intention across different cultures (e.g., Kim, Ahn & Kim, 2004; Mirkarimi et al., 2016; Seo, Lee & Nam, 2011). For example, Seo et al. (2011) found that TPB accounted for fast-food consumption successfully. It was revealed that Korean middle-school students' fast food consumption behavioral intentions were significantly related to behaviors. In addition, it was stated that PBC was more related to intention to consume fast-food than subjective norm, while no significant relationship was found between attitudes toward fast food consumption and their intentions. In a similar vein, in Mirkarimi et al.' (2016) study, antecedents of Iranian high-school students' fast food consumption behaviors were investigated in the framework of TPB. It was found that fast-food consumption behavior was strongly related to intention. It was verified that subjective norms and PBC were important determinants of intention of fast food consumption, while no significant relationship existed between attitude and intention. Lastly, PBC was found as the most proximal construct of intention. Padgett, Kim, Goh, and Huffman (2013) applied the TPB to understand Chinese university students' fast food consumption. The results of the study showed that attitude, subjective norm, and PBC, were found to have a positive influence on intentions to fast food consumption and PBC had the strongest influence on intentions. Moreover, it was verified that attitudinal beliefs, normative beliefs, and control beliefs positively affected attitude, subjective norm, and PBC, respectively. Dunn, Mohr, Wilson, and Wittert (2011) identified that Australian participants' fast-food consumption behaviors were significantly associated with behavioral intentions and the intentions were explained by attitude, subjective norm, and PBC. Subjective norm was found to be the strongest antecedent of intentions. Finally, the study result revealed that salient beliefs were significantly related to central components of the original TPB Ajzen (1991, 2002, 2006) postulated.

As a result, the previous empirical studies showed that the TPB significantly explained fast-food consumption behaviors. However, there are several important issues that need to be emphasized. Firstly, some of the previous studies did not investigate the relationship between behavioral intentions and fast-food consumption behaviors. In these studies, intentions or behaviors were included. Therefore, it is not known how the relationship between these two variables is in the context of this topic. With this current study, Ajzen (1991)'s statement that intention is the most important determinant of behavior was aimed to test. Secondly, the most influential variable on intention and behavior was not clear. Some studies emphasized the role of attitude (e.g., Kim et al., 2004), some of them stated that subjective norm is the most predictor construct on intention and behavior (e.g., Wilson & Wittert, 2011) and a number of earlier studies highlighted that PBC plays an important role (e.g., Padgett et al., 2013; Seo et al., 2011). Thirdly,

some of the studies didn't state the explanation variance on intention and behavior. With the current study, we aimed to test that higher or lower percentages of explained variance shows a stronger or weaker strength of the relationship (Rosenthal & Rosenthal, 2011). Fourthly, earlier studies reflect the results conducted with individuals of different ages such as college students and occupational groups in different cultures, so it is not possible to generate these study results for pre-service science teachers who are still undergraduate students in the present study settings. In addition, the difference of studying with pre-service teachers is that they play an important role in raising future generations and their education at the university affects their continued teaching profession. Finally, past studies aimed to understand individuals' fast food consumption in terms of healthy nutrition. However, most importantly, no research has examined studies in terms of sustainability. The reason why we attach the importance to this issue is due to the fact that pioneering studies in the field frequently emphasize the importance of fast food as a very important threat to sustainability (Feeley, Pettifor & Norris 2009; Gallego-Schmid, Mendoza & Azapagic, 2019; Meldrum, Little, Sagoo, Mithani, McLauchlin & de Pinna, 2009; Schmitt & Jones, 2013; Watkins & Jones, 2015). Therefore, to fill the research gaps, this research aimed to explain pre-service science teachers' fast-food consumption behaviors within the framework of sustainability, unlike the previous ones because fast-food consumption has economic, environmental, and social effects which are the three main pillars of sustainability, as well as health. With this study, we proposed that pre-service science teachers with strong behavioral beliefs, normative beliefs, and control beliefs toward fast-food consumption will more strongly have attitudes toward fast-food consumption, subjective norm, and perceived behavioral control. It was also suggested that the more positive the attitudes and subjective norm of pre-service science teachers towards fast food consumption and the greater the perceived behavioral control, the greater their fast food consumption intentions. Based on the results of a series of studies conducted by Icek Ajzen and his colleagues and previous empirical studies, the research framework demonstrated in Figure 1 was tested in this study.

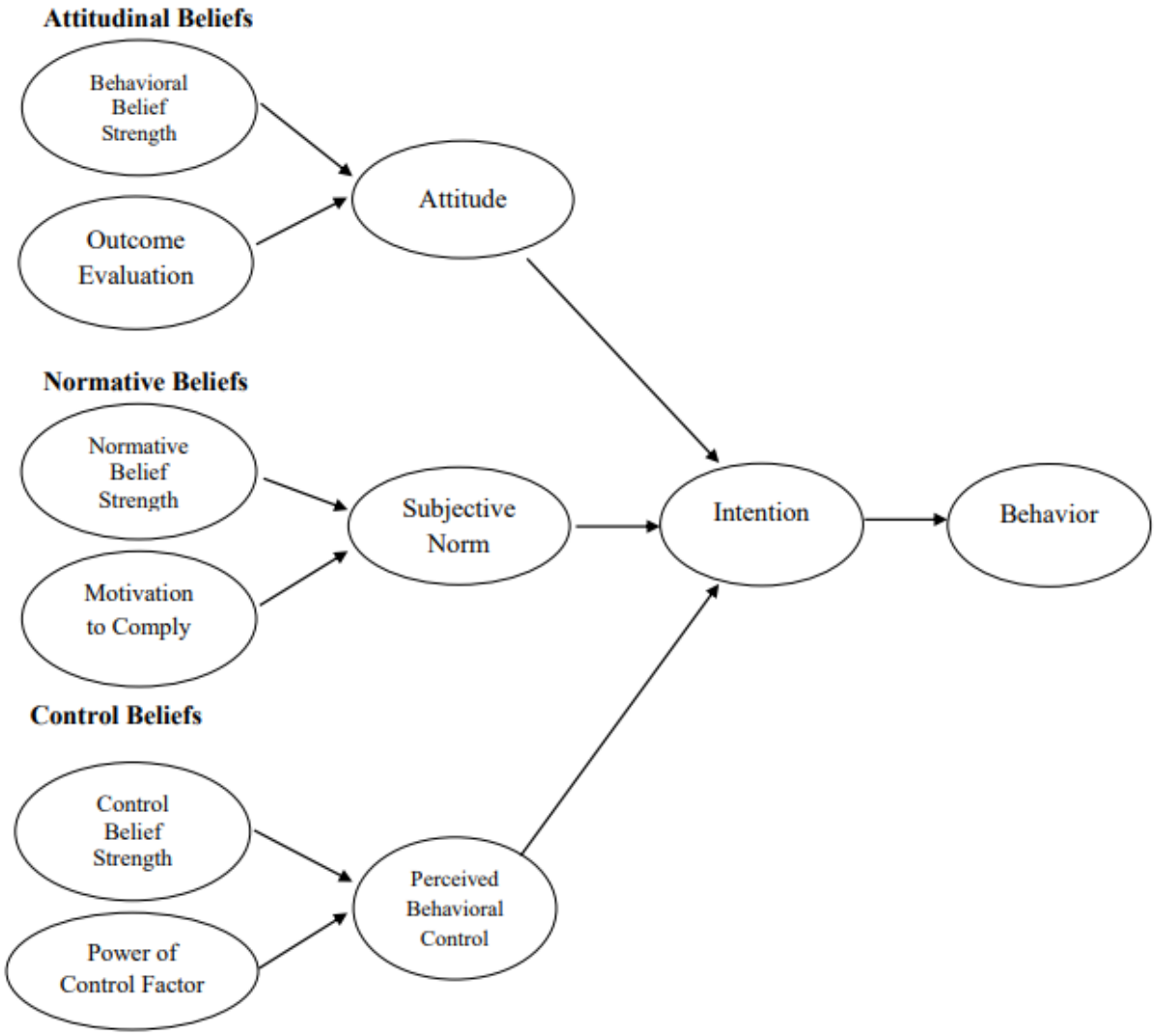

Figure 1: Conceptual model of TPB (Ajzen, 2006)

2. METHOD

2.1. Research Design

The study was conducted in accordance with the cross-sectional study research design. In this design, data are collected "*from a sample that has been drawn from a predetermined population. Furthermore, the information is collected at just one point in time, although the time it takes to collect all of the data may take anywhere from a day to a few weeks or more*." (Fraenkel, Wallen & Hyun, 2012, p.391). The data were collected during the spring semester of the education period (March to July 2019) using self-administrated scales.

2.2.Sample and Data Collection

The sample of the study was determined by convenience sampling method and participated in the study voluntarily. A total of 270 pre-service science teachers studying at the education faculties of various universities in the central Anatolian region of Turkey participated in the study. Of the sample,

%82.70 were female and 17.30% of them were male. Table 1 demonstrates more information related to participant characteristics.

Table 1: *Demographic Characteristics of Pre-Service Science Teachers*

Characteristics	Frequency	Percentage
Gender		
Female	223	82.70
Male	47	17.30
Grade Level		
1	72	26.49
2	83	30.81
3	64	23.78
4 and more	51	18.92
Educational status of mother		
Illiterate	34	12.70
Primary School	136	50.27
Middle School	55	20.27
High School	36	13.51
Undergraduate	7	2.70
Post Graduate Education	1	0.54
Educational status of father		
Illiterate	4	1.35
Primary School	82	30.54
Middle School	72	26.76
High School	72	26.49
Undergraduate	35	12.97
Post Graduate Education	5	1.89
Monthly income of the family		
Less than 1000 TL	33	12.16
1001 TL - 2000 TL	84	31.08
2001 TL - 3000 TL	65	24.05
3001 TL - 4000 TL	48	17.84
4001 TL - 5000 TL	18	6.76
More than 5001 TL	22	8.11
Location		
City Center	136	50.54
District	69	25.68
Town	23	8.65
Village	41	15.14

2.3. Data Collection Tools

Data collection tools consisted of three parts. Firstly, demographic characteristics of participants including gender, grade level, area of hometown, income, and educational status of the family were determined. Secondly, instruments explaining salient beliefs (behavioral beliefs, normative beliefs, and control beliefs) were developed. During the development process of these instruments, literature was reviewed and an item pool was formed. Due to the wide variety of beliefs related to sustainable consumption such as traveling, recycling, and energy (Yuriev et al., 2020), previously developed scales consist ofitems specific to that field. In the current study, it was aimed to develop a fast food consumption-based belief scale. In this framework, it was tried to produce qualified items that can answer the questions mentioned in detail in the next section. Finally, constructs of TPB (attitude, subjective

norm, perceived behavioral control, intention, and behavior) were adapted from pioneer studies (Ajzen & Fishbein, 1980; Ajzen, 2002; Ajzen, 2006) and other empirical studies (e.g., Levy et al., 2018; Wang, 2009; Whitley et al., 2018; Yazdanpanah et al., 2015) to explain fast-food consumption behaviors by modifying this study setting.

2.3.1. Construct Measures for Beliefs

Ajzen (2002) suggested having interviews to obtain salient beliefs including 'Behavioral Beliefs', 'Normative Beliefs', and 'Control Beliefs' of individuals. Semi-structured interviews were conducted with 13 pre-service science teachers in Türkiye to generate items about behavioral beliefs, normative beliefs, and control beliefs. The open-ended questions used in semi-structured interviews were adapted from the study of Fishbein and Ajzen (2010). After explaining the purpose of the interview, conversations related to the topic were carried out within 20-30 minutes. This elicitation study enables to reveal the list of the most commonly held beliefs of pre-service science teachers' fast-food consumption. The generated items were revised in line with the opinions of experts who work in science education, environmental education, and education for sustainable development. The open-ended questions measuring salient beliefs are given below.

Behavioral Beliefs

1. What do you see as the advantages of fast-food consumption in terms of sustainable development?
2. What do you see as the disadvantages of fast-food consumption in terms of sustainable development?

Normative Beliefs

1. Are there any individuals or groups who approve or think you should not eat fast-food?
2. Are there any individuals or groups who approve or think you should eat fast-food?

Control Beliefs

1. Please list any factors or circumstances that would make it easy or enable you to avoid consuming fast-food?
2. Please list any factors or circumstances that would make it difficult or prevent you to avoid consuming fast-food?

A conducted subsequent pilot test with 100 pre-service science teachers showed the scales have adequate question clarities. As a result, following the recommendations of Ajzen (2002, 2006), 46 items were formed. However, because some statistical results including high skewness and kurtosis values and low-reliability values were not within the recommended ranges, six items were deleted. In the final form of the instruments, a 40-item scale with a 7-point Likert-type scale ranging from strongly disagree (1) to strongly agree (7) was developed for measures of behavioral beliefs (Behavioral belief strength; 7 items and, outcome evaluation; 7 items), normative beliefs (Normative belief strength; 6 items and motivation to comply, 6 items) and control beliefs (Control belief strength; 7 items and power of control factor, 7 items).

2.3.2. Construct Measures for the Constructs of the TPB

Among the constructs of the TPB, attitude (9 items), subjective norm (4 items), perceived behavioral control (4 items), and fast-food consumption intention (5 items) were employed using a 7-point semantic differential scale ranging from strongly disagree (1) to strongly agree (7). Finally, a four-item measurement with a 7-point Likert-type scale was used to assess fast-food consumption behavior (1 = never, 7 = always). More details on the scales are presented in the Appendix.

2.4. Data Analysis

The TPB was tested through a series of hierarchical multiple regression analyses. Before the analyses, assumptions of the multiple regression analysis were tested (see result section) and exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were performed in the development and evaluation of the scales using SPSS and AMOS statistical programs.

EFA was applied to understand the interrelationships among a set of constructs and then CFA, on the other hand, was used to confirm if the proposed model is suitable (Pallant, 2020). Since Bartlett's Test of Sphericity was significant ($p< 0.05$) and Kaiser-Meyer-Olkin (KMO) index was higher than the recommended value of 0.06 (Tabachnick & Fidell, 2019), factor analysis was suitable. In addition, principal component analysis with varimax rotation was applied to construct the factor structure. It was found that using Kaiser's criterion, 75.67% of the total variance was accounted for, the eigenvalues were more than 1.0 and all factor loading values were above 0.4. The results of EFA revealed that the total variance explained was 69.21%, the eigenvalues were above 1.0, and all items had a factor loading score higher than 0.4 (See Appendix). On the other hand, the results of CFA using a maximum likelihood estimation showed that the conceptual theoretical model showed a good fit to data (χ^2=626.13, df=160; χ^2/df=3.91; GFI=0.90 IFI=0.90, TLI=0.91 CFI=0.92; RMSEA=0.06; SRMR= 0.06) and as presented in the Appendix, all the items in the factors were loaded above-suggested value of 0.60 (Chin, Gopal & Salisbury, 1997). The internal consistency of the constructs showed that all of the Cronbach alpha (α) values presented in Table 2 are higher than 0.70 as Nunnally (1978) suggested.

Table 2: *Internal Consistency of the Constructs*

Constructs	Number of items	Reliability values (α)
Attitude	9	0.84
Behavioral Belief Strength	7	0.85
Outcome Evaluation	7	0.84
Subjective Norm	4	0.81
Normative Belief Strength	6	0.76
Motivation to Comply	6	0.85
Perceived Behavioral Control	4	0.81
Control Belief Strength	7	0.93
Power of Control Factor	7	0.93
Intention	5	0.86
Behavior	4	0.76

Subsequently, the descriptive and regression analyses were performed in line with the relationships proposed in the theoretical conceptual model. Besides, some demographic variables including gender, grade level, and location were controlled since they may affect the constructs in the study (Liere & Dunlap, 1980; Pienaar, Lew & Wallmo, 2015). Firstly, the control variables were entered in the analysis to predict the dependent variable (Step 1). Secondly, in addition to control variables, it was tested whether other variables in the conceptual model explain the variance in the dependent variable (Step 2). This process provided to test whether the constructs also directly influence variables further down the chain when the demographic variables are controlled.

Finally, mediation analyses were performed using Goodman's (I) version of the Sobel test in line with Baron and Kenny's (1986) suggestions. In particular, the following conditions should be provided to perform a mediation analysis (Baron & Kenny, 1986; Kenny & Judd, 2014; Preacher & Leonardelli, 2020): 1) Independent variables should influence mediator variable. 2) In the absence of a mediator variable, the independent variable should be related to the dependent variable. 3) There should be a significant relationship between the mediator variable and the dependent variable. 4) In the presence of a mediator variable, the effect of the independent variable on the dependent variable should be non-significant.

3. FINDINGS

3.1. Testing the Assumptions of the Multiple Hierarchical Regression Analysis

Before hierarchic multiple regression analysis, preliminary analyses were performed to ensure assumptions of normality, linearity, multicollinearity, and homoscedasticity. Tabachnick and Fidell (2019) proposed that skewness values should be < |2| and kurtosis values should be < |4| to provide an assumption of normality. As indicated in Table 3, skewness and kurtosis values for all constructs were suitable ranges. The sample size of 270 was considered to be fit and above (N>8m+50, N: sample size, m: the number of independent variables) the suggested level for all models (e.g. when the dependent variable is behavior, the number of the independent variable is 7. The equality of 270>8*7+50=106 was achieved). And then, the examination of the collinearity statistics showed that all tolerance values were above 0.1 and all variance inflation factor (VIF) levels were below 10. Hence, the assumption of multicollinearity was also provided. Lastly, linearity and homoscedasticity were provided.

3.2. Descriptive and correlation analysis

Means, standard deviations, and intercorrelations of the constructs used in the study were presented in Table 3. Regression analysis results showed that intention significantly and positively correlated with behavior (r=0.46, p<0.01). In addition, it was found that attitude (r=0.17, p<0.01), subjective norm (r=0.29, p<0.01), and perceived behavioral control (r=0.32, p<0.01) were significantly and positively related to behavioral intention. The study also showed that the correlation between attitude and two attitudinal beliefs, that is, behavioral belief strength (r=0.13, p<0.05) and outcome evaluation (r=0.12, p<0.05), was significant. Considering the normative beliefs, a significant effect of subjective norm on normative belief strength (r=0.33, p<0.01) and motivation to comply (r=0.29, p<0.01) was found. On the other hand, control belief strength and power of control factor in the control beliefs were

not significantly related to perceived behavioral control. The results of control variables revealed that while gender was positively and significantly associated with perceived behavioral control (r=0.19, p<0.01) and behavior (r=0.26, p<0.01), it was not significantly correlated with other constructs. Further, grade level was positively and significantly related to behavioral belief strength (r=0.15, p<0.05), intention (r=0.13, p<0.05), and behavior (r=0.13, p<0.01). However, no significant relationship between grade level and other constructs was found. Lastly, it was obtained that the location was not significantly related to any research constructs.

Table 3: *Descriptive and Correlation Analysis*

	Gender	Grade level	Location	ATT	BBS	OE	SN	NBS	MTC	PBC	CBS	PCF	INT	BEV
Gender	1													
Grade level	0.01	1												
Location	0.00	0.12	1											
ATT	-0.02	0.08	-0.04	1										
BBS	-0.05	0.15*	0.02	0.13*	1									
OE	-0.08	0.12	-0.05	0.12*	0.58**	1								
SN	-0.07	0.02	-0.05	0.16**	0.38**	0.43**	1							
NBS	-0.00	0.02	-0.04	0.09	0.30**	0.33**	0.33**	1						
MTC	-0.07	0.01	0.00	0.04	0.28**	0.38**	0.29**	0.61**	1					
PBC	0.19**	0.01	0.05	0.14*	0.16**	0.12	0.04	0.11	0.04	1				
CBS	0.05	-0.10	-0.08	-0.15*	0.02	-0.09	-0.04	0.12*	0.08	-0.05	1			
PCF	-0.03	0.05	-0.10	-0.03	0.19**	0.23**	0.20**	0.29**	0.24**	0.05	0.34**	1		
INT	0.01	0.13*	0.06	0.17**	0.41**	0.40**	0.29**	0.24**	0.20**	0.32**	0.01	0.20**	1	
BEV	0.26**	0.13*	0.05	0.18**	0.15*	0.16**	0.15*	0.19**	0.05	0.42**	-0.06	0.08	0.46**	1
M	-	-	-	5.64	5.19	5.80	5.62	5.05	5.00	5.09	4.29	5.38	4.81	4.08
SD	-	-	-	1.06	1.37	1.07	1.24	1.21	1.37	1.21	1.70	1.48	1.47	0.93
Skewness	-	-	-	-1.39	-0.99	-1.52	-1.35	-0.87	-0.62	-0.10	-0.13	-1.11	-0.50	0.24
Kurtosis	-	-	-	2.55	0.61	3.48	1.97	0.62	-0.14	0.75	-1.08	0.64	-0.38	0.33

Note: * Significant at 0.05 level (2-tailed), ** Significant at 0.01 level (2-tailed). ATT= Attitude, BBS= Behavioral Belief Strength, OE= Outcome Evaluation, SN= Subjective Norm, NBS=Normative belief strength, MTC= Motivation to comply, PBC= Perceived Behavioral Control, CBS= Control belief strength, PCF= Power of control factor, INT= Intention, BEV=Behavior, Mean=M, SD=Standard Deviation.

3.3. Hierarchical Regression Analysis: Testing Proposed Model

In the framework of the TPB, hierarchical multiple regression analysis was conducted to assess to what extent salient beliefs, attitude, subjective norm, and perceived behavioral control can explain intention and behavior, and to examine the mediating influence of intention on behavior. Firstly, in case behavior is the dependent variable, the effect of gender, grade level, and location were examined as demographic variables in Step 1 of the hierarchical model and these variables explained 8% of the variance in behavior (F (3, 266) = 8.35, p < 0.001, Adj. R^2 = 0.08, effect size (f^2) =0.09). When the intention was added in Step 2 of the hierarchical model, 27% of the variance in behavior was explained (F (1, 265) = 71.96, p < 0.001, Adj. R^2 = 0.27, f^2=0.37). In the next stage, attitude, subjective norm, and perceived behavioral control were entered in Step 3 and the three variables accounted for 33% of the

variance in behavior (F (3, 262) = 9.28, p < 0.001, Adj. R^2 = 0.27, f^2=0.49). Lastly, gender (β=0.21, p<0.001), intention (β=0.34, p<0.001), and perceived behavioral control (β=0.26, p<0.001) were significant predictors of the behavior.

In the second analysis, when intention was determined as a dependent variable, the demographic variables were added to the hierarchical model in Step 1. These variables accounted for a non-significant amount of variance in intention (F (3, 266) = 1.72, p>0.05, Adj. R^2 = 0.01, f^2=0.01). Besides, attitude, subjective norm, and perceived behavioral control were entered in Step 2 of the hierarchical model and the three variables explained %19 of the variance in intention (F (3, 263) = 20.70, p < 0.001, Adj. R^2 = 0.19, f^2=0.24). However, grade level (β=0.13, p>0.005), subjective norm (β=0.26, p<0.001), and perceived behavioral control (β=0.31, p<0.001) were significantly associated with intention. Results of regression analysis with regards to intention and behavior are reported in Table 4.

Table 4: *Hierarchical Regression Analysis to Predict Intention and Behavior*

	β	%95 CI	*t*	*p*	Adj. R^2	*F*	d*f*	*p*	f^2
DV: Behavior									
Step 1:					0.08	8.35	3,266	0.000	0.09
Gender	0.26	1.41,3.66	4.43	0.000					
Grade level	0.13	0.04,0.93	2.16	0.031					
Location	0.03	-0.28,0.48	0.53	0.598					
Step 2:					0.27	71.96	1,265	0.000	0.37
Gender	0.26	1.51,3.52	4.95	0.000					
Grade level	0.07	-0.12,0.67	1.36	0.175					
Location	0.01	-0.31,0.37	0.19	0.849					
Intention	0.45	0.17,028	8.48	0.000					
Step 3:					0.33	9.28	3,262	0.000	0.49
Gender	0.21	1.11,3.07	4.21	0.000					
Grade level	0.08	-0.09,0.67	1.51	0.132					
Location	0.01	-0.30,0.35	0.15	0.881					
Intention	0.34	0.11,0.23	6.02	0.000					
Attitude	0.08	-0.01,0.07	1.58	0.116					
Subjective norm	0.04	-0.05,0.11	0.76	0.449					
Perceived behavioral control	0.26	0.12,0.28	4.79	0.000					
DV: Intention									
Step 1:					0.01	1.74	3,266	0.159	0.01
Gender	0.01	-2.22,2.42	0.09	0.930					
Grade level	0.13	0.03,1.85	2.04	0.040					
Location	0.05	-0.48,1.09	0.78	0.440					

Step 2:					0.19	20.70	3,263	0.000	0.24
Gender	-0.03	-2.74,1.55	-0.55	0.583					
Grade level	0.11	0.01,1.66	2.00	0.047					
Location	0.05	-0.39,1.03	0.88	0.380					
Attitude	0.08	-003,0.15	1.40	0.164					
Subjective norm	0.26	0.23,0.56	4.73	0.000					
Perceived behavioral control	0.31	0.30,0.63	5.40	0.000					

Note: DV: Dependent Variable, 95% CI: 95% confidence interval, If the CI excludes zero, the β is assumed to be statistically significant by conventional standards (Smithson, 2003), f^2=effect size. Population effect size index for multiple correlation. For multiple correlation, f^2 of 0.35 is defined to be large, and f^2 of 0.15 is defined to be medium, f^2 of 0.02 is defined to be small (see Cohen, 1992).

Considering the effect of beliefs on attitude, subjective norm, and perceived behavioral control (see Table 5), it was revealed that when attitude is the dependent variable and demographic variables were entered in Step 1 of the hierarchical model, this group of variables did not explain significantly variance in attitude (F (3, 266) = 0.84, p >0.001, Adj. R^2 = 0.00, f^2=0.00). Similarly, when behavioral belief strength and outcome evaluation were entered in Step 2 of the hierarchical model, these beliefs did not account for a significant amount of variance in attitude (F (2, 264) = 2.26, p > 0.001, Adj. R^2 = 0.01, f^2=0.01).

When the subjective norm is the dependent variable and demographic variables were entered in Step 1 of the hierarchical model, no significant variance of demographic variables in subjective norm was found (F (3, 266) = 0.74, p >0.001, Adj. R^2 = 0.00, f^2=0.00). Further, normative belief strength and motivation to comply were entered in Step 2 of the hierarchical model and it was found that these beliefs explained a significant increase in variance of subjective norm (F (2, 264) = 17.46, p < 0.001, Adj. R^2 = 0.11, f^2=0.12). Gender (β= 0.06, p>0.05), grade level (β=0.02, p=0.803), location (β=-0.04, p>0.05) and motivation to comply (β=0.14, p>0.05) were not significantly related to subjective norm. On the other hand, normative belief strength (β=0.24, p<0.001) was significantly related to the subjective norm.

Lastly, if perceived behavioral control is assigned as the dependent variable and demographic variables were entered in Step 1, only 3% of variance in perceived behavioral control was explained by demographic variables (F (3, 266) = 3.46, p < 0.05, Adj. R^2 = 0.03, f^2=0.03). Next, control belief strength and power of control factor were added to Step 2 of the hierarchical model. However, these variables did not change significantly the variance in perceived behavioral control beyond that explained by the initial set of demographic variables (F (2, 264) = 1.16, p > 0.001, Adj. R^2 = 0.03, f^2=0.03). Finally, it was found that only gender (β=0.19, p<0.01) made a significant contribution to this model.

Table 5: *Hierarchical Regression Analysis to Predict Attitude, Subjective Norm, and Perceived Behavioral Behavior*

	β	%95 CI	*t*	*P*	Adj. R^2	*F*	d*f*	*p*	f^2
DV: attitude									
Step 1:					0.00	0.84	3,266	0.471	0.00
Gender	-0.02	-3.40,2.61	-0.26	0.794					
Grade level	0.09	-0.32,2.03	1.43	0.155					
Location	-0.05	-1.44,0.60	-0.82	0.414					
Step 2:					0.01	2.26	2,264	0.106	0.01
Gender	-0.01	-3.16,2.85	-0.10	0.918					
Grade level	0.07	-0.53,1.84	1.09	0.278					
Location	-0.05	-1.40,0.63	-0.75	0.451					
Behavioral Belief Strength	0.09	-0.06,0.23	1.14	0.255					
Outcome Evaluation	0.06	-0.11,0.27	0.82	0.414					
DV: Subjective norm									
Step 1:					0.00	0.74	3,266	0.527	0.00
Gender	-0.07	-2.53,0.61	-1.21	0.229					
Grade level	0.02	-0.50,072	0.35	0.725					
Location	-0.05	-0.76,0.30	-0.84	0.400					
Step 2:					0.11	17.46	2,264	0.000	0.12
Gender	-0.06	-2.32,0.65	-1.10	0.271					
Grade level	0.02	-0.51,0.65	0.25	0.803					
Location	-0.04	-0.68,0.32	-0.72	0.474					
Normative belief strength	0.24	0.07,0.26	3.27	0.001					
Motivation to comply	0.14	-0.01,0.17	1.88	0.061					
DV: Perceived behavioral control									
Step 1:					0.03	3.46	3,266	0.017	0.03
Gender	0.19	0.86,3.88	3.09	0.002					
Grade level	-0.00	-0.57,0.61	0.07	0.948					
Location	0.05	-0.28,0.74	0.88	0.379					
Step 2:					0.03	1.16	2,264	0.315	0.03
Gender	0.19	0.89,3.92	3.14	0.002					
Grade level	-0.01	-0.64,0.56	-0.13	0.899					
Location	0.06	-0.27,0.76	0.95	0.342					
Control belief strength	-0.07	-0.08,0.02	-1.13	0.258					
Power of control factor	0.09	-0.02,0.10	1.35	0.179					

Note: DV: Dependent Variable, 95% CI: 95% confidence interval, f^2=effect size. Population effect size index for multiple correlation. For multiple correlation, f^2 of 0.35 is defined to be large, and f^2 of 0.15 is defined to be medium, f^2 of 0.02 is defined to be small (see Cohen, 1992).

3.4. Mediation Analyses

In the study, mediation analyses were conducted to examine mediating effect of intention on relationships, with Model 1, Model 2, and Model 3 via the Sobel test in four steps based on Baron and Kenny's (1986) suggestions. First, the attitude (β=0.13, p<0.01), subjective norm (β=0.43, p<0.001), and perceived behavior control (β=0.49, p<0.001) were significantly related to intention, expressing that the effects of all independent variables on mediating variable were significant. Second, the coefficient effect of attitude, subjective norm, and perceived behavioral control on behavior were respectively 0.07 (p<0.01), 0.11 (p<0.05), 0.32 (p<0.001), indicating that in the absence of a mediator variable independent variables had a significant total effect on the dependent variable. Third, the intention was significantly associated with behavior for Model 1 (β=0.22, p<0.001), Model 2 (β=0.23, p<0.001), and Model 3 (β=0.180, p<0.001). Lastly, only subjective norm (β=0.01, p>0.05) had a non-significant effect, while attitude (β=0.04, p<0.05) and perceived behavior control (β=0.23, p<0.001) were significantly and directly related to behavior in the presence of the intention. In the Sobel test, results showed that attitude (β=0.03, p<0.05), subjective norm (β=0.10, p<0.001), and perceived behavior control (β=0.09, p<0.001) were significantly associated with behavior indirectly. Overall, in the study, it was revealed that mediating effect of intention was significant for Model 2, unlike Model 1 and Model 3. Table 6 includes the details regarding direct effect, indirect effect, and total effect.

Table 6: *Direct, Indirect, and Total Effects as well as 95% Confidence Intervals in Particular Mediation Models*

	Independent variables	Mediator	Dependent variable	Direct effect			Indirect effect			Total effect		
				β	[95% CI]	*p*	*β*	[95% CI]	*p*	*β*	[95% CI]	*p*
Model 1	ATT	INT	BHV	0.04	[0.000, 0.085]	0.049	0.03	[-0.176, 0.236]	0.007	0.07	[0.026, 0.118]	0.002
Model 2	SN	INT	BHV	0.01	[-0,073, 0.094]	0.808	0.10	[-0.202, 0.399]	0.000	0.11	[-0.073, 0.094]	0.017
Model 3	PBC	INT	BHV	0.23	[0.152,0.316]	0.000	0.09	[-0.193, 0.371]	0.000	0.32	[0.239, 0.406]	0.000

Note: z and p value in indirect effect are Sobel test results. ATT= Attitude, SN= Subjective Norm, PBC= Perceived Behavioral Control, INT= Intention, BHV=Behavior.

4. DISCUSSION AND IMPLICATIONS

Understanding fast food consumption behaviors within the framework of sustainability is complex and multidimensional. This study attempted to test the TPB to understand pre-service science teachers' fast food consumption intentions and behaviors within the framework of sustainability. Three variables including gender, grade level, and location were added to regression analysis as control variables since they may influence the study result. The conceptual model explained 19% of the variance in intention and 33% of the variance in behavior implying that incorporating volitional and non-volitional factors into the context of fast food consumption based on sustainability validated the applicability of the proposed model. In other words, the results provided a solid theoretical basis for the sustainable consumption behavior literature.

Overall, the results of the study showed that almost all predictors of subjective norm, intention, and behavior had a positive influence on the next construct in the causal chain, while the impact of determinants of attitude and perceived behavioral control on the next variable in the model was not

significant. Considering the effect of the additional variables, it was revealed that, in addition to control variables, when new variables were entered into the model, the model's explanatory power increased in many cases. Particularly, the variance in perceived behavioral control, intention, and behavior was better explained when other predictor constructs were entered into the chain. More specifically, intention increased significantly explanatory power in Step 2 and the variance was significantly strengthened by perceived behavioral control as well as intention in Step 3. Similarly, subjective norm, and perceived behavioral control reinforced the explained variance when they entered the model next to attitude and control variables. Lastly, normative belief strength and motivation to comply made a significant contribution to the explanatory power of the model. However, antecedents of attitude and perceived behavioral control didn't' benefit the chain on the model when they were involved in addition to control variables. These findings approve the causal order of the constructs in the chain, moving from two salient beliefs to subjective norm but not attitude and perceived behavioral control which in turn are related to intention to consume sustainablyand sustainable consumption behavior respectively.

Considering the interrelationship among the constructs within the model, attitude was not related to intention and behavior, while subjective norm had an effect on intention but not behavior. Moreover, there was a positive relationship between perceived behavioral control and intention and behavior. These general findings imply that the stronger the normative beliefs of a person, the stronger the subjective norm, and thus, the more likely it is to have a strong intention. The results also inrefer that people who have powerful perceived behavioral control for difficulties and obstacles toward sustainable consumption more strongly base their decisions to engage in these behaviors. Accordingly, these results revealed that sustainable food consumption is not seen as a social norm and receiving the approval of people whose opinions are valued with regards to avoiding fast-food products is not important for sustainable consumption in Türkiye. These findings are consistent with a variety of earlier researches on pre-service and in-service science teachers (e.g., Ateş, 2020a, 2020b) and other pro-environmental based studies (e.g., Liu et al., 2020; Taufique & Vaithianathan, 2018; Yadav & Pathak, 2016). Surprisingly, contrary to the current study, attitude was found to be a significant construct in sustainable food consumption in the majority of recent studies (e.g., Aitken, Watkins, Williams & Kean, 2020; Çoker & van der Linden, 2020). This finding implies that to promote pre-service science teachers' intentions and behaviors to not consume fast food, strengthening their attitudes towards fast food consumption can be effective. Considering the fast food consumption, some of the earlier studies found no significant effect of attitude on intention and behavior (e.g., Mirkarimi et al., 2016; Seo et al., 2011), while others reported a significant relationship (e.g., Ajzen & Sheikh, 2013; Dunn et al., 2011; Padgett et al., 2013). Accordingly, this situation shows that the effect of attitude on fast food consumption has not yet been fully established in terms of general consumption and sustainable consumption, thus the current study makes an important contribution to relevant literature. One of the most important reasons why attitude is not a significant determinant of behavior is due to the determinants of attitudes (Fishbein & Ajzen, 2010). As far as the TPB is concerned, attitudes are based on easily salient beliefs about the possible consequences of behavior, whether effective or not. In this vein, when individuals are prompted to think about engaging in a behavior, their attitude towards this behavior is determined by their easily salient beliefs about the outcomes of doing it (Ajzen & Sheikh, 2013). More importantly, if behavior is generally determined by perceived behavioral control, attitudes are not expected to have a significant impact on intentions and behaviors (Fishbein & Ajzen, 2010). Considering the determinants of attitude are salient beliefs and perceived behavioral control was an important predictor of intention and behavior in the present study, it can be seen as an expected situation that the attitude does not have a significant effect

on intention and behavior. Results of the study also showed that attitudinal beliefs and control beliefs have no influence on attitude and perceived behavioral control implying that individuals who perceived positive results of consuming fast food with regards to sustainability are not likely to have a positive assessment of consuming behaviors. Further, we can conclude that people who perceive the presence of factors that may affect their sustainable consumption do not have higher perceptions about the ease of engagement in consumption behavior.

Our findings demonstrated that, among the personal characteristics, gender and grade level had a significant effect on fast food consumption behaviors, while only grade level was related to intention to consume fast food. These results implied that gender role in the community plays an important role in fast food consumption behaviors with regards to sustainability. In particular, female customers showed a greater willingness to consume sustainable foods. Consistent with earlier theories such as social role theory and evolutionary psychology, gender differences in fast food consumption behaviors were identified in this study. Previous empirical studies also emphasized the gender role in sustainable consumption behaviors (Bloodhart & Swim, 2020; do Prado & de Moraes, 2020; Lazaric et al., 2020). In addition, it was found that there is a positive relationship between grade level and sustainable consumption behaviors implying that the education that pre-service science teachers received at the university had a positive effect on their sustainable consumption perspectives. This result is in line with past study results conducted with pre-service science teachers (e.g., Afacan, 2020).

Finally, the mediation analysis which provides important support to explain fast food consumption behaviors within the framework of sustainability for the causal structure of the TPB revealed that intention mediated the effect of subjective norm on behavior. This finding is consistent with some earlier studies on sustainable consumption (e.g., Paul, Modi & Patel, 2016), while others found non-significant predictors of sustainable consumption behavior just as Taufique and Vaithianathan (2018). Since the influence of the views of people who are important to individuals on behavior differs according to the type of sample, age-range, and culture in which they are located, the different results obtained in the studies conducted in this field are thought to explain the reason for this finding. Accordingly, the significant mediating effect of intention should not be ignored, as the results show, using the variable as a mediator is effective when researchers broaden, and deepen an existing theory and develop new theories or models. Considering the mediating characteristics of this variable, future researchers in environmental psychology and education who investigate the role of attitude, subjective norm, and perceived behavioral control in forming behavior, should manage and progress this mediator variable efficiently.

The findings have some implications for researchers, environmental and science educators, policy-makers, and curriculum makers. Before the professional life of pre-service science teachers, there are several situations to consider. Since they are still university students, the results of the study provide preliminary insights and help science educators and policymakers to develop sustainable education interventions and make the necessary educational arrangements. During intervention programs, targeting rational considerations such as volitional (attitude and subjective norm) and non-volitional (perceived behavioral control) may be effective in encouraging sustainable consumption behaviors of pre-service science teachers. Future research can investigate the effectiveness of intervention programs that target rational considerations, for example, educational programs at universities that propose to strengthen attitude, subjective norm, and perceived behavioral control and make a comparison of their effectiveness to traditional education programs. Finally, since pre-service teachers are the most important factor to shape future students' psychological characteristics such as beliefs, attitudes, and behaviors related to

sustainable consumptions, the number of courses related to environmental and sustainability education should be increased and their scope should be expanded in pre-service teacher education programs (Yıldırım & Semiz, 2019).

4.1. Limitation and future studies

Even though the current study provides useful theoretical and practical implications based on findings, some limitations need to be carefully considered for future studies. First, the data of this study were collected from pre-service science teachers in Türkiye. Therefore, this should be taken into account when generalizing to other participants and cultures. A cross-cultural test can improve the validity of the model regarding intentions and behaviors and thus new studies using different participants is necessary to examine whether the results of this study can be generalized to various fields. Second, data collection tools relied on self-reported measures. Thus, participants tend to express their behaviors differently due to social desirability. In subsequent studies, data can be collected through observed behaviors. Third, this study was based on fast food consumption within the framework of sustainability; therefore, it is somewhat difficult to generalize the study results to general pro-environmental behaviors. Finally, the study was conducted within the framework of the TPB that reflects rational considerations and includes volitional and non-volitional dimensions. Understanding fast food consumption within the scope of sustainability is insufficient in terms of many psychological considerations such as normative/morale, pro-social motives, environmental identity, and value orientations. Hence, future research can merge/combine the TPB with other personal and social theories such as value belief norm theory, value identity theory, and norm activation model.

Appendix

Construct measures for TPB

Construct	Item No	Statements	Factor Loading (EFA)	Factor Loading (CFA)	Source
Behavioral Belief Strength (If I pay attention to my fast food consumption…)	BBS 1	I will be healthier.	0.58	0.60	Self-developed
	BBS 2	I consume unprocessed foods as much as possible.	0.62	0.60	
	BBS 3	I spend less money on my food consumption.	0.55	0.62	
	BBS 4	I respect animal rights.	0.60	0.61	
	BBS 5	I will take care of the environment.	0.53	0.62	
	BBS 6	I support local production.	0.55	0.61	
	BBS 7	I reduce my ecological footprint.	0.64	0.61	
Outcome Evaluation (How important are the following situations to you?)	OE 1	Being healthier	0.53	0.60	Self-developed
	OE 2	Consuming as much unprocessed foods as possible	0.58	0.61	
	OE 3	Spending less money on my food consumption	0.54	0.63	
	OE 4	Respecting animal rights	0.51	0.66	
	OE 5	Taking care of the environment	0.52	0.63	
	OE 6	Supporting local production	0.53	0.67	
	OE 7	Reducing my ecological footprint	0.54	0.61	
Attitude (Consuming Fast Food…)	ATT 1	It affects the economy of the country negatively.	0.58	0.64	Ajzen (2002) Yazdanpanah et al. (2015)
	ATT 2	It harms natural resources.	0.59	0.62	
	ATT 3	It is harmful to the health.	0.57	0.63	
	ATT 4	It is harmful to the environment.	0.62	0.64	
	ATT 5	It causes air / environmental pollution.	0.64	0.68	
	ATT 6	It causes hazardous waste to be generated.	0.68	0.70	
	ATT 7	It leads to extravagance.	0.67	0.72	
	ATT 8	It is not hygienic.	0.70	0.71	
	ATT 9	It causes hunger.	0.73	0.72	
Normative Belief Strength (The following	NBS 1	My family	0.51	0.60	Self-developed
	NBS 2	My friends	0.53	0.65	

persons or institutions expect me to be careful about consuming fast-food products.) (α=0.76)	NBS 3	My relatives	0.55	0.62	
	NBS 4	Society	0.51	0.63	
	NBS 5	Ministry of Education	0.57	0.64	
	NBS 6	Instructors I Take Courses at the University	0.54	0.66	
Motivation to Comply (How important is the expectations of the following people or institutions for you to consume fast-food products?)	MTC 1	My family	0.56	0.61	Self-developed
	MTC 2	My friends	0.56	0.61	
	MTC 3	My relatives	0.57	0.64	
	MTC 4	Society	0.54	0.62	
	MTC 5	Ministry of Education	0.53	0.63	
	MTC 6	Instructors I Take Courses at the University	0.59	0.64	
Subjective norm	SN 1	People I value think I should consume non-fast foods.	0.69	0.71	Ajzen (2002) Yazdanpanah et al. (2015)
	SN 2	People whose opinions I care about support me avoiding fast-food products.	0.61	0.70	
	SN 3	People whose opinions I care about think that I should stay away from fast food products.	0.68	0.69	
	SN 4	People whose opinions I care about want me to stay away from fast food products.	0.66	0.66	
Control Belief Strength (To what extent are the following conditions possible?)	CBS 1	In the production of foods other than fast food, the world's natural resources are used in a balanced way.	0.57	0.61	Self-developed
	CBS 2	Recycling of foods other than fast food is properly packaged.	0.57	0.66	
	CBS 3	Production of foods other than fast food is done in a health-friendly way.	0.51	0.65	
	CBS 4	Water consumption during the production of foods other than fast food has a low environmental impact.	0.53	0.61	
	CBS 5	Environmentally friendly products are used in the production of foods other than fast food.	0.56	0.62	
	CBS 6	Products that contribute to the country's economy are used in the production of foods other than fast food.	0.58	0.66	
	CBS 7	Foods with low calorie value are preferred in the production of foods other than fast food.	0.59	0.67	
Power of Control Factor (Providing the following conditions will make it easier for me to stay away from fast-food products.)	PCF 1	Balanced use of the world's natural resources in the production of foods other than fast food	0.59	0.66	Self-developed
	PCF 2	Proper packaging of recycling of foods other than fast food	0.55	0.61	
	PCF 3	Production of foods other than fast food beneficial to health	0.56	0.62	
	PCF 4	Low environmental impact of water consumption during the production of foods other than fast food	0.54	0.68	
	PCF 5	Use of environmentally friendly products in the production of foods other than fast food	0.52	0.67	
	PCF 6	Using products that contribute to the national economy in the production of foods other than fast food	0.56	0.69	
	PCF 7	Preferring foods with low calorie value in the production of foods other than fast food	0.56	0.66	
Perceived Behavioral Control	PBC 1	It is mostly up to me whether or not buy fast food	0.54	0.61	Ajzen (2002); Yazdanpanah et al. (2015)
	PBC 2	It is possible for me to avoid consuming fast food products in the coming months if I want.	0.69	0.70	
	PBC 3	It is difficult for me to stay away from fast food regularly in the coming months.	0.66	0.72	
	PBC 4	Even though I know how wrong it is, I can't help myself from consuming fast-food products.	0.67	0.71	
Fast Food Consumption Intention	INT 1	I plan not to consume fast food products in the coming days.	0.69	0.73	Ajzen (2002); Wang (2009)
	INT 2	I will make an effort not to consume fast food products in the coming days.	0.69	0.71	
	INT 3	I decide not to consume fast food products in the coming days.	0.64	0.77	
	INT 4	I will consume non-fast food products even if I have to pay more.	0.61	0.75	
	INT 5	I think not to consume fast-food products in order to protect the environment.	0.59	0.71	
Fast Food Consumption Behavior	BEH 1	I consume fast food.	0.54	0.60	Levy et al (2018); Whitley et al. (2018)
	BEH 2	When choosing food products, I consider the environmental impact of the products.	0.56	0.62	
	BEH 3	When choosing food products, I prefer those who contribute to the national economy among the products.	0.59	0.64	
	BEH 4	How often do you consume fast food?	0.58	0.66	

Note. EFA: Exploratory factor analysis, CFA: Confirmatory factor analysis

REFERENCES

Afacan, Ö. (2020). Investigation of pre-service science teachers' behavior towards sustainable environmental education. *International Electronic Journal of Environmental Education*, *10*(1), 110-121.

Ahmad, N., Ullah, Z., Arshad, M. Z., waqas Kamran, H., Scholz, M., & Han, H. (2021). Relationship between corporate social responsibility at the micro-level and environmental performance: The mediating role of employee pro-environmental behavior and the moderating role of gender. *Sustainable Production and Consumption*, *27*, 1138-1148.

Aitken, R., Watkins, L., Williams, J., & Kean, A. (2020). The positive role of labelling on consumers' perceived behavioural control and intention to purchase organic food. *Journal of Cleaner Production*, *255*, 120334.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology*, *32*(4), 665-683.

Ajzen, I. (2005). *Attitudes, personality, and behavior*. McGraw-Hill Education (UK).

Ajzen, I. (2006). Constructing a theory of planned behavior questionnaire. Obtained on 26.12.2020 from http://people.umass.edu/~aizen/pdf/tpb.measurement.pdf

Ajzen, I., & Driver, B. L. (1991). Prediction of leisure participation from behavioral, normative, and control beliefs: An application of the theory of planned behavior. *Leisure Sciences*, *13*(3), 185-204.

Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*.

Ajzen, I., & Sheikh, S. (2013). Action versus inaction: Anticipated affect in the theory of planned behavior. *Journal of Applied Social Psychology*, *43*(1), 155-162.

Ateş, H. & Gül, K. S. (2018). Investigating of pre-service science teachers' beliefs on education for sustainable development and sustainable behaviors, *International Electronic Journal of Environmental Education, 8*(2), 105-122.

Ateş, H. (2020a). Merging theory of planned behavior and value identity personal norm model to explain pro-environmental behaviors, *Sustainable Production and Consumption, 24*, 169-180.

Ateş, H. (2020b). Pre-service science teachers' perceptual biases regarding sustainable food consumption: Negative footprint illusion, *International Journal of Research in Education and Science, (IJRES), 6*(4), 599-612.

Ateş, H. (2021). Understanding students' and science educators' eco-labeled food purchase behaviors: extension of theory of planned behavior with self-identity, personal norm, willingness to pay, and eco-label knowledge. *Ecology of Food and Nutrition, 60*(4), 454-472.

Bahadoran, Z., Mirmiran, P., Golzarand, M., Hosseini-Esfahani, F., & Azizi, F. (2012). Fast food consumption in Iranian adults; dietary intake and cardiovascular risk factors: Tehran Lipid and Glucose Study. *Archives of Iranian Medicine*, *15*(6), 346-351.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, *51*(6), 1173.

Bereket, A., & Atay, Z. (2012). Current status of childhood obesity and its associated morbidities in Turkey. *Journal of Clinical Research in Pediatric Endocrinology, 4*(1), 1-7.

Birdsall, S. (2014). Measuring student teachers' understandings and self-awareness of sustainability. *Environmental Education Research*, *20*(6), 814-835.

Bloodhart, B., & Swim, J. K. (2020). Sustainability and consumption: What's gender got to do with it. *Journal of Social Issues*, *76*(1), 101-113.

Bodzin, A., Klein, B. S., & Weaver, S. (Eds.). (2010). *The inclusion of environmental education in science teacher education*. Springer Science & Business Media.

Burmeister, M., & Eilks, I. (2012). An example of learning about plastics and their evaluation as a contribution to Education for Sustainable Development in secondary school chemistry teaching. *Chemistry Education Research and Practice*, *13*(2), 93-102.

Casas Jr, E. V., Pormon, M. M., Manus, J. J., & Lejano, R. P. (2021). Relationality and resilience: Environmental education in a time of pandemic and climate crisis. *The Journal of Environmental Education*, *52*(5), 314-324.

Chin, W. W., Gopal, A., & Salisbury, W. D. (1997). Advancing the theory of adaptive structuration: The development of a scale to measure faithfulness of appropriation. *Information Systems Research*, *8*(4), 342-367.

Chou, S.Y., Grossman, M., & Saffer, H., (2004). An economic analysis of adult obesity: results from the behavioral risk factor surveillance system. *Journal of Health Economics, 23*, 565–587.

Cohen, J. (1992). A power primer. *Quantitative Methods in Psychology, 112*(1), 155-159.

Çoker, E. N., & van der Linden, S. (2020). Fleshing out the theory of planned of behavior: Meat consumption as an environmentally significant behavior. *Current Psychology*, 1-10.

de Leeuw, A., Valois, P., Ajzen, I., & Schmidt, P. (2015). Using the theory of planned behavior to identify key beliefs underlying pro-environmental behavior in high-school students: Implications for educational interventions. *Journal of Environmental Psychology*, *42*, 128-138.

do Prado, N. B., & de Moraes, G. H. S. M. (2020). Environmental awareness, consumption of organic products and gender. *Revista de Gestão, 27*(4), 353-368.

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. *Journal of Social Issues*, *56*(3), 425-442.

Dunn, K. I., Mohr, P., Wilson, C. J., & Wittert, G. A. (2011). Determinants of fast-food consumption. An application of the theory of planned behaviour. *Appetite, 57*(2), 349-357.

Edgerton, E., Romice, O., & Spencer, C. (2021). *Environmental psychology: Putting research into practice*. Cambridge Scholars Publishing.

Egemen, İ. (2019). Türkiye'de obezitenin sosyoekonomik belirleyicileri. *Uluslararası İktisadi ve İdari İncelemeler Dergisi*, (25), 57-70.

Erem, C. (2015). Prevalence of overweight and obesity in Turkey. *IJC Metabolic & Endocrine*, *8*, 38-41.

Evans, C. E. L., Greenwood, D. C., Thomas, J. D., & Cade, J. E. (2010). A cross-sectional survey of children's packed lunches in the UK: food-and nutrient-based results. *Journal of Epidemiology & Community Health*, *64*(11), 977-983.

Feeley, A., Pettifor, J. M., & Norris, S. A. (2009). Fast-food consumption among 17-year-olds in the Birth to Twenty cohort. *South African Journal of Clinical Nutrition*, *22*(3), 118-123.

Feldman, A., & Nation, M. (2015). Theorizing sustainability: An introduction to science teacher education for sustainability. In *Educating science teachers for sustainability* (pp. 3-13). Springer, Cham.

Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior: The reasoned action approach*. New York: Taylor & Francis Group.

Food and Agriculture Organization (FAO). (2014). *Food and nutrition in numbers*. Retrieved from http://www.fao.org/publications/card/en/c/9f31999d-be2d-4f20-a645-a849dd84a03e/

Fraenkel, J.R., Wallen, N. & Hyun, H.H. (2012), *How to design and evaluate research in education*, McGraw-Hill, Ney York, NY.

Funk, A., Sütterlin, B., & Siegrist, M. (2020). Consumer segmentation based on Stated environmentally-friendly behavior in the food domain. *Sustainable Production and Consumption*, *25*, 173-186.

Gallego-Schmid, A., Mendoza, J. M. F., & Azapagic, A. (2019). Environmental impacts of takeaway food containers. *Journal of Cleaner Production*, *211*, 417-427.

Gough, A. (2008). Towards more effective learning for sustainability: Reconceptualising science education. *TCI (Transnational Curriculum Inquiry)*, *5*(1), 32-50.

Han, H. (2015). Travelers' pro-environmental behavior in a green lodging context: Converging value-belief-norm theory and the theory of planned behavior. *Tourism Management*, *47*, 164-177.

Han, H., Hsu, L. T. J., & Lee, J. S. (2009). Empirical investigation of the roles of attitudes toward green behaviors, overall image, gender, and age in hotel customers' eco-friendly decision-making process. *International Journal of Hospitality Management*, *28*(4), 519-528.

Han, H., Meng, B., & Kim, W. (2017). Bike-traveling as a growing phenomenon: Role of attributes, value, satisfaction, desire, and gender in developing loyalty. *Tourism Management*, *59*, 91-103.

Hartmann, C., & Siegrist, M. (2017). Consumer perception and behaviour regarding sustainable protein consumption: A systematic review. *Trends in Food Science & Technology*, *61*, 11-25.

Hawcroft, L. J., & Milfont, T. L. (2010). The use (and abuse) of the new environmental paradigm scale over the last 30 years: A meta-analysis. *Journal of Environmental Psychology*, *30*(2), 143-158.

Hestness, E., McGinnis, J. R., & Breslyn, W. (2015). Integrating sustainability into science teacher education through a focus on climate change. In *Educating Science Teachers for Sustainability* (pp. 143-162). Springer, Cham.

Hodson, D. (2014). Learning science, learning about science, doing science: Different goals demand different learning methods. *International Journal of Science Education*, *36*(15), 2534-2553.

Jia, F., & Yu, H. (2021). Action, communication, and engagement: how parents "ACE" children's pro-environmental behaviors. *Journal of Environmental Psychology*, *74*, 101575.

Keith, R. J., Given, L. M., Martin, J. M., & Hochuli, D. F. (2021). Urban children's connections to nature and environmental behaviors differ with age and gender. *Plos One*, *16*(7), e0255421.

Kenny, D. A., & Judd, C. M. (2014). Power anomalies in testing mediation. *Psychological Science, 25*(2), 334–339.

Kim, K. W., Ahn, Y., & Kim, H. M. (2004). Fast food consumption and related factors among university students in Daejeon. *Korean Journal of Community Nutrition*, *9*(1), 47-57.

Kim, M., Wagner, D., & Jin, Q. (2021). Tensions and hopes for embedding peace and sustainability in science education: stories from science textbook authors. *Canadian Journal of Science, Mathematics and Technology Education*, *21*(3), 501-517.

Laroche, M., Bergeron, J., & Barbaro-Forleo, G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing*, *18*(6), 503-520.

Lassen, A. D., Lehmann, C., Andersen, E. W., Werther, M. N., Thorsen, A. V., Trolle, E., ... & Tetens, I. (2016). Gender differences in purchase intentions and reasons for meal selection among fast food customers–Opportunities for healthier and more sustainable fast food. *Food Quality and Preference*, *47*, 123-129.

Lazaric, N., Le Guel, F., Belin, J., Oltra, V., Lavaud, S., & Douai, A. (2020). Determinants of sustainable consumption in France: the importance of social influence and environmental values. *Journal of Evolutionary Economics*, *30*(5), 1337-1366.

Lederman, N. & Niess, M. (1998). Survival of the fittest. *School Science and Mathematics*, *98*(4), 169–172.

Lehman, P. K., & Geller, E. S. (2004). Behavior analysis and environmental protection: Accomplishments and potential for more. *Behavior and Social Issues*, *13*(1), 13-33.

Levy, A., Orion, N., & Leshem, Y. (2018). Variables that influence the environmental behavior of adults. *Environmental Education Research*, *24*(3), 307-325.

Liere, K. D. V., & Dunlap, R. E. (1980). The social bases of environmental concern: A review of hypotheses, explanations and empirical evidence. *Public Opinion Quarterly*, *44*(2), 181-197.

Liobikienė, G., & Minelgaitė, A. (2021). Energy and resource-saving behaviours in European Union countries: The Campbell paradigm and goal framing theory approaches. *Science of the Total Environment*, *750*, 141745.

Liu, M. T., Liu, Y., & Mo, Z. (2020). Moral norm is the key An extension of the theory of planned behaviour (TPB) on Chinese consumers' green purchase intention. *Asia Pacific Journal of Marketing and Logistics*, *32*(8), 1823-1841.

MacKerron, B. C. (2015). *Waste and Opportunity 2015: Environmental Progress and Challenges in Food, Beverage, and Consumer Goods Packaging*. The Natural Resources Defence Council and As You Sow, Oakland (USA), p. 62.

McDonald, J. T., & Dominguez, L. A. (2010). Professional preparation for science teachers in environmental education. In *The inclusion of environmental education in science teacher education* (pp. 17-30). Springer, Dordrecht.

Meldrum, R. J., Little, C. L., Sagoo, S., Mithani, V., McLauchlin, J., & De Pinna, E. (2009). Assessment of the microbiological safety of salad vegetables and sauces from kebab take-away restaurants in the United Kingdom. *Food Microbiology*, *26*(6), 573-577.

Meng, B., Chua, B. L., Ryu, H. B., & Han, H. (2020). Volunteer tourism (VT) traveler behavior: merging norm activation model and theory of planned behavior. *Journal of Sustainable Tourism*, 1-23.

Mi, L., Qiao, L., Xu, T., Gan, X., Yang, H., Zhao, J., ... & Hou, J. (2020). Promoting sustainable development: The impact of differences in cultural values on residents' pro-environmental behaviors. *Sustainable Development*, *28*(6), 1539-1553.

Mirkarimi, K., Mansourian, M., Kabir, M. J., Ozouni-Davaji, R. B., Eri, M., Hosseini, S. G., ... & Charkazi, A. (2016). Fast food consumption behaviors in high-school students based on the Theory of Planned Behavior (TPB). *International Journal of Pediatrics*, *4*(7), 2131-2142.

National Research Council (NRC). (1996). *National science education standards*. Washington, DC: National Academy Press.

Nguyen, V., Nguyen, N., Schumacher, B., & Tran, T. (2020). Practical application of plan–do–check–act cycle for quality improvement of sustainable packaging: A case study. *Applied Sciences*, *10*(6332), 1-15.

North American Alliance for Environmental Education (NAAEE). (2000). *The guidelines for the initial preparation of environmental educators*. Washington, DC: North American Association for Environmental Education.

Norton, T. A., Parker, S. L., Zacher, H., & Ashkanasy, N. M. (2015). Employee green behavior: A theoretical framework, multilevel review, and future research agenda. *Organization & Environment*, *28*(1), 103-125.

Nunnally, J. O. (1978). *Psychometric theory*. New York: McGraw-Hill.

Offer, A., Pechey, R., & Ulijaszek, S. (2010). Obesity under affluence varies by welfare regimes: the effect of fast food, insecurity, and inequality. *Economics & Human Biology*, *8*(3), 297-308.

Orr, D.W. (1992). *Ecological literacy; education and the transition to a postmodern world*. Albany, NY: State University of New York Press.

Padgett, B. C., Kim, H., Goh, B. K., & Huffman, L. (2013). The usefulness of the theory of planned behavior: Understanding US fast food consumption of generation Y Chinese consumers. *Journal of Foodservice Business Research*, *16*(5), 486-505.

Pallant, J. (2020). *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSS*, Routledge.

Paul, J., Modi, A., & Patel, J. (2016). Predicting green product consumption using theory of planned behavior and reasoned action. *Journal of retailing and consumer services*, *29*, 123-134.

Pienaar, E. F., Lew, D. K., & Wallmo, K. (2015). The importance of survey content: testing for the context dependency of the New Ecological Paradigm Scale. *Social Science Research*, *51*, 338-349.

Preacher, K. J., & Leonardelli, G. J. (2020). *Calculation for the Sobel test.An interactive calculation tool for mediation tests*. Available at http://quantpsy.org/sobel/sobel.htm

Raghu, S. J., & Rodrigues, L. L. (2020). Behavioral aspects of solid waste management: A systematic review. *Journal of the Air & Waste Management Association*, *70*(12), 1268-1302.

Rosenthal, G., & Rosenthal, J. A. (2011). *Statistics and data interpretation for social work*. Springer publishing company.

Rydell, S. A., Harnack, L. J., Oakes, J. M., Story, M., Jeffery, R. W., & French, S. A. (2008). Why eat at fast-food restaurants: reported reasons among frequent consumers. *Journal of the American Dietetic Association*, *108*(12), 2066-2070.

Sahin, E., Alper, U., & Oztekin, C. (2021). Modelling pre-service science teachers' pro-environmental behaviours in relation to psychological and cognitive variables. *Environmental Education Research*, *27*(1), 1-21.

Satimanon, T., & Weatherspoon, D. D. (2010). Hedonic analysis of sustainable food products. *International Food and Agribusiness Management Review*, *13*(4), 57-74.

Schmitt, J., & Jones, J. (2013). Slow Progress for Fast-food Workers. Available at: http:// http://cepr.net/documents/publications/fast-food-workers-2013-08.pdf. (Accessed 08 January 2021).

Seo, H. S., Lee, S. K., & Nam, S. (2011). Factors influencing fast food consumption behaviors of middle-school students in Seoul: an application of theory of planned behaviors. *Nutrition Research and Practice*, *5*(2), 169-178.

Shi, J., Visschers, V. H., Bumann, N., & Siegrist, M. (2018). Consumers' climate-impact estimations of different food products. *Journal of Cleaner Production*, *172*, 1646-1653.

Shokri, A., Oglethorpe, D., & Nabhani, F. (2014). Evaluating sustainability in the UK fast food supply chain. *Journal of Manufacturing Technology Management*, *25*(8), 1224 – 1244.

Siegrist, M., & Hartmann, C. (2019). Impact of sustainability perception on consumption of organic meat and meat substitutes. *Appetite*, *132*, 196-202.

Skamp, K., & Preston, C. (2020). *Teaching primary science constructively*. Cengage AU.

Smithson, M. J. (2003). *Confidence intervals.* Thousand Oaks, CA: Sage

Solís-Espallargas, C., & Morón-Monge, H. (2020). How to Improve Sustainability Competences of Teacher Training? Inquiring the Prior Knowledge on Climate Change in Primary School Students. *Sustainability*, *12*(16), 1-17.

Stern, P. C. (2000). New environmental theories: toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, *56*(3), 407-424.

Stern, P. C., Young, O. R., & Druckman, D. (1992). *Global environmental change: Understanding the human dimensions*. Washington, DC: National Academy Press.

Stratton, S. K., Hagevik, R., Feldman, A., & Bloom, M. (Eds.). (2015). *Educating science teachers for sustainability*. Springer.

Tabachnick, B., G. & Fidell, L. S. (2019). *Using multivariate statistics* (7th ed.). New York, NY: Pearson.

Taufique, K. M. R., & Vaithianathan, S. (2018). A fresh look at understanding Green consumer behavior among young urban Indian consumers through the lens of Theory of Planned Behavior. *Journal of Cleaner Production*, *183*, 46-55.

TechNavio, (2016). *Global Delivery and Takeaway Food Market 2016-2020*. TechNavio, Elmhurst (USA), p. 64.

Thøgersen, J. (2009). The motivational roots of norms for environmentally responsible behavior. *Basic and Applied Social Psychology*, *31*(4), 348-362.

Timmis, A., Townsend, N., Gale, C., Grobbee, R., Maniadakis, N., Flather, M., ... & Vardas, P. (2018). European Society of Cardiology: cardiovascular disease statistics 2017. *European Heart Journal*, *39*(7), 508-579.

Tippins, D., Pate, P. E., Britton, S., & Ammons, J. (2015). A fork in the road: reclaiming a conversation on sustainability for science teacher education in the Anthropocene. In *Educating Science Teachers for Sustainability* (pp. 69-87). Springer, Cham.

Trott, C. D., & Weinberg, A. E. (2020). Science Education for Sustainability: Strengthening Children's Science Engagement through Climate Change Learning and Action. *Sustainability*, *12*(16), 6400.

Tukker, A., & Jansen, B. (2006). Environment impacts of products - a detailed review of studies. *Journal of Industrial Ecology*, *10*(3), 159–182.

United Nations Development Programme, (2016). *Sustainable Development Goals*, retrieved from http://www.undp.org/content/undp/en/home/sustainable-development-goals.html on 03.11.2018.

United Nations Educational, Scientific and Cultural Organisation [UNESCO]. (2005). *GuideLines and Recommendations for Reorienting Teacher Education to Address Sustainability*. Education for sustainable development in action. Technical Paper No. 2. France: UNESCO.

Varah, F., Mahongnao, M., Pani, B., & Khamrang, S. (2020). Exploring young consumers' intention toward green products: applying an extended theory of planned behavior. *Environment, Development and Sustainability*, 1-15.

Vassallo, M., Scalvedi, M. L., & Saba, A. (2016). Investigating psychosocial determinants in influencing sustainable food consumption in Italy. *International Journal of Consumer Studies*, *40*(4), 422-434.

Vermeir, I., & Verbeke, W. (2008). Sustainable food consumption among young adults in Belgium: Theory of planned behavior and the role of confidence and values. *Ecological Economics*, *64*, 542-553.

Vicente-Molina, M. A., Fernández-Sainz, A., & Izagirre-Olaizola, J. (2018). Does gender make a difference in pro-environmental behavior? The case of the Basque Country University students. *Journal of Cleaner Production*, *176*, 89-98.

Walshe, N. (2008). Understanding students' conceptions of sustainability. *Environmental Education Research*, *14*(5), 537-558.

Wang, R. (2009). *Sustainable consumption from the consumer's prespective: a study on the purchase intention of green food in China.* Master's Thesis, University of Bedfordshire, Bedfordshire, UK,

Watkins, F., & Jones, S. (2015). Reducing adult obesity in childhood: Parental influence on the food choices of children. *Health Education Journal*, *74*(4), 473-484.

Whitley, C. T., Takahashi, B., Zwickle, A., Besley, J. C., & Lertpratchya, A. P. (2018). Sustainability behaviors among college students: An application of the VBN theory. *Environmental Education Research*, *24*(2), 245-262.

World Health Organization. (2015). Health in 2015: From MDGs to SDGs. Retrieved from: www.who.int/gho/publications.

World Wildlife Fund (WWF) (2016). *Living Planet Report 2016. Risk and resilience in a new era*. WWF International, Gland, Switzerland.

Wray-Lake, L., Flanagan, C. A., & Osgood, D. W. (2010). Examining trends in adolescent environmental attitudes, beliefs, and behaviors across three decades. *Environment and Behavior*, *42*(1), 61-85.

Yadav, R., & Pathak, G. S. (2016). Young consumers' intention towards buying green products in a developing nation: Extending the theory of planned behavior. *Journal of Cleaner Production*, *135*, 732-739.

Yardimci, H., Ozdogan, Y., Ozcelik, A. O., & Surucuoglu, M. S. (2012). Fast-food consumption habits of university students: The sample of Ankara. *Pakistan Journal of Nutrition*, *11*(3), 265–269.

Yazdanpanah, M., & Forouzani, M. (2015). Application of the Theory of Planned Behaviour to predict Iranian students' intention to purchase organic food. *Journal of Cleaner Production*, *107*, 342-352.

Yıldırım, Ç. B., & Semiz, G. K. (2019). Future teachers' sustainable water consumption behavior: A test of the Value-Belief-Norm Theory. *Sustainability*, *11*(1558), 1-18.