PREDICTORS OF MIDDLE SCHOOL STUDENTS' ENERGY CONSERVATION BEHAVIORS: INDICATIONS FROM VALUE-BELIEF-NORM THEORY

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ABSTRACT

PREDICTORS OF MIDDLE SCHOOL STUDENTS' ENERGY CONSERVATION BEHAVIORS: INDICATIONS FROM VALUE-BELIEF-NORM THEORY

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The aim of this study was to investigate middle school students' energy conservation behaviors utilizing Value-Belief-Norm Theory. Furthermore, these students' value orientations, personal norms, ascription of responsibilities, awareness of consequences, environmental beliefs and predictors of energy conservation behaviors were examined. Data were collected from 549 middle school students at Sarıyer in İstanbul during May-June 2018. This study was designed as a correlational research. According to results of descriptive statistics, these middle school students had moderate level energy conservation behaviors and egoistic value orientations while they had higher levels of biospheric and altruistic value orientations, responsibility, personal norms and awareness through environment. The results of multiple linear regression analysis revealed that Value-Belief-Norm Theory could be used to explain middle school students' energy conservation behaviors. To be more specific, the predictors of middle school students' energy conservation behaviors were found as biospheric value orientations, personal norms and ascription of responsibility. In addition, a statistically significant relationship was found out between these students' biospheric value orientations, personal norms and ascription of responsibility.

Keywords: Energy, Conservation, Energy Education, Value-Belief-Norm Theory, Energy Literacy

ÖZ

ORTAOKUL ÖĞRENCİLERİNİN ENERJİ TASARRUFU DAVRANIŞLARININ BELİRLEYİCİLERİ: DEĞER-İNANÇ-NORM KURAMI AÇISINDAN GÖSTERGELERİ

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Bu çalışmanın amacı, ortaokul öğrencilerinin Değer-İnanç-Norm Teorisini kullanarak enerji tasarrufu davranışlarını incelemektir. Ayrıca, bu öğrencilerin değer yönelimleri, kişisel normları, sorumluluk bildirimi, enerji kullanımına yönelik sonuçların farkındalığı, çevresel inançları ve enerji tasarrufu davranışlarının yordayıcıları incelenmiştir. Veriler, Mayıs-Haziran 2018 döneminde İstanbul Sarıyer'de bulunan 549 ortaokul öğrencisinden toplanmıştır. Bu çalışma, bir korelasyon araştırması olarak tasarlanmıştır. Betimleyici istatistiklerin sonuçlarına göre, bu ortaokul öğrencileri orta düzeyde enerji koruma davranışlarına ve egoistik değer yönelimlerine sahipken, daha yüksek seviyelerde biyosferik ve özgecil değer yönelimleri, sorumluluk, kişisel normlar ve çevre duyarlılığına sahip olduğu sonucuna ulaşılmıştır. Çoklu doğrusal regresyon analizinin sonuçları, Değer-İnanç-Norm Teorisinin, ortaokul öğrencilerinin enerji tasarrufu davranışlarını açıklamak için kullanılabileceğini ortaya koydu. Araştırma verilerine göre, ortaokul öğrencilerinin enerji tasarrufu davranışlarının yordayıcıları, biyosferik değer yönelimleri, kişisel normlar ve sorumluluk bildirimi olarak bulundu. Ayrıca, bu

öğrencilerin biyosferik değer yönelimleri, kişisel normlar ve sorumluluk tanımlamaları arasında istatistiksel olarak anlamlı bir ilişki bulundu.

Anahtar Kelimeler: Enerji, Tasarruf, Enerji Eğitimi, Değer-İnanç-Norm Kuramı, Enerji Okuryazarlığı.

To my familiy

And

To my patient and devoted mom

Aynur Öztürk, Mustafa Öztürk and Sema Öztürk

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CHAPTER 1

INTRODUCTION

Environment provides lots of benefits not only for people but also for non-human kinds. First of all, it supplies basic needs to live and depot for natural resources such as fresh air, nutrition, home etc. From another perspective, environment behaves like a "sink" or "waste repository" in order to overcome residual substances that we generate and environment could be also regarded as a living area for living things (Dunlap & Catton 2002). To illustrate, human beings have treated air as "waste repository" by increasing the concentration of greenhouse gases but these gases have yielded an alteration in average global surface temperature. Such a condition adversely impacts habitats of living things and also whole vitality action. There is a limit of our planet which means, except from the previous acceptance that being deprived of food or energy resources supplied by ecology for communities but the ability of the universal ecosystem to bring the mentioned vital tasks smoothly is not infinite (Dunlap & Jorgenson, 2012). In addition, excessive amount of waste causes environmental problems since we as human beings disturb recycling or absorbing capability of nature. Dunlap and Catton (2002) states that excessive usage of its capability also causes trouble for natural resources and natural systems.

There is a common growing idea that environmental problems which yield today's most significant debates are due to human activities (Schultz, Gouveia, Cameron, Tankha, Schmuck & Franek, 2005). Energy consumption has risen very quickly and any energy resources may not compensate risen needs of energy. Therefore, some precautions are required to be undertaken to save energy resources and decrease environmental problems. Both human and non-human beings suffer from environmental problems which hinder creating a sustainable world. Every precaution having a potential to reduce energy consumption is very important for the improvement of the life conditions. In the early 1970s, many developed countries

and scientists started to work to find out some solutions about energy crisis and it was pointed out that conservation of energy is a very important solution and they have a common idea that one of the ways to energy conservation is to reduce the energy usage of individuals. (Erten, 2002).

World population is growing and global energy demand is rising but there are limited resources which are set by nature. Nonrenewable sources are commonly used as a source of energy (Hinrichs & Kleinbach, 2013). However, energy needs does not lessen and greenhouse gas emission is increased because of fossil fuels. After an increasing awareness on the destruction of the environment in the 1960s, environmental and ecological movements began. To illustrate, Stockholm Conference was held initially about global environmental concerns (UNEP, 1972). Sustainable development has been mentioned in the Bruntland Report "Our Common Future" (1987) in the sense that sustainable development consists of the highly correlated concepts environment and development. In accordance with *Agenda 21*, sustainable development and importance of education for it has become even more important and the energy issue was addressed in *Agenda 21* and it was emphasized that the way to acquisition and usage of energy is non-sustainable (UNCED, 1992). Furthermore, energy needs are still increasing.

Energy has an outmost importance in daily life and fossil fuels such as petrol, natural gas, coal considered as nonrenewable are mostly used for energy demands. With the development of technology, demand for energy has begun to increase and more fossil fuels have been consumed to meet growing energy needs. According to Farhar (1994), the reason for environmental problems such as "energy sources depletion", "greenhouse gas emissions" and "global climate change" is basically because of producing and consuming energy. Usage of fossil fuels leads to an increase in greenhouse gases which has various environmental impacts over time. Although climate change and energy sources are important problems concerning humanity, not consuming clean energy resouces causes global warming and energy shortage (Zhao et al., 2015). Energy consumption increases day by day but this situation release

greenhouse gases to the atmosphere. Consequently, rising amount of greenhouse gases have adverse impacts on not only humans but also all living things and ecosystems. Increase in actions requiring energy consumption unfortunately, causes depletion of natural resources and leads environmental problems including climate change (IPCC, 2014).

According to recent trends reported by Wang and Moriarity (2017), both in OECD and non-OECD countries except low-income domiciles energy resources are used for domestic activities such as heating, operating electronic devices etc. In other words, household energy consumption makes up a significant part of whole energy usage. Domestic energy conservation behaviors have an important point in saving energy. According to U.S. Energy Information Administration (2010), nearly %14 of the total energy usage is constituted by domestic energy. On the other hand, electricity demand and consumption arouse because of the rise in family revenue and advance in technological devices, and as a reason of that greenhouse gas emission has increased. With the development of technology, energy need is increased and electricity is used for enlightment and also for technological devices such as washing machine, refrigerator, television, etc. (Sahin, 2013).

The world population is tending to increase day by day and this creates a global potential to increase in the number of students and schools. According to Carter (2012), science education makes it possible critical thinking and to encourage making effort for a more sustainable, equitable world. To cope with the problems about environment caused by energy usage students should be environmentally literate. As indicated by Stevenson (2007), environmentally literate person has higher level responsible environmental behavior to prevent environmental problem. According to Roth (1968), “environmentally literate citizen” is defined as who has a fundamental consciousness, awareness and understanding on environment. However, Roth (1992) has expressed that environmental literacy also includes behaviors and problem solving skills except from environmental attitude and knowledge. Likewise, Dickey and Roth (as cited in Roth, 1992) emphasized environmental literacy has

many elements such as “knowledge, sensitivity, awareness, concerns and personal responsibility on environment”. In order to reduce energy usage and decrease energy related environmental problems all citizens include students should take some responsibilities. Being an energy literate citizen has a significant importance about to understand effects of over usage of energy, knowledge about energy and energy conservation, for sustainability choosing and deciding convenient energy sources (Barrow & Morrisey, 1989; DeWaters & Powers, 2013).

In the present study Value-Belief-Norm Theory was used. The theory includes values, awareness of consequences, ascription of responsibility, personal norms, the new environmental paradigm, and norm-activation model. Value-Belief-Norm Theory is used to explain major predictors of pro-environmental behaviors. Morover, this theory is able to find out environmental motive concerns, environmentally responsible behaviors and nature relatedness of individuals. In this aspect, the purpose of the present study is to explain the energy conservation behaviors of middle school students by using Value-Belief-Norm Theory, to define the predictors of energy conservation behaviors of students and examine the relationship between students’ energy conservation behaviors and universal values, personal norms, ascription of responsibilities, awareness of consequences and environmental beliefs.

1.1 Research Questions

Based on the goals of the present study, the following research questions guided this study:

1. What are the energy conservation behaviors of middle school students?

2. What are middle school students’ beliefs, values, and personal norms regarding household energy usage?

3. What is the relationship among middle school students' energy conservation behaviors, values, beliefs, and personal norms?

The problems were tested by hyphothesis given below;

H_o: The linear combination of personal norms, values, and beliefs is not significantly related to middle school students' energy conservation behaviors.

1.2 Definition of Key Terms

Energy: Energy is defined as "underlying currency that governs everything humans do with each other and with the natural environment that supports them" (KEEP, 2003, p.9).

Conservation: Conservation is defined as "management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations" (IUCN, 1980, section 1).

Energy Education: Energy Education goal is mainly to raise awareness of individuals about energy-related issues and to elucidate the relationship between energy and the environment for sustainability (Kandpal & Garg, 1999).

Value-Belief-Norm Theory: This is a theoretical framework that includes the components of values, awareness of consequences, ascription of responsibility, personal norms developed by Stern Dietz, Abel, Guagnano, and Kalof (1999) to determine pro-environmental behaviors.

Energy Literacy: The notion of energy literacy covers a broad scope of comprehension of energy that contains content knowledge, affective and behavioral issues (DeWaters & Powers, 2013).

1.3 Significance of the Study

Greenhouse gases which are released during using fossil fuels mostly emitted while generating and consuming energy. Greenhouse gases such as carbon dioxide (CO_2) create environmental problems. For example, one of the problems is climate change which affects every living thing's life and ecosystems in a negative way directly or indirectly. Furthermore, climate change has adverse consequences on physical, biological and human managed systems (IPCC, 2014). After an increasing awareness on the destruction of the environment in the 1960s, environmental and ecological movements began, and to illustrate in 1983 the United Nations (UN) created the World Commission on Environment and Development. Energy consumption and greenhouse gases emission should be minimized and behaviors, awareness and environmental attitudes of people important to make a sustainable movement. While fossil fuels are widely used as a source of energy, energy conservation could reduce carbon dioxide emissions (Hinrichs & Kleinbach, 2013). Therefore, energy consumption and in relation to this greenhouse gases emission should be minimized. As indicated by Bodzin, Fu, Peffer and Kulo (2013), school and science education courses are crucial for students to create and develop energy conservation behaviors, to create awareness about energy conservation. According to Dobson (2003), education is the key term to establish value and environmental citizenship for life-long and permanent sustainability. Education has a great impact to increase awareness about environmental problems and generate citizens who has a sustainable lifestyle. In other words, educating students who are the citizens of the future as environmentally literate people is considered as a way to create a sustainable world. Thus, the current study has intended to understand middle school students' energy conservation behaviors and the predictors of energy conservation behaviors.

Behavior is a guideline about our choices which have an influence on changes through surroundings (Rosa & Dietz, 1998). Behaviors concerning environmental issues lead to make environmental alteration (Stern, Young, & Druckman, 1992) and behaviors could be shaped by human's values (Schultz & Zelezny, 1999; Stern, 2000). In this aspect, behaviors, awareness, and environmental values of people are regarded to be vital to make a sustainable movement. Value-Belief-Norm (VBN) Theory as a theoretical framework was used in this study to examine middle school students' energy conservation behaviors and the determinants of these behaviors. A previous study sampling pre-service teachers in Turkey (Sahin, 2013) showed that VBN theory has a predictive power for energy conservation behaviors. Turkish population has a great number of young citizens and it is essential to enhance knowledge, awareness to make a sustainable world by changing attitudes and behaviors toward sustainability, creating awareness, gaining behaviors and responsibility. Education has been depicted as one of the key points to create environmental behaviors. In this regard, the purpose of the study is to determine Turkish middle school students' values, beliefs, norms, and behaviors pertinent to the energy conservation.

As regards the Turkish elementary science education curriculum (Ministry of National Education, 2018), it is intented to improve students' environmental subject knowledge such as local and global environmental problems, energy resources, conservation of resources, energy conservation, future problems if resources are not used efficiently, greenhouse effect, global warming, climate change reasons and its' effects on human and environment, sustainabilty etc. The current study is determining the energy consumption behaviors of the students and reveals the reasons behind these behaviors. There are limited research conducted about the topic especially for elementary students in Turkey and it is believed that the present study is important, expected to contributes to the literature and be helpful to curriculum developers.

CHAPTER 2

REVIEW OF LITERATURE

In this section, environmental education, energy education and energy conservation, theoretical framework and related studies will be explained. This chapter starts with environmental education, the purpose and historical process of environmental education. The second part is includes the terms energy education and energy conservation, examples of energy education application, the reasons of need for energy education and information about energy conservation. The last part of this chapter is composed of theoretical framework and related studies which were based on the same theoretical framework with the present study.

2.1. Environmental Education

With increasing environmental problems, environmental education has gained importance since the beginning of the 1970s. To be able to realize and solve the environmental problems, save nature and natural resources and organize a sustainable lifestyle education is the key point. Environmental problems could be overcome by improving environmental consciousness which is feasible only through education and environmental education (Orr, 1992). Environmental education is the address to overcome environmental problems and individuals should be knowledgeable and actively participate in daily life to solve environmental problems properly (UNESCO, 1978). Initially, it was mentioned in 1972 Stockholm Conference that the important role of education in dealing with environmental problems (UNEP, 1972). Then, the environmental education was firstly mentioned in "The Belgrade Charter" (UNESCO, 1975) and framework was created and "environmental literacy" defined during an international conference about environmental education in Tbilisi (UNESCO, 1977). In Belgrade Charter

environmental education purpose is defined as to improve individuals' awareness, environmental apprehension and understanding, skills to resolve problems related with environment, attitude, motivating force, willingness to participate in resolutions to environmental troubles and ability to prevent future problems. Environmental education has an evident role to play if the issues are to be provided with the knowledge, skills and attitudes which can modify the existing situation for the better. The role of education in the face of environmental problems and opportunities is therefore a crucial one. Environmental education was offered to integrated into the whole system of formal education at all levels to provide the necessary knowledge, understanding, values and skills needed by the general public and many occupational groups, for their participation in devising solutions to environmental concerns in Tbilisi declaration.

Tbilisi Declaration was a milestone in terms of identified the properties, objectives and teaching guidelines of environmental education (UNESCO, 1977). In this conference basic objectives of environmental education were shaped which were consisted from gaining knowledge, consciousness, value, attitude, skills for participation about environment and environmental problems, forecasting and contributing to the solution of environmental problems and take part in administration of improvement in environmental standard, to make the environmental differences arising from the coactions of people and societies understandable (UNESCO, 1977). Environmental education is expected to foster students for investigating the connection between human and environment, create an environmental morality, develop a sense of accountability towards the environment and improve favorable self-concept (Harvey 1976, Hammerman & Voelker 1987). In addition, environmental education helps to build environmental knowledge for individuals, also qualified and committed citizens for sustain balance between quality of life and quality of environment by providing them environmental information (Hungerford, Peyton & Wilke, 1980). According to Roth (1996) environmental education is a learning process to make today's learners' as an environmental literate individuals who has knowledge, attitude and problem solving skills with having

environmental conscience, awareness for present environmental problems and prevent from possible ones.

Environmental education has arised with a purpose of encouraging people to be environmentally literate (Teksoz, Sahin, & Tekkaya-Oztekin, 2012). The importance of environmental education has been supported by different studies in increasing the knowledge, attitude and behavior about environmental concerns. According to Prerdproa (2009) it is concluded that after participating environmental training students had increase in knowledge about environment and Bunprasert (2012) indicated that electricity saving and waste disposal knowledge was also increased. There is another research done with a group to detect environmental literacy whose participants composed of enrolled to and not enrolled to environmental education activities. The research results showed that participants who received environmental education had higher results than those who did not (Culen & Mony, 2003). When environmental education studies including primary and secondary schools were examined which were done between 1993 and 1999, it was determined that some environmental positive behaviors developed (Rickinson, 2001).

As indicated by Wright (2006), although there are different descriptions of environmental education, descriptions are similar in there is a relationship between people and the environment, and maintaining this relationship is necessary for the continuity of quality of life. Environmental education has an important role in becoming "environmentally literate" citizen acting behaviors towards creating more sustainable world.

2.2. Energy Education and Energy Conservation

World population expands and global energy demands rise but there are limited resources which are set by nature. Moreover, it is emphasized that energy consumption should be shaped by considering health, air and nature (UNCED,

1992). Energy efficiency programs in education could lead to create positive energy related behaviors, reduce energy usage and greenhouse gas releasing level while producing and wasting energy. The energy issue is addressed during *Agenda 21* and the result was that energy acquisition way, usage is non-sustainable and energy needs are increasing (United Nations 1992). As explained by UNESCO (2005), energy-related subjects are namely "environment, economy and society". These three dimensions have influence on welfare, therefore energy is one of the major aspects of the sustainable development and these three aspects are needed to be including in energy education. In this respect, it is emphasized that to decrease global warming "energy, energy education and energy efficiency" subjects are significantly important and increase in awareness for energy problems and energy, education has a great importance to act proper energy saving behaviors (DeWaters & Powers, 2011). Morover, DeWaters and Powers (2011) underline the significance of energy literacy which is interrelated with daily life in order to overcome energy related problems. According to Bloom, Fuentes, Holden and Feille (2015), energy related concerns have a crucial place in environmental education to ensure sustainability. Therefore implementing energy management program affects sustainable behaviors of students. Energy education is applied in different countries onwards 1979 (Hsu, Huang, Fu, & Teng, 2010). There are books for guiding on energy education which one of them is consist of energy activities related with energy production, conservation and resources for K-12 (Coon & Alexander, 1976). One another is multidisciplinary energy source book for grade 4 to grade 6 which was prepared by Ayers (1981). According to Kandpal and Garg (1999), aim of the energy education is basically to improve awareness related with energy concerns, to figure out the relationship between energy and environment and to maintain global sustainability.

According to World Conservation Strategy of International Union for Conservation of Nature (1980) conservation is defined as "management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations". Energy and energy conservation are so interrelated subjects that

students who are aware of energy subjects think that energy conservation should definitely take place in the next stage (Goldring & Osborne, 1994). Morover, there are researches in order to determine knowledge, attitudes, and behaviors of humans through energy related concerns. A research was done with the students, who are from grade 4 to grade 6, have been given a 9-day "energy conservation field trip program" and the impact of this education on students' energy conservation attitudes were explained. The results of the study showed that students had positive attitudes toward energy conservation after that energy conservation education program (Collins, et al. 1979). Another research was done by Kushler (1980) concluded that energy conservation instruction had positive impact on energy related attitudes and behaviors of students and those instructed students tend to save more energy. There is a research which examines energy conservation programs. Initially, students were informed about energy conservation throughout the academic year then they and their parents were self-reported by researchers. The research examines the alteration on environmental behaviors of students during one year. At the end of the research, it was concluded that energy conservation programs were successful in terms of behavioral changes through environment (Zografakis, Menegaki, & Tsagarakis, 2008).

Education has a crucial importance to solve energy related problems and apply sustainable behaviors. It could be concluded that energy literate citizen be able to take action about energy saving, to have knowledge about energy, to use energy properly, to take action about energy management and to make the proper decisions about energy conservation which are feasible with energy education. There is another example for energy education in Thailand. Energy education project held on in primary level to teach energy related subjects and educators were engaged in energy education programs (Fongsamootr, 2017). When students would be an energy literate person in terms of knowledge, behavior and affective perspective they will be able to make proper selection and actions in daily life related with energy issue (DeWaters & Powers, 2011). Rising awareness and content knowledge about energy subjects is possible through energy education program into curriculum in schools.

2.3 Theoretical Framework and Related Studies

Environmental behavior was investigated according to some variant theoretical aspects (Vining & Ebero, 2002). People do not perform participatory behaviours adequately because of missing knowledge, understanding, awareness and responsibility towards environmental conservation (Louber, Swanepeal & Chacko, 2001). Students who have favorable attitudes towards environmental responsibilities may be personally or collectively attempt about energy conservation (Lawrenz & Dantchik, 1985). Another study results show that although senior level high school students were interested in energy problems, students were found to have deficiencies in energy saving behaviors and correlational analyses of the research expressed that behaviors are more related with knowledge than affective feature. (Chen, Liu & Chen, 2015). A cavity between the value action states and their cognitive, affective actions has been identified as well as it has also been found that as age progress people are more resistant to change energy consumption behaviors (DeWaters & Powers, 2011).

A research was done to examine environmental literacy of high school students in Florida and results of behavior dimension of the study showed that students have knowledge environmentally responsible behavior (Bogan & Kromrey, 1996). Another study about "environmental behavior, knowledge and attitudes" was applied to secondary and junior college students in Singapore and the result for behavioral dimension students often showed positively environmental behavior (Ivy, Lee & Chun, 1998). There are cognitive and affective determinants that determine positive environmental behaviors in favor of the environment. It was claimed that underlying cause of environmental behaviors are proper and sufficient environmental knowledge and awareness or attitude (Ramsey & Rickson, 1977). However, the linear model of "knowledge-attitude-behavior" was not sufficient to explain the reasons of complicated human behaviors and a moral norm based approach "the Norm Theory" was improved by Schwarts (1977), which focus on personal norms that effective in explaining environmentally friendly behaviors. Nonetheless, research results

revealed that even though individuals have concerns about problems related to nature, they do not exhibit responsible behaviors in this direction (Kaplan, 2000; Schultz, 2000).

Environmental issues cause damages such as species lost and so energy conservation subject grap attention for researching (Gardner & Stern, 2002). In 1994, Stern and Dietz put forward a "value-basis theory" related with values and environmental attitudes in order to identify complex human environmentally responsible behaviors such as energy conservation behaviors. Theory is composed of environmental manners and behaviors based on mindfulness about destructive results to precious matters and precious matters are centered at either self, others or whole living creatures (Schultz, et al., 2005). "Value-Belief-Norm Theory" which is the theoretical framework of this study is including values, personal norms and environmental beliefs that include awareness of consequences, New Environmental Paradigm, ascription of responsibility (Schwartz, 1994; Stern & Dietz, 1994). One of the constructs of the theory is "Norm-Activation Model" which is able to identify pro-environmental behaviors accordingly personal norms and moral values claim that the norms might cause pro-environmental behaviors (Schwartz, 1977).

According to the theory there are three types of environmental attitudes considering values which are namely; egoistic, social-altruistic and biospheric. People who have egoistic environmental attitudes have an individualistic perspective about environment. This type of human interested in environment for own benefits and requisitions, social-altruistic value oriented attitudes has a view of pay attention to environmental troubles owing to negative influence on all human species, on the other hand biospheric oriented demeanors related with caring about human and non-human living things (Schultz, et al., 2005). Those three concerns are center upon values that are based on Schwartz's pattern of value styles and the design is suggested to categorize human values by Schwartz (1992, 1994). Some researchers concluded that not only recycling (Dunlap, Grieneeks, & Rokeach, 1983) but also having sense to gang up to preserve environment has a relationship with values

(Stern & Dietz, 1994). Stern and Dietz (1994) also claimed that human's participation in pro-environmental behaviors shaped by value orientations. "Self–transcendence" and "openness to change" values are interrelated with the altruistic and biospheric oriented concerns, on the contrary "self-enhancement" and "conservation" values are interrelated with the egoistic oriented demeanors (Sahin, 2013).

The motivation concerns of people and relationship with environment have been the subject of research that has attracted the attention of many researchers and educators (e.g., Dietz, Kalof & Stern, 2002; Nordlund & Garvill, 2002; and Steg et. al., 2005). There were other research concluded that there was a contradictory found between with egoistic and altruistic motive concerns (Sahin, 2016; Schmuck, 2003), on the other hand pro-environmental behaviors was found positively correlated with biospheric motive concerns in different studies (Milfont, Duckitt & Cameron, 2006; Schultz, Shriver, Tabanico & Khazian, 2004). In order to examine Turkish elementary students environmental motive concerns, environmentally responsible behaviors and nature relatedness a survey study was conducted (Bahar & Sahin, 2017). As result of the nature relatedness questionnaire students cannot establish a connection between human actions and the environment, for the environmentally responsible behaviors questionnaire it was concluded that it has been determined that students are more prone to individual actions for environmental protection and results for motive concerns dimension revealed that participants had more egoistic motive concerns in comparison to the altruistic and biospheric concerns. It was also emphasized egoistic participants were less tend to represent environmentally responsible behaviors. However, multiple linear regression analysis of Bahar and Sahin's study (2017), showed that middle school students' responsible environmental behaviors' predictors were found biospheric and altruistic motive concerns not egoistic concerns.

A research carried out by Sahin (2013) and results indicated that energy conservation behaviors were positively correlated with egoistic concerns. Other similar studies had

a conclusion those students who had biospheric and altruistic oriented values more likely to express pro-environmental behaviors (Gutierrez 1996; Schultz & Zelezny, 1999; Thompson & Barton, 1994). In 2012, a research was carried out to measure elementary students' value orientations, attitudes in terms of ecocentric, anthropocentric and apathy, also environmental concern according to gender (Onur, Sahin & Tekkaya, 2012). According to research results elementary school students' environmental attitudes gathering around ecocentric attitude and their value orientations were found to be egocentric. Nonetheless, the same study determine elementary school students' motive concerns about environmental constructs and the results of the study showed that participants' motive concerns were egoistic and biospheric for protection of environment (Onur et al., 2012).

In 2001, Schultz carried out a study to determine environmental attitudes with the help of value-basis theory and the results of the study showed that altruistic and biospheric value orientations were negatively related with conservation (Schultz, 2001). In addition there is a research done by Schultz and Zelezny (1999) and results also support biospheric and altruistic value orientations effects personal encouragement in terms of pro-environmental behaviors. According to Murray and Murray (2007), values come which are shaped by attitudes and beliefs are meaningful predictors for behaviors. Although it is clear that values and attitudes have a great impact on behaviors, Murray and Murray found it as a controversial issue that whether the values are the main determinants of behavior or the attitudes which composed from values and beliefs affect behavior. In 1996, a study was conducted in Canada and it was revealed that people who have biocentric value orientations are more probably perform environmental behaviors (Steel, 1996). A study was revealed to uncover the reasons for conservative and pro-environmental behaviors of students in different regions of New Zealand and it was revealed that while biospheric and altruistic value orientations have positive effects on pro-environmental behaviors, egoistic concerns has negatively impact on pro-environmental behaviors (Milfont, Duckitt & Cameron, 2006). In the Master Thesis of Bahar (2015), it was found that 7^{th} and 8^{th} grade level elementary students'

responsible environmental behaviors could be predict from biospheric value, altruistic value, nature relatedness self experience and nature relatedness perspective.

In 1987, Dunlap and Van Liere developed a method new environmental paradigm which differs from any other previous ones to explain environmental behavior. As a part of Value-Belief-Norm Theory, new environmental paradigm could be thought as a reflective aspect and as a reason for engagement of pro-environmental behaviors (Menzel & Bogeholz, 2010). On the contrary, Poortinga, Steg and Vlek (2004) and Vining and Ebreo (1992) conducted different research and revealed that paradigm was not a strong predictor for pro-environmental behaviors. A survey was conducted to determine daily environmental behaviors and new environmental paradigm questionnaire was used to examine attitudes toward environment of African American college students (Lee, 2008). According to questionnaire results of this study was that students have average level of pro-environmental behaviors. In addition, a questionnaire which was consisted of four sub-scales namely; "awareness of environmental problems, national environmental problems, solutions to the problems and awareness of individual responsibility" applied to different elementary level students and results revealed that participants had average scores in total (Tuncer, Sungur, Tekkaya & Ertepınar, 2007).

Hines, Hungerford and Tomera (1986/87) carried out a study to examine the predictors of environmental friendly behavior and according to that study's researchers one of the psycho-social dimensions is "personal responsibility". The results of the study concluded that an individual who has higher level of personal responsibility more likely to perform environmentally friendly behaviors. Another study was conducted to examine attitudes towards environment, recycling and conservation behaviors of African American college students. In order to analyze students' attitudes New Environmental Paradigm questionnaire was used and the results indicated that participants had moderate level of environmental attitudes. Interpreting the conservation and recycling behaviors of the students a survey was

used and it was concluded that participants were insufficient (Lee, 2008). One another research results show that predictors of middle school students' energy saving behavior was both the the ascription of responsibility and awareness of consequences (Akitsu, Ishihara, Okumura & Yamasue, 2017). Akitsu and Ishihara (2018), conducted a research for investigating the predictors of energy saving behavior and energy knowledge of secondary school students in Japan. In base of Value-Belief-Norm Theory and Theory of Planned Behavior awareness of consequences dimension was found as a dominant determinant for causal connection between energy knowledge and energy saving behavior. Nonetheless, ascription of responsibility, personal norm were also able to predict and explain more than half of the variance attitude toward behavior of the students.

Sahin (2016) conducted a study in order to define pre-service elementary science teachers' gender related household energy conservation behaviors. The results of the study revealed that energy conservation behaviors of female participants were positively related with biospheric value orientations and personal norms. Altruistic value orientations, awareness of consequences and the paradigm found as a encouragement factor for responsibility about decrease in energy usage and the results showed that New Environmental Paradigm and awareness of consequences had almost equal effect on energy conservation responsibility. In addition, the researcher emphasized that individual who had dominantly biospheric value orientations appeared to be more careful in use of energy. Another result for the research is that ascription of responsibility was found in strong relationship with altruistic and biospheric value orientations. One another study of Sahin (2013) was conducted to examine pre-service elementary teachers' energy conservation behaviors with the help of Value-Belief-Norm theoretical framework. Multiple linear regression analysis was used to found predictors of energy conservation behaviors and it is concluded that personal norms, egoistic and biospheric value orientations were successfully able to explain those behaviors. A study was done with university students in order to clarify sustainable behaviors and the predictors by using Value-Belief-Norm theory and the results showed that although each value orientations

related with different sustainable behaviors, biospheric values were more probable determinators of all kind of behaviors (Whitley, Takahashi, Zwickle, Besley, and Lertpratchya, 2016).

To sum up, there were some researches which were done to analyze participants' environmental behaviors, energy conservation behaviors and clarify the reasons behind them. There are differences and similarities in different types of studies. For example, in some similar researches it was found that behaviors were found in a positive relation with biospheric value orientations. On the contrary, one another research result shows that students' environmental attitudes were ecocentric although value orientations were found egocentric. This study is expected to be able to explain the energy conservation behaviors and the determinants of those behaviors. The result of the present study would expect to supply information to literature and developers, and help to make behavioral changes by regulations in curriculum.

CHAPTER 3

METHOD

In this chapter, the information about research design, population and sample, data collection tools used in the study, validity and reliability of the instruments, procedure, data collection and data analysis process were included. At the end of this chapter, assumptions, internal validty, ethics of the study were described.

3.1 Research Design

The study was carried out to investigate middle school students' energy conservation behaviors and the factors explaining these behaviors which are namely; personal norms, ascribed responsibility, awareness of consequences, beliefs on human-nature interactions, and value orientations. For this specified purpose, correlational research was used in this study. Correlational research study is defined as clarifying comprehension of significant phenomena by examining relationship between variables (Frankel, Wallen & Hyun, 2012). As to correlational study, to clarifying relationship between energy conservation behaviors and the other five constructs was defined with the guidance of VBN Theory.

3.2 Population and Sample

The target population of the study was defined as all the 8th grade level students at the public schools in İstanbul as a metropolitan city of Turkey. However, an accessible population was identified as 8th grade students from public schools in Sarıyer at a district of İstanbul; Turkey since it is not feasible to reach entire

population due to the limitations regarding time and effort. Participants were selected from the population by cluster random sampling method to collect data which provides the chance of being selected equally and independently for schools and classrooms (Frankel, Wallen & Hyun, 2012). Furthermore, according to Fraenkel et al. (2012), this is among the significant methods for large samples to represent the population interest. The sample of the main study covered 549 eighth grade students at public schools in Sariyer, İstanbul. Table 3.1 shows the demographic information of the participants which includes number of family members and gender distribution. As shown in the Table 3.1, gender distribution was almost equal and participants' number of family members mostly consists of four member.

Table 3.1 *Demographic Characteristics of the Participants*

Gender	**Frequency**	**Percent**
Girls	288	52.5
Boys	259	47.2
Total	547	99.6
Missing	2	.4
Total	549	100.0
# of Family Members	**Frequency**	**Percent**
2	11	2.0
3	66	12.0
4	258	47.0
5	156	28.4
6	52	9.5
More Than 6	6	1.1
Total	549	100.0

Table 3.2 presented information about the educational level of the parents. As shown in the table, the percentage of the parents who attained an undergraduate education

was low. In general, it was detected that mothers and fathers had primary, middle or high school education level as shown in Table 3.2.

Table 3.2 *Educational Level of Family of the Participants*

Educational Level	**Mother**		**Father**	
	Frequency	**Percent**	**Frequency**	**Percent**
Illiterate	12	2.2	1	.2
Primary School	166	30.2	111	20.2
Middle School	167	30.4	177	32.2
High School	148	27.0	184	33.5
Undergraduate	51	9.3	71	12.9
Total	544	99.1	544	99.1
Missing	5	.9	5	.9
Total	549	100.0	549	100.0

3.3 Data Collection Instruments

In this study the measurement tool has seven dimensions: Demographic Information, Energy Conservation Behaviors, Universal Values, Ascription of Responsibility, Awareness of Consequences, Personal Norms and New Environmental Paradigm. In terms of content validity, two experts in the field of science and environmental education were examined the instrument in terms of reasonability. To address the issues regarding construct related validity, exploratory factor analysis was carried out. Internal consistency of the each scale was examined by calculating Cronbach's Alpha values. With respect to Pallant (2005) Cronbach alpha values of each scale was calculated to decide internal consistency. According to Pallant (2005), internal consistency could be regarded as adequate when the Cronbach alpha value is between 0.60 and 0.70, good internal consistency if it is calculated as between 0.70 - 0.90 and 0.90 and higher Cronbach alpha values refers to excellent internal consistency. On the other hand, construct validity was examined by analyzing Kaiser

Meyer Olkin Value and Barlet sphericity of each dimension. Barlet sphericity ought to be supported when it is calculated as $p<0.05$ (Barlett, 1954) and Kaiser Meyer Olkin value is acceptable when it is calculated as higher than 0.6 (Tabachnick & Fideli, 2001). With all these criteria, pilot study was done in order to examine validity and reliability for each questionnaire. In pilot study, the sample was composed of 149 students at public middle schools in Sarıyer in İstanbul, and all the results were reported. Based on the results of the statistical analysis, reactive comments from the experts, and the responses from the participants during the pilot administration, the final version of the measuring tool was decided to be implemented with the participation of 8th grade level students at the same region in the main study.

3.3.1 Pilot Study

Pilot study was applied to analyze appropriateness of each questionnaire and to be able to make essential corrections and revisions through validity and reliability results. For the energy conservation behavior questionnaire in order to address construct validity of the scale, exploratory factor analysis was used to analyze factor structure. Students' energy conservation behaviors were investigated by the Turkish adapted version of the Ibtissem's questionnaire (2010). Translation and adaptation into Turkish was carried out by Sahin (2013). The initial Turkish version of the scale was applied to pre-service teachers by Sahin and the scale was found uni-dimensional.

To ensure circumstances for factorability of present research Kaiser-Mayer-Olkin and Barlett's value of the pilot study was detected. Barlett Spherity value of the pilot study was found significant (p =.000) and Kaiser Meyer Olkin was calculated as .758 which was as acceptable. Nonetheless, varimax rotation was utilized, Eigenvalues were larger than one and scree plot graph were investigated to identify how many factors the scale contains and factor loadings were also determined. However, the

item "*I leave the windows of my room open for a long time in the winter*." had a factor loading score less than .30. Therefore, this item was removed since it did not fit the uni-dimensional model. At the end of the pilot study for energy conservation behaviors, one item "*I share my thoughts on the energy resources or use of energy*" was added, one item "I *care to save energy*" was revised to "*I take concrete steps to reduce energy use*" in order to make it more comprehensive for middle school level students by considering construct validity. In addition, it was decided to study with middle school students since the students were familiar with terms in the questionnaire especially through the science courses until to be the 8th grade. Moreover, to address reliability issues Cronbach's alpha was calculated as 0.715. In this study Cronbach's alpha value is represents good internal consistency while being in the interval of 0.70-0.90.

After adminestering pilot study and doing necessary changes which were removing the item "*I leave the windows of my room open for a long time in the winter*", adding "*I share my thoughts on the energy resources or use of energy"* and revising the item *"I care to save energy*" to "*I take concrete steps to reduce energy use*" main study was conducted.

The original personal norms, ascription of responsibility and awareness of consequences questionnaires developed by Steg, Dreijerink, and Abrahamse (2005) and in 5-point Likert type ranging from 'strongly disagree' to 'strongly agree' ('1' = strongly disagree, '2' = disagree, '3' = undecided, '4' = agree, '5' = strongly agree). Turkish adapted version of the instruments were prepared by Sahin (2013). In the pilot study, Cronbach's alpha coefficient for personal norms questionnaire was found .85 for reliability of the instrument that indicates good internal consistency (Pallant, 2005). On the other hand, exploratory factor analysis was conducted to provide construct validity. Barlett Spherity value of the pilot study was supplied (.000) and Kaiser Meyer Olkin value was calculated as reasonable (.88). For exploratory factor analyses eigenvalues and screeplot graph were used to investigate number of factors

of the questionnaire. It was found one dimensional and fitted with the original model. Finally, under the light of pilot study no item has been revised or extracted.

In the present study, validity and reliability evidences were carried out for also ascription of responsibility instrument. Construct and content validty analyses were implemented and the questionnaire was found one-dimensional by Sahin (2013). Furthermore, it was found to represents a good internal consistency as a result of internal consistency evidences. Since the research was done with pre-sevices teacher, pilot study was performed with middle school students before main study. Kaiser Meyer Olkin value was calculated .73 and Barlett's sphericity was significant (p = *.000).* Varimax rotation technic was operated for principle component analysis to detect number factors the items loading on. It was found that the items were loading on one dimension as it was in the original scale.

Morover, Cronbach's alpha value was calculated .521 for reliability concern. Based on the corrected item-total correlation results and responses and reactive comments during the application of survey, items were revised. For instance, item-5 *"In principle, individuals alone cannot contribute to the solution of energy problems"* had a corrected item-total correlation results lower than .30 and negatively correlated (-.191). The item was revised to *"The measures we take as an individual contribute to the solution of energy problems"*. Nonetheless, one item was added *"I have my own responsibilities with other people in combating climate change*". At the end of the pilot study final form of the ascription of responsibility questionnaire was conducted.

For the awareness of consequences questionnaire to prove content validity of the instrument exploratory factor analysis was examined for the pilot study. Barlett's test result was concluded as significant and Kaiser Meyer Olkin value was calculated as .74 which indicates acceptable value (Tabachnick & Fideli, 2001). In addition, principle component factor analysis was performed with varimax rotation technique and eigenvalues and scree plot were used to decide number of factor. Sahin (2013)

found that the awareness of consequences questionnaire whose participants were pre-service teachers was one-dimensional based on validity results, there were 2 factors found in the pilot study items loading on. Internal consistency of total scale was estimated with the help of Cronbach's alpha value. In this pilot study, Cronbach's alpha value was found .60 for all eleven items of whole awareness o f consequences scale.

Finally, based on the results of awareness of consequences questionnaire's analyses, reactive comments from the advisor and feedbacks from the participants during the application one item *"I know the connection between climate change and people's energy consumption."* was added and three item of the scale was revised. The item *"Global warming is a serious problem for our country."* was changed into *"Climate change is a serious problem for our country."* the item *"The depletion of fossil fuels is not a problem."* was altered to *"The depletion of fossil fuel sources causes a shortage of energy and raw materials."* and the item *"It is unclear whether global warming is really a problem."* turned into *"I'm sure that global warming is really a problem."*. At the end of the changes there were 11 items in the scale for the main study.

The revised New Environmental Paradigm questionnaire (Dunlap, Liere, Mertig & Jones, 2000) was used to estimate students' beliefs on human-nature relation was evaluated. The instrument was a 5-point Likert type ('1' = strongly disagree, '2' = disagree, '3' = undecided, '4' = agree, '5' = strongly agree) and had 15 items and the negatively represented items were reversed. Adaptation of the tool was conducted by Ozsoy (2010). The conditions to supply factorability Kaiser Meyer Olkin value and Barlett's test of sphericity were checked. Kaiser Meyer Olkin value of the instrument in the pilot study was calculated as .70 and Barlett's test of sphericity was found significant ($p=.000$). All the conditions were sufficient for factorability. Nonetheless, varimax rotation was revealed while administering principle component factor analysis, scree plot graph and eigenvalues were detected and it was concluded that the scale had 5 factors. For the reliability concern Cronbach's alpha value was

estimated as .68. Pallant (2005) states that the scale has an adequate internal consistency if Cronbach's alpha value is between 0.60-0.70.

Universal values questionnaire whose short version was adapted from Stern, Dietz, and Guagno (1998) and applied by Steg, Dreijerink, and Abrahamse (2005) was utilized to evaluate students' values that were leading their life. There were 12 items representing values in the tool and students were asked to rate those values from 1 'not at all important' to 5 'of supreme importance'. The questionnaire had three value orientations which were namely egoistic, biospheric and altruistic. Egoistic value orientation consisted from 4 values; "*authority, social power, wealth, influential*"; biospheric value one comprised from "*preventing pollution, respecting the earth, unity with nature, protecting the environment*"; altruistic value orientation inclueded "*social justice, helpful, a world at peace, equality*".

According to analyses, it was found that there were three factors in the scale as stated in theoretical grounds. Three dimensions of value orientations were egoistic, biospheric and altruistic. For whole scale, Kaiser Meyer Olkin value was measured .77 indicating admissible result (Tabachnick & Fideli, 2001) and Barlett's Test of Sphericity was sufficient (*p=.000*) (Barlet, 1954). The model could explain more than half of the variance (57.75%).

Reliability of the instrument was investigated with measuring Cronbach's alpha values of the each value orientations. Cronbach's alpha value was calculated .56 for egoistic, .27 for biospheric and .71 for altruistic value orientation. Total item's Cronbach's alpha score was calculated as .67. Because of the instrument was applied before to pre-service teachers by Şahin (2013), items were revised with respect to the results and reactive comments of the experts. It was decided to administer questionnaire to middle school students and to make items more apprehensive for middle school students some expressions were found appropriate to be replaced with the information in the parenthesis.

3.3.2 Main Study

Main study was conducted with the participation of 549 middle school students from public schools in Sarıyer at a district in İstanbul. Demographic information of the participants was detected and validity and reliability analysis were also conducted for main study. To control construct validity of each questionnaire, exploratory factor analysis was used to analyze factor structure and to provide circumstances for factorability of present research Kaiser-Mayer-Olkin and Barlett's value of the main study was detected. Furthermore, for reliability issues Cronbach's alpha values were calculated for each questionnaire.

3.3.2.1 Demographic Information Questionnaire

Demographical survey was designed to provide information concerning the students' gender, the number of family members, parents' education level, source of information about energy conservation, their opinions about the regulations in school to encourage energy saving and about use of materials and tools that support energy efficiency in school.

Detailed information about main study participants' gender, the numbers of family members, parents' education level were given in Table 3.1 and Table 3.2. Regarding source of information about energy conservation, the participants were asked to select the sources listed which were internet, school board, teacher, TV, city boards in that they live, books, science journals and other.

On the other hand, there were two items in rating type ('3' = quite sufficient, '2' = sufficient, '1' = insufficient) scale which used to assess opinions about the regulations in school to encourage energy saving and evaluation about use of materials and tools that support energy efficiency in school.

3.3.2.2 Energy Conservation Behaviors Questionnaire

The present study was conducted with middle school students, and based on the validity and reliability evidences; the Turkish version was revised to be appropriate for middle school students. The energy conservation questionnaire includes energy conservation behaviors such as lightening, electricity usage, energy consumption etc. and in the present study the final version of the questionnaire consists of 8 items in 5-point scale ranging from 'never' to 'always' ('1' = never, '2' = rarely, '3' = sometimes, '4' = frequently, '5' = always). To ensure circumstances for factorability of present research Kaiser-Mayer-Olkin and Barlett's value of the pilot study was detected. Barlett spherity value of the main study was significant (p = .000) and Kaiser Meyer Olkin value was calculated as .84 which was reasonable for factor analysis of the study. Moreover, eigenvalues, scree plot and varimax rotation method results were investigated to make more meaningful the factorability. The scale explained 51,9% of the total variance and consisted of two factor model which was different from original scale. Two components' eigenvalues were found more than 1 which was acceptable for defining factor structure (Pallant, 2005).

Table 3.3 shows factor loadings of the energy conservation scale's items. First factor was could be named as "Indirect committment for energy conservation" with 3.094 eigenvalue and contains five items had a .79 Cronbach alpha value. On the other hand, second factor was named as "direct use of energy" with 1.065 eigenvalue and includes three items had a .31 Cronbach's alpha value. According to Brigss and Cheek (1986) and also mentioned by Pallant (2005), Cronbach alpha values could be low if the item numbers small and it is recommended optimal inter-item correlation mean range from .2 to .4.

The reliability of the total scale including 8 items and .76 Cronbach alpha's coefficient which shows good internal consistency based on Pallant (2005). On the other hand, the original scale and Turkish adapted version was found to have one-factor. However, different from original scale, the main study showed that this scale

has two-factor model after two items were removed which were "*I can turn off the devices like TV, computer, PlayStation from remote control and also button*" and "*I take concrete steps to reduce energy use*". These items were extracted from the scale since these items did not fit in any two factors, and the communalities were calculated below .30. Factor analysis did not fit the original model but this may be due to the characteristics of the samples. These research studies were conducted with the participation of different samples in terms of age, education, knowledge and awareness level, experiencess etc. Detailed information about Turkish adapted version and present study were shown in Table 3.4.

Table 3.3 *Factor Loadings of the Energy Conservation Behavior Questionnaire*

	Factor	
Items	**1**	**2**
I follow publications (documentaries, magazines, etc.) which include topics such as energy resources, energy saving.	**.769**	
I share my thoughts on energy resources or use.	**.757**	
I follow the topics such as energy resources and energy saving in my school.	**.744**	
I direct my family to use / buy energy-efficient products.	**.674**	
I direct my family / friends to save energy.	**.622**	
I turn off the unnecessary lights.		**.704**
I unplug the power tools when I finished.		**.654**
In the summer, I encourage my parents to open the windows instead of running the air conditioner or fan.		**.491**

Table 3.4 *Comparison of the Energy Conservation Behavior Questionnaire*

	Turkish Adapted Version	**This Study**
# of items	9	8
Dimensions	Uni-dimensional	Two dimensional
Cronbach Alpha Value	.72	.76

3.3.2.3 Personal Norms Questionnaire

In order to analyse construct validty in this study exploratory factor analysis was applied and Kaiser-Meyer-Olkin and Barlett's test was revealed. The Kaiser-Meyer-Olkin value was found .83 and Barlett sphericity value was significant (p = .000). Eigenvalues and scree plot were examined to define the number of factor of 9 items of the scale. There were two dimensions detected whose eigenvalues were higher than 1. Varimax rotation method was conducted and factor loadings were shown in the Table 3.5. However, different from the pilot study main study was loading to two factors and explained almost half of the total variance (48.5). These two factors could be categorized as "moral obligation on energy conservation" and "moral obligation to actively engage in energy conservation".

First component had 3.214 eigenvalue and contains four items related with "moral obligation on energy conservation" and had a Cronbach alpha value .69 and the other factor had 1.141 eigenvalue which was related with "moral obligation to actively engage in energy conservation" includes five items with .66 Cronbach's alpha value. For the main study reliability analysis was revealed through evaluation of Cronbach's alpha value. Cronbach's alpha value for whole scale of nine items was detected .77 which refers to good internal consistency (Pallant, 2005). By the way, internal consistency of the personal norm scale in the main study was calculated as acceptable. Table 3.6 shows the comparison results of Turkish version of the instrument done by Sahin (2013) topre-service teachers and present study.

Table 3.5 *Factor Loadings of the Personal Norm Questionnaire*

Item	Component 1	Component 2
Regardless of what others are doing, I feel a moral obligation to save energy.	**,758**	
Everyone like me should do anything they can do to reduce energy use.	**,754**	
I feel I am obliged to save as much energy as possible.	**,703**	
I feel that I should take nature and environment into account in my daily life.	**,465**	,418
I feel guilty when I buy imported products because to bring it from long distances causes energy consumption.		**,768**
If I'm going to buy a new washing machine, I feel a moral obligation to buy an energy-efficient product.		**,626**
I'm a better person if I save energy.		**,604**
I feel guilty when I waste energy.		**,593**
It is our moral obligation to use clean energy (solar, wind, geothermal energy) instead of fossil fuels.	,364	**,479**

Table 3.6 *Comparison of the Personal Norms Questionnaire*

	Turkish Adapted Version	**This Study**
# of items	9	9
Dimensions	Uni-dimensional	Two dimensional
Cronbach Alpha Value	.87	.77

3.3.2.4 Ascription of Responsibility Questionnaire

In main study, exploratory factor analysis was conducted for validity. Kaiser Meyer Olkin value was calculated .81 and Barlett' test score was significant which indicate the scale was support validity concern. Eigenvalue scores and scree plot graph shows that items were loading on one dimension that was overlap with the original and pilot scale. Only one dimension's eigenvalue was calculated larger than 1 which was 2.924. Varimax rotation used implementing principle component analysis and Table 3.7 shows items and factor numbers of items loading on. Consequently, the questionnaire was found one-dimensional and 48.7 % of variance was explained. Cronbach alpha score was calculated as .79 in the main study which indicates good reliability for investigating internal consistency with respect to Pallant (2005). In comparison, reliability of the main study was found greater than the pilot study and positively correlated item-total correlations of each item was greater than .30. Differences and similiarties in terms of number of items, dimensions and Cronbach alpha value between this study and Sahin's study was represented in Table 3.8.

Table 3.7 *Factor Loadings of the Ascription of Responsibility Questionnaire*

	Factor
Item	**1**
I'm responsible for energy issues with other people.	,743
I am responsible for the exhaustion of energy resources with other people.	,730
I have my own responsibilities with other people in the fight against climate change.	,718
I also have a responsibility in solving energy problems.	,716
Our individual measures also contribute to the solution of energy problems.	,654
I'm responsible for the global warming problem with other people.	,618

Table 3.8 *Comparison of the Ascription of Responsibility Questionnaire*

	Turkish Adapted Version	**This Study**
# of items	6	6
Dimensions	Uni-dimensional	Uni-dimensional
Cronbach Alpha Value	.80	.79

3.3.2.5 Awareness o f Consequences Questionnaire

To investigate the awareness of consequences reliability and validity concerns were evaluated after translation and adaptation into Turkish was completed by Sahin (2013). The scale was found one dimensional and had a good reliability (Sahin, 2013). In the main study in order to estimate validity, principle component factor analysis was conducted and to estimate reliability, internal consistency was analyzed for awareness of consequences scale.

Kaiser-Mayer-Olkin value was found .86 which was higher than the pilot study's value and Barlett's test of Sphericity was statistically significant as a consequence of the explanatory factor analysis. The results showed that factorability was supported. Furthermore, while conducting exploratory factor analyzis varimax rotation was used to decide the number of factors. Eigenvalues and scree plots were detected and it was concluded that the awareness of consequences questionnaire had two dimesions with higher than 1 eigenvalue score as it was found in the pilot study and explained a total 46.0% of the variance. One dimension had 3.928 and other dimension had 1.135 eigenvalue score.

When the Table 3.9 is examined it is seen that the items related with climate change loading a factor and the other six items loading another factor. By the way, these two dimensions could be named as "directly related with climate change" that includes four items contains climate change concerns and the other dimension could be named

as “not directly related with climate change” which contains seven items related with energy conservation, global warming and fossil fuels. The reason of factor loaidngs’ differency in original scale and the present study may because of demographical dissimilarity and misconceptions, inaccurate or inadequate learning about climate change.

These two factors could be categorized by “consequences of climate change” had four items with .64 Cronbach’s alpha value and “consequences of energy usage” had seven items with .77 Cronbach’s alpha value. Cronbach’s alpha value and corrected item- total correlations were determined for reliability for whole scale. Internal consistency was calculated as .81 indicates good internal consistency (Pallant, 2005) and corrected item- total correlations of all items were positively higher than .30 which supports internal consistency (Pallant, 2005). Table 3.10. gives detailed information about Turkish adopted version and present study.

Table 3.9 *Factor Loadings of the Awareness of Consequences Questionnaire*

	Factor	
Item	**1**	**2**
Energy savings will benefit our country.	**,715**	
The exhaustion of energy resources is a serious problem.	**,713**	
Saving energy contributes to the solution of environmental problems.	**,696**	
Energy saving will contribute to the reduction of global warming.	**,557**	,376
Energy savings will benefit me and my family.	**,543**	
I'm sure that global warming is really a problem.	**,542**	,413

Table 3.9 (Continued)

The depletion of fossil fuel sources causes a shortage of energy and raw materials.	**,464**	,322
Climate change is a serious problem affecting my life.		**,789**
Climate change is a serious problem for our country.		**,758**
I know the connection between climate change and people's energy consumption.		**,561**
Climate change will become a problem for all plant and animal species.	,397	**,482**

Table 3.10 *Comparison of the Awareness of Consequences Questionnaire*

	Turkish Adapted Version	**This Study**
# of items	10	11
Dimensions	Uni-dimensional	Two dimensional
Cronbach Alpha Value	.87	.81

3.3.2.6 New Environmental Paradigm Questionnaire

The scale was applied for main study and principle component factor analysis was conducted to evaluate factorability and Cronbach's alpha value was utilized to assess realiability concern. Kaiser Meyer Olkin value was meausred and Barlett's Test of Sphericity result was estimate for validty concern. Kaiser Meyer Olkin value was measured as .79 and Barlett's Test of Sphericity was supported which means factorability was supported. Results of principle component analysis with varimax rotation the scale were investigated. Scree plot and eigenvalue have been viewed There were three dimensions whose eigenvalues higher than 1. The scale was found to be three factors (see Table 3.11). Three-factor model was account for 45.9% of the

variance. These three factors could be named as “interaction between human-nature” with 2.808 eigenvalue, “environmental attitude” with 2.764 eigenvalue and “environmental assessment” with 1.309 eigenvalue. Each factor’s Cronbach alpha value was calculated and frist facor had .77, second factor had .63 and third factor had .56 Cronbach’s alpha value. Eventually, Cronbach’s alpha value was measured as .64 for total scale. To illustrate another study reliability result, in Sahin’s study the Cronbach alpha value was calculated as .73. However, factorability of the scale was done in different studies and different results exist. As explained by Dunlap et al. (2000), it is difficult to assess its validity since it is a worldview, and the number of dimensions depends on the results of the study and can be evaluated separately if the variables are not closely related. Therefore, the comparison of the original instrument and the present study was shown in Table 3.12.

Table 3.11 *Factor Loadings of the New Environmental Paradigm Questionnaire*

	Factor		
Item	**1**	**2**	**3**
People have the right to change nature to meet their needs.*	**,765**		
Being a human means dominating the rest of nature.*	**,764**		
The so-called “environmental problems” that people face are exaggerated.*	**,754**		
Human intelligence and talents are the guarantee that the Earth will not deteriorate.*	**,744**		
The balance of nature is strong enough to cope with the impacts of modern industrial notions.*	**,492**		
The earth has plenty of natural resources if we just learn how to benefit from them.		**,752**	
Plants and animals have as much right as humans to exist.		**,634**	
Nature is very sensitive and easily damaged.		**,554**	

Table 3.11 (Continued)

If everything goes on like today, we will soon be faced with a major ecological disaster.	**,553**	,391
Despite our special abilities that make us superior to other creatures, we are still struggling with the laws of nature	**,486**	
People will eventually find out that they need to understand nature to control nature.	**,450**	
The world is like a spacecraft with limited space and resources.		**,724**
We are approaching the limit of the number of people the earth can support.		**,660**
When humans interfere with the nature it often produces disastrous consequences.		**,599**
People are very bad about nature.	,341	**,505**

Table 3.12 *Comparison of the New Environmental Paradigm Questionnaire*

	Original Version	**This Study**
# of items	15	15
Dimensions	Five dimensional	Three dimensional
Cronbach Alpha Value	.83	.64

3.3.2.7 Universal Value Questionnaire

Universal values questionnaire was applied for main study and to explore validity explanatory factor analysis was conducted and for reliability internal consistency was analyzed. Explanatory factor analysis was conducted and Kaiser Meyer Olkin value and Barlett's Test of Sphericity results were evaluated for validity concern. For whole scale, Kaiser Meyer Olkin value was measured .78 which indicates good

internal consistency (Tabachnick & Fideli, 2001) and Barlett's Test of Sphericity was sufficient ($p=.000$) (Barlett, 1954).

In order to discriminate factors principle component analysis with varimax rotation was conducted, eigenvalues and scree plot were explored. The model in the main study could be able to explain almost half of the total variance (50.81%). It was found that the instrument had three dimensions with 3.192, 1.800 and 1.106 with respect to larger than 1 eigenvalue scores as stated in the pilot study and theoretical ground.

However, one item "living in harmony with other species (respect to the earth)" which was expected to loading on biospheric value, loaded almost equal on altruistic and biospheric dimensions. Although it was categorized in biospheric value orientation in theoretical framework and the study done by Sahin (2013), because the expression contains the term respect (respecting to the earth) may be perceived as an altruistic value by middle school students. Table 3.13 shows factor loadings of the value orientations.

Cronbach's alpha value was calculated for each value orientations to analyze reliability of the scale. Cronbach's alpha value was calculated as .61 for egoistic, .72 for biospheric, .60 for altruistic value orientations. As indicated by Pallant (2005), the scale has an adequate internal consistency if Cronbach's alpha value is between 0.60-0.70, has good internal consistency if Cronbach's alpha value is between 0.70 – 0.90 and has excellent internal consistency if Cronbach's alpha value is 0.90 and higher. Thus, egoistic and biospheric value orientations indicate adequate internal consistency while altruistic value orientation reflects good consistency. With compared to pilot study egoistic and biospheric value orientations reliability had higher and reasonable value. Table 3.14 express the comparison of Sahin's study and present study in terms of number of items, dimensions and Cronbach alpha values.

Table 3.13 *Factor Loadings of Universal Value Questionnaire*

	Factor		
Item	**1**	**2**	**3**
Protecting the environment (Take care of nature)	**,796**		
Prevention of environmental pollution	**,767**		
Adapting to nature (being a whole with nature)	**,713**		
Providing equal opportunities for all (Equality)		**,733**	
Correcting injustices, helping the weak (Social justice)		**,687**	
Charity (striving for the welfare of others)		**,572**	
Living in harmony with other species (Respect to the Earth)	**,421**	**,467**	
A world in peace (a world without war)		**,430**	
Leadership (Having authority)			**,825**
Managing / controlling others (Social power)			**,755**
Owning property and money (Wealth)			**,647**
To be persuasive (to be effective on people and events)			**,414**

Table 3.11 *Comparison of Universal Value Questionnaire*

	Turkish Adapted Version	**This Study**
# of items	12	12
Dimensions	Three dimensional	Three dimensional
Cronbach Alpha Value for Egoistic Values	.77	.61
Cronbach Alpha Value for Biospheric values	.81	.72
Cronbach Alpha Value for Altruistic Values	.75	.60

3.4 Procedure

In this study, middle school students energy conservation behaviors and relationship between energy conservation behaviors and psychological features were examined. First of all, literature review was done to specified purpose, get information about previous searches and their results. Afterward, questionnaire for the present study was decided. Development of the tools, adaptation and translation of the instruments into Turkish were obtained from the literature. Demographic information part was added to instrument appropriate for the sample. For ethical concerns necessary permissions were taken from both Research Center for Applied Ethics (UEAM) at METU and Directorate of National Education of İstanbul (Appendix-C).

Data collection tool is decided for the purpose of the study and data were collected during the spring semester in 2017-2018 at Sarıyer, in İstanbul. The measuring instrument has seven dimensions in order to identify participants' energy conservation behaviors, values and personal norms. Personal information is the initial part and the other ones are related with "energy conservation behaviors, personal norms, ascription of responsibility, consciousness of consequences, new environmental paradigm, and universal values" (Sahin, 2013). The scale has items and items are in Likert type. Pilot study was conducted with 7^{th} and 8^{th} grade level 149 students from public schools at Sarıyer in İstanbul. According to results of the statistical analysis, responses and reactive comments it was decided to conduct main study with 8^{th} grade middle school students. Students were informed about study and their permissions were taken before application. Data collection process was carried out by the researcher and it was a paper-pen application. Before the application of the instrument, the aim of the present study, the directions to complete the survey and necessary information were stated clearly to the participants in this study. These students were informed that they did not have to write a name, personal information would remain confidential and the results would not affect school grades. Participants were able to complete the scale about 20 minutes.

3.5 Data Analysis Techniques in the Study

SPSS program was used during analysis of data gathered from participants. Descriptive statistics, inferential statistics and reliability and validity concerns were analyzed by utilizing SPSS program.

3.6 Descriptive and Inferential Statistics

Descriptive statistics were composed of mean, frequency and standard deviation of all the instruments used in present study to collect data. On the other hand, multiple linear regression analysis was used to investigate connection between energy conservation behaviors and personal norms, ascription of responsibility, consciousness of consequences, new environmental paradigm, and universal values.

3.7 Assumptions, Limitations and Ethics of the Study

Assumptions and limitations of the present study were given below.

3.7.1 Assumptions

1. Instrument was applied under the standardized circumstances.

2. Participants completed the data collection tool sincerely.

3.7.2 Limitations

1. Participants selected from only one region from İstanbul which is Sarıyer and it may be not possible to generalize the results because of limited sample size.

2. Data collection tool was self-reported and this was may cause not to represent opinions and behaviors totally.

3. Results could be affected from social desirability bias.

4. Participants were selected from public middle school students. Different age level and different type of school may conclude with different results.

3.7.3 Ethical Concern

1. The purpose of the research clearly explained by the researcher to participants.

2. In order to provide confidentially neither participants' name nor specific information was taken.

3. The study did not cause psychological or physical damage on participants.

CHAPTER 4

RESULTS

In this chapter, descriptive statistics revealing middle school students' energy conservation behaviors, personal norm, ascribed responsibility, awareness of consequences, and general beliefs about the environment were presented. Furthermore, inferential statistics conducted to investigate correlations between energy conservation behaviors and the other aspects were reported. First of all, missing data analysis was conducted before mean scores, standard deviation and frequencies were defined for descriptive statistics and multiple regression analysis was carried out. Summary of the findings were emphasized at the end of this chapter.

4.1. Missing Data

Initially, Little's MCAR test was used for each scale to analyse whether the data were missing completely at random (Little, 1988). According to Little's MCAR test result significance level for energy conservation behavior scale .47, for ascription of responsibility scale .86, for personal norms scale .60, for new environmental paradigm .87 and there were no missing value for universal values and consciousness of consequences. The significance values were found higher than 0.05 which indicates missing values distributed completely at random. By the way, all missing values were replaced with the series mean of the items.

4.2 Descriptive Statistics

In this part, mean scores, standard deviation and frequencies of each scale were presented.

4.2.1 Descriptive Statistics regarding Middle School Students' Opinions about School Environment in terms of Energy Conservation

Students were asked to reveal their opinions about the regulations on energy conservation at school, and the results were represented in Figure 4.1. Half of the students stated that regulations at school to encourage energy conservation are sufficient. Some of the participants found the condition as insufficient while little part of the students reported that it is quite sufficient.

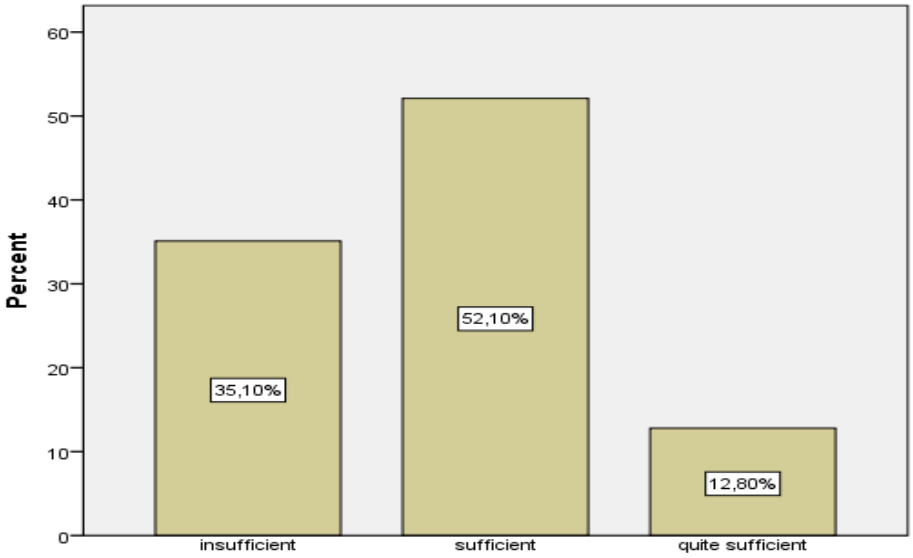

Figure 4.1 Students opinions about Regulations in School to Encourage Energy Conservation

Respondents were also asked to evaluate use of materials and tools that support energy efficiency in school and the results were shown in Figure 4.2. Almost half of

the students found the use of materials and tools that support energy efficiency in school are insufficient. Participants percentages who found sufficient and insufficient were close to each other, whereas the percentage of those who found quite sufficient were less (see Figure 4.3).

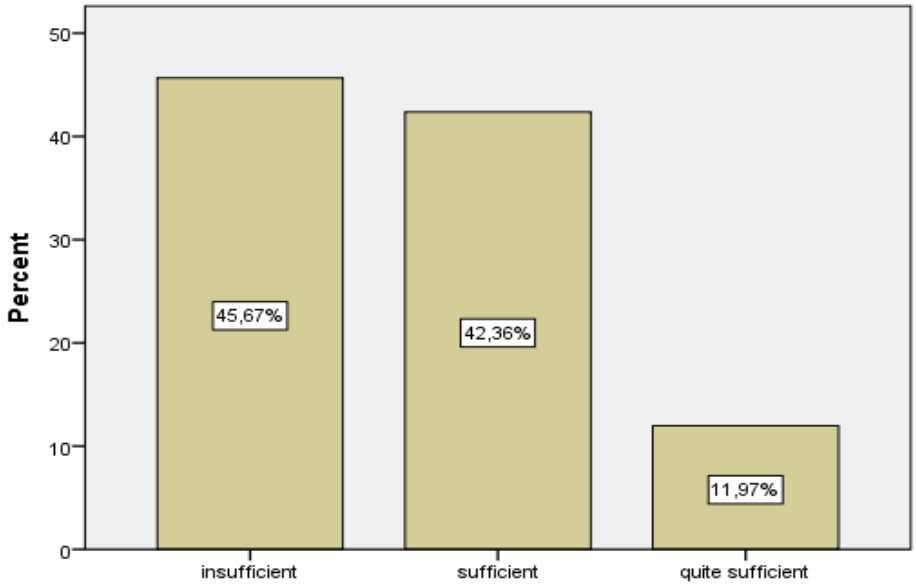

Figure 4.2 Students opinions about Use of Materials and Tools That Support Energy Efficiency in School

To sum up, according to students regulations in school to encourage energy saving is sufficient but regulations about use of materials and tools that support energy efficiency in school is insufficient.

The participants were also asked to reveal the source of information that they used for the topic of energy conservation. As presented in Table 4.1, the students gathered information mostly (28.0%) from the internet and the television (20.6%) while the information from teacher (15.8%), books (13.6%), scientific journals (8.6%), school boards (7.5%), city boards that I live (3.8%) is limited.

Table 4.1 *Source of Information of Energy Conservation*

Source of Information	**N**	**Percent**
Internet	446	28.0%
School Board	120	7.5%
Teacher	252	15.8%
TV	328	20.6%
City Board That I Live In	60	3.8%
Books	217	13.6%
Science Journals (National Geographic, Bilim Çocuk etc.)	137	8.6%
Other	31	1.9%
Total	1591	100%

**N is larger than the sample volume*

4.2.2 Descriptive Statistics of Energy Conservation Behaviors

There were 8 five-point Likert type items in the energy conservations behaviors questionnaire and participants' responses about energy conservation behaviors were presented in terms of mean, standard deviation and percentages in Table 4.2. The mean of the total was calculated as 3.10 and standard deviation of the instrument was .74. Results showed that middle school students mostly had moderate level behaviors related with energy conservation and it could be deduced that students do not frequently perform these behaviors. In the sub-dimension scale "direct use of energy" which includes 3 items, students had high sensitivity about turning off unnecessary burning lamps "I turn off the unnecessary lights" (84.2%). In addition, more than half of the participants had a high frequency level about the items "I unplug the power tools when I'm finished" (70.1%). Students who were score never or rarely (38.2%), sometimes (24.8%) and frequently and always (37%) responds were almost equal in terms frequency of behavior for the item "In the summer, I encourage my parents to open the windows instead of running the air conditioner or fan." In the "indirect energy use" sub-dimension scale there were 5 items that determine students' energy conservation behavior. Participants were score sometimes for the items "I direct my family / friends to save energy" (31.8%), "I direct my

family to use / buy energy-efficient products" (26.2%) and "I follow the topics such as energy resources and energy saving in my school" (26.1%). However, for the items "I follow publications (documentaries, magazines, etc.) which include topics such as energy resources, energy saving" (56.5%) and "I share my thoughts on energy resources or use" (45%) students answered never or rarely. In the Table 4.2, each item's and sub-scale's mean, standard deviation, percentages were shown in detail.

Table 4.2 *Frequency Distribution of Participants Energy Conservation Behaviors and Corresponding Item Means and Standard Deviations*

Items	**N**	**R**	**S**	**F**	**A**	**M**	**SD**
Direct use of energy							
I turn off the unnecessary lights.	.7	3.1	12.0	46.3	37.9	4.17	.81
In the summer, I encourage my family to open the windows instead of running the air conditioner or fan.	20.9	17.3	24.8	14.0	23.0	3.00	1.43
I will unplug the power tools when I'm finished.	3.8	10.2	15.8	23.3	46.8	3.99	1.17
Total						3.72	.75
Indirect commitment for energy conservation							
I will direct my family / friends to save energy.	13.8	23.7	31.8	20.0	10.6	2.89	1.18
I direct my family to use / buy energy-efficient products.	18.8	17.3	26.2	22.0	15.7	2.98	1.33
I follow publications (documentaries, magazines, etc.) that include topics such as energy resources and energy savings.	26.2	30.3	23.9	11.8	7.8	2.44	1.21
I follow the topics such as energy resources and energy saving in my school.	23.3	27.0	26.1	15.3	8.4	2.58	1.23
I share my thoughts on energy use or use.	19.3	25.7	24.6	18.9	11.5	2.77	1.27
Total						2.73	.92

(Note: N never, R rarely, S sometimes, F frequently, A always, M mean, SD standard deviation)

4.2.3 Descriptive Statistics of Universal Values

In this scale, there were 12 items and three subscales which were egoistic, biospheric and altruistic related with universal values. Participants were asked to rate the universal values given in the scale according to importance level from no importance to ultimate importance. According to results of the analyses the mean scores of the each dimension was calculated as 3.06 for egoistic value orientation, 4.47 for biospheric value orientation and 4.59 for altruistic value orientation from 5-point scale. The results of the study showed that students had a sensitivity about nature with respect to not only themselves but also all other living things except from human.

According to results participants moderately gave importance to egoistic value orientations which were wealth, social power, being convincing leading people. All biospheric items which includes preventation of environmental pollution, being adapted with nature, respect to the earth and protect the environment had an ultimate importance for most of the students. The results of descriptive statistics related with altruistic value orientations show that students had an ultimate importance level through helpfulness, equality, social justice and living world in a peace items. For each three value orientations mean, standard deviation and percentages was given in the Table 4.3 in detail. To sum up, it can be stated that students give more importance to biospheric and altruistic oriented values than egoistic oriented values.

Table 4.3 *Frequency Distribution of Universal Values and Corresponding Item Means and Standard Deviations*

	No Importance				Ultimate Importance		
Items	**1**	**2**	**3**	**4**	**5**	**Mean**	**Std.**
Egoistic Value Orientations							
To have property and money (Wealth).	20.0	16.2	31.3	16.4	16.0	2.92	1.32
Managing / controlling others (Social power)	37.7	21.1	17.7	11.3	12.2	2.39	1.39
Leadership (Having authority)	22.8	17.9	20.2	16.2	23.0	2.98	1.47
To be persuasive (to be effective on people and events)	4.6	5.3	21.7	26.4	42.1	3.96	1.12
Total						3.06	0.90
Biospheric Value Orientations							
Prevention of environmental pollution.	0.2	1.5	9.3	17.1	71.9	4.59	0.73
Adapting to nature (being a whole with nature)	1.1	4.2	10.9	26.4	57.4	4.34	0.91
Living in harmony with other species (Respect to the Earth)	2.0	2.9	12.0	20.6	62.5	4.38	0.94
Protecting the environment (Take care of nature)	0.5	2.9	7.3	18.4	70.9	4.56	0.79
Total						4.47	0.62
Altruistic Value Orientations							
Charity (striving for the welfare of others).	1.3	1.5	11.5	20.6	65.2	4.46	0.84
Providing equal opportunities for all (Equality)	1.6	1.8	7.8	14.6	74.1	4.57	0.84
Correcting injustices, helping the weak (Social justice)	1.5	1.3	4.4	16.2	76.7	4.65	0.75
A world in peace (a world without war)	1.6	1.8	5.8	7.8	82.9	4.68	0.79
Total						4.59	0.55

4.2.4 Descriptive Statistics of Ascription of Responsibility

There were 6 items in the five point Likert type ascription of responsibility questionnaire. Results of the study show that middle school students had high responsibility with a mean of 4.09 (*SD=.68*). Majority of the students were agree with that they were also responsible from energy related problems (82.5%), depletion of energy resources (79.2%) and global warming (74.8%) as much as other people. Moreover, participants thought that they were responsible for solving energy problems (74.1%) and combating climate change with other people (74.1%). More than half of the students (78.5%) were in agreement with that individual precautions also contribute to solution related with energy problems. Table 4.4 shows mean, standard deviation and percentage of items in detail. As a result, participants feel personally obliged to energy related topics.

Table 4.4 *Frequency Distribution of Participants Ascription of Responsibility and Corresponding Item Means and Standard Deviations*

Items	**SD**	**D**	**U**	**A**	**SA**	**M**	**SD***
I'm responsible for energy issues with other people.	0.7	3.3	13.5	40.4	42.1	4.19	.84
I am responsible for the exhaustion of energy resources with other people.	2.7	5.3	12.8	36.8	42.4	4.10	.99
I have my own responsibilities with other people in the fight against climate change.	2.2	5.1	18.6	34.6	39.5	4.04	.99
I also have a responsibility in solving energy problems.	1.3	5.8	18.8	37.3	36.8	4.02	.95
Our individual measures also contribute to the solution of energy problems.	2.2	4.4	14.9	35.7	42.8	4.12	.96
I'm responsible for the global warming problem with other people.	4.0	6.6	14.6	30.2	44.6	4.04	1.10

(Note: SD: Strongly disagree. D: Disagree. U: Undecided. A: Agree. SA: Strongly agree. M: Mean. SD*: Standard deviation)

4.2.5 Descriptive Statistics of Awareness of Consequences

This instrument was used to determine middle school students awareness related with benefits of energy conservation, problems about energy and energy resources, global warming and climate change relationship with energy usage. The questionnaire contains 11 five-point Likert type items and total scale mean was calculated 4.25 (*SD=.53*). According to results students had a higher level of awareness of consequences about energy related concerns. All items and answers were presented in Table 4.4.

For the first sub-scale "Consequences of energy usage" (*M=4.37, S=.55*), participants were mostly agree with the statements which emphasized that energy conservation will contribute to the reduction of global warming (82.3%), energy conservation contributes to the solution of environmental problems (85.2%), energy conservation will be beneficial for our country (92.9%), energy conservation will be beneficial for me and my family (86.3%), depletion of energy resources is a serious problem (90.2%), global warming is definitely a real problem (89.3%). However, students were undecided about whether depletion of fossil fuel sources will be a shortage of energy and raw materials or not (24.0%). Table 4.5 presented means, standard deviations and percentages of all items in detail.

As indicated in Table 4.5 for the sub-scale "Consequences of climate change" (*M=4.06, S=.68*), descriptive statistics represented that they were generally agree with the statements which emphasized that "climate change will be a problem both for all plants and animals" (86.7%), "climate change is a crucial problem for our country" (79.1%) and students were undecided about whether climate change is a serious problem affecting personal life or not (25.1%). Moreover, middle school students are not sure about their knowledge related with climate change and energy consumption connection (31.1%). It can be inferred from the statistics students mostly had an awareness of consequences associated with energy conservation and energy related concerns.

Table 4.5 *Frequency Distribution of Awareness of Consequences and Corresponding Item Means and Standard Deviations*

Items	SD	D	U	A	SA	M	SD*
Consequences of energy usage							
Energy savings will benefit our country.	0.9	1.6	4.6	23.5	69.4	4.58	.73
The exhaustion of energy resources is a serious problem.	0.9	2.0	6.9	23.9	66.3	4.52	.78
Saving energy contributes to the solution of environmental problems.	1.1	3.8	9.8	31.5	53.7	4.32	.88
Energy saving will contribute to the reduction of global warming.	0.9	1.6	15.1	30.2	52.1	4.30	.86
Energy savings will benefit me and my family.	2.2	3.5	8.0	29.1	57.2	4.35	.92
I'm sure that global warming is really a problem.	0.5	1.8	11.3	23.1	63.2	4.46	.80
The depletion of fossil fuel sources causes a shortage of energy and raw materials.	2.9	2.7	24.0	30.6	39.7	4.01	1.00
Total						4.37	.55
Consequences of climate change							
Climate change is a serious problem affecting my life.	2.2	8.7	25.1	30.2	33.7	3.84	1.05
Climate change is a serious problem for our country.	1.8	3.1	16.0	31.7	47.4	4.19	.94
I know the connection between climate change and people's energy consumption.	4.2	4.0	31.1	31.1	29.5	3.77	1.04
Climate change will become a problem for all plant and animal species.	1.8	1.5	10.0	26.0	60.7	4.42	.86
Total						4.06	.68

(Note: SD: Strongly disagree. D: Disagree. U: Undecided. A: Agree. SA: Strongly agree. M: Mean. SD*: Standard deviation)

4.2.6 Descriptive Statistics of Personal Norms

In this part of the study, five-point Likert type 9 statements were used to identify middle school students personal norms. Total mean of the instrument was calculated as 3.82 and standard deviation was .61. Results indicate that students partially have norms in concern with energy conservation and energy usage.

There were five items in the sub-scale "moral obligation on energy conservation" (*M=4.01, S=.68*). As presented in Table 4.6, more than half of the participants agree with that they feel obligation to save energy as much as possible (72.2%), they feel that they need to consider nature and the environment in daily life (77.2%), participants believe in everyone should do everything they can to reduce energy use (85.4%). On the other hand, about feeling moral obligation to save energy regardless of others behaviors 27.1% of the participants were undecided while more than half of the participants (65.2%) were agree or strongly agree.

The sub-dimension "moral obligation to actively engage in energy conservation" consisted from five items (*M=3.67, S=.77*). Table 4.6 indicated that participants were undecided about feeling guilty while wasting energy (26.4%), feeling moral obligation to buy an energy-efficient product (25.5%), feeling guilty while buying imported products because of bringing it from long distances cause energy consumption (32.2%), three quarters of the participants believe in they will be a better person if they save energy (75.8%). Nonetheless, middle school students feel moral obligation to use clean energy instead of fossil fuels (76.4%).

Table 4.6 *Frequency Distribution of Personal Norms and Corresponding Item Means and Standart Deviations*

Items	**SD**	**D**	**U**	**A**	**SA**	**M**	**SD***
Moral obligation on energy conservation							
I feel I am obliged to save as much energy as possible.	2.6	6.2	19.1	43.2	29.0	3.89	.97
Regardless of what others are doing, I feel a moral obligation to save energy.	2.0	5.6	27.1	37.9	27.3	3.82	.96
Everyone like me should do anything they can do to reduce energy use.	2.2	2.6	9.8	35.9	49.5	4.28	.90
I feel that I should take nature and environment into account in my daily life.	1.8	4.2	16.8	41.0	36.2	4.05	.92
Total						4.01	.68
Moral obligation to actively engage in energy conservation							
I feel guilty when I waste energy.	5.6	9.5	26.4	33.7	24.8	3.62	1.12
If I'm going to buy a new washing machine, I feel a moral obligation to buy an energy-efficient product.	4.4	7.5	25.5	31.5	31.1	3.77	1.10
I feel guilty when I buy imported products because it brings energy consumption from long distances.	15.1	24.2	32.2	16.8	11.7	2.85	1.20
I'm a better person if I save energy.	4.7	5.5	14.0	34.6	41.2	4.02	1.09
It is our moral obligation to use clean energy (solar, wind, geothermal energy) instead of fossil fuels	3.1	3.8	17.7	29.0	46.4	4.11	1.02
Total						3.67	.77

(Note: SD: Strongly disagree. D: Disagree. U: Undecided. A: Agree. SA: Strongly agree. M: Mean. SD*: Standard deviation)

4.2.7 Descriptive Statistics of NEP

New environmental paradigm questionnaire was used to analyse participants' environmental beliefs. The instrument consists of 15 five-point Likert type items and the mean of the total scale was calculated as 3.81 and standard deviation was .46. Students have positive beliefs towards environment. Table 4.7 shows mean, standard deviation and percentage for each item in detail.

The questionnaire consisted of three factor and first factor was named as "interaction between human and nature" which included five items (*M=3.34, SD=.94*). According to research results, participants were agree with the statements which were "people have the right to change nature to meet their needs" (61.4%), "people behave badly to nature" (77.4%), "being human means dominating the rest of nature" (62.3%). Middle school students were undecided about whether human intelligence and abilities are the guarantee that the Earth will deteriorate or not (26.1%) and about overestimation of environmental problems (27.3%). On the other hand, participants were disagree with the item which was balance of nature is able to compete with the effect of industrial societies (46.8%).

Another dimension of the scale was "environmental attitude" with 6 items. Most of students agree with the items "there are enough natural resources in the world for everyone as long as we know how to benefit from these sources" (83.4%), "nature is very sensitive and easily damaged" (79.7%), "if everything goes on like today, we will soon be faced with a major ecological disaster" (79.2%) and "people will eventually find out that it is needed to understand nature in order to control nature" (70.8%). Moreover, a large amount of students were absolutely agreed with plants and animals also have the right to live up as much as people (81.0%). Students were undecided about the item "despite our special abilities that make us superior to other creatures, we are still struggling with the laws of nature" (61.6%).

One of the sub-scale of the NEP was defined as “environmental assessment” and was formed in 4 items (M=3.86, S=.72). Participants were agree with “when humans interfere with the nature it often produces disastrous consequences” (68.8%) and “people are very bad about nature” (77.4%) while undecided with the items which were “the earth has plenty of natural resources if we just learn how to benefit from them” (25.3%) and “the world is like a spacecraft with limited space and resources” (30.4%). As aresult of these analyses it can be inferred that middle school students had average and above average level of positive beliefs among environment.

Table 4.7 *Frequency Distribution of New Environmental Paradigm and Corresponding Item Means and Standart Deviations*

Items	**SD**	**D**	**U**	**A**	**SA**	**M**	**SD***
Interaction between human and nature							
People have the right to change nature to meet their needs.*	10.7	14.0	13.8	19.3	42.1	3.67	1.41
Human intelligence and talents are the guarantee that the Earth will not deteriorate.*	10.9	11.7	26.1	23.5	27.9	3.46	1.30
The balance of nature is strong enough to cope with the impacts of modern industrial notions.*	22.4	25.3	37.2	9.5	5.6	2.51	1.10
The so-called "environmental problems" that people face are exaggerated.*	11.7	13.3	27.3	21.9	25.9	3.37	1.31
Being a human means dominating the rest of nature.*	11.1	10.7	15.8	22.5	39.7	3.68	1.37
Total						3.34	.94
Environmental attitude							
The earth has plenty of natural resources if we just learn how to benefit from them.	2.4	3.6	10.6	28.2	55.2	4.30	.96
Plants and animals have as much right as humans to exist.	1.5	1.1	4.2	12.2	81.0	4.70	.73
Despite our special abilities that make us superior to other creatures, we are still struggling with the laws of nature.	6.0	7.1	25.3	32.6	29.0	3.71	1.13
Nature is very sensitive and easily damaged.	3.6	4.9	11.8	30.3	49.4	4.17	1.05
People will eventually find out that they need to understand nature to control nature	3.6	7.7	17.9	31.5	39.3	3.95	1.09

Table 4.7 (Continued)

If everything goes on like today, we will soon be faced with a major ecological disaster.	2.6	3.6	14.6	24.0	55.2	4.25	1.00
Total						4.18	.59
Environmental assessment							
The earth has plenty of natural resources if we just learn how to benefit from them.	2.9	6.9	25.3	31.4	33.5	3.85	1.05
When humans interfere with the nature it often produces disastrous consequences.	5.3	6.0	19.9	31.5	37.3	3.89	1.13
People are very bad about nature.	4.9	3.6	14.0	28.8	48.6	4.12	1.09
The world is like a spacecraft with limited space and resources.	5.1	10.9	30.4	28.8	24.8	3.56	1.12
Total						3.86	.72

(Note: SD: Strongly disagree. D: Disagree. U: Undecided. A: Agree. SA: Strongly agree. M: Mean. SD*: Standard deviation)

4.3 Inferential Statistics

In this section of the study, multiple regression analysis was administered to identify the major determinants of variables on energy conservation as recommended by VBN theory. Multiple linear regression analysis is technique to evaluate the intercourse between dependent variable and independent variables or determinants (Pallant, 2005).

4.3.1 Assumption of Multiple Linear Regression Analysis

First of all, assumption analyses were conducted to examine relationships between independent variables and energy conservation. According to Pallant (2005), "indepence of observation, normality, level of measurement, linearity and homoscedasticity" should be controlled at the beginning of the analysis. With respect to Pallant (2005), indepence of observation was explained as all observations and measurements should not be dependent on other observations and measurements. During data collection it was observed that each participant completed the instrument independently.

Normality assumption was checked through skewness and kurtosis values and histogram of depended variable energy conservation behaviors. Figure 4.3 shows histogram graph of energy conservation which was seen normally distributed. As represented in Table 4.8 skewness and kurtosis values were admissible which were between -2 and +2 interval (Gravetter & Wallnau, 2014).

Table 4.8 *Skewness and Kurtosis Values of Energy Conservation Behaviors*

Construct	**Skewness**	**Kurtosis**
Energy Conservation Behavior	.065	-.529

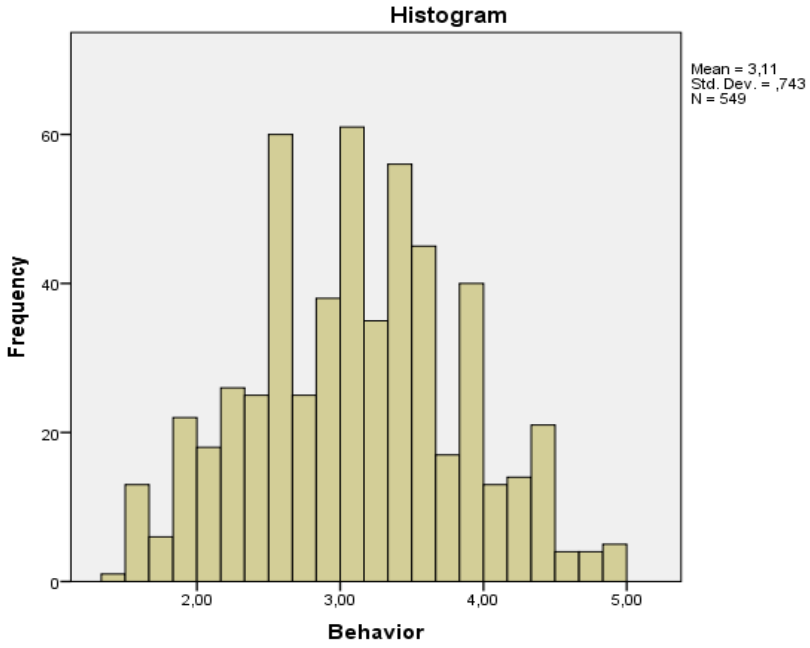

Figure 4.3 Histogram Graph of Energy Conservasion Behaviors

With respect to Pallant (2005), relationship between two variables ought to be almost a straight line, not a curve. In order to examine linearity scatterplots were examine and there were no certain curve relationship which means there were no violation of linearity assumption.

For homoscedasticity assumption, variance of the dependent variable exhibits similar scores with independent variables variances (Pallant, 2005). Scatterplots of the standardized residuals has been viewed to check homoscedasticity assumption. Scores were centralized around zero, almost rectangularly distributed and did not show a systematic pattern. Thus, homoscedasticity assumption was not violated.

4.3.2 Multiple Linear Regression

The purpose of conducting multiple linear regression is to explain middle school students energy conservation behaviors under the light of VBN Theory. Dependent variable of the present study is energy conservation behaviors of participants while universal values, awareness of consequences, ascription of responsibility, personal norms and beliefs about the environment are independent variables.

Multiple linear regression test was applied to examine the determinants of energy conservation behaviors. Table 4.9 represents the results of the analyses. According to results ascription of responsibility, personal norms and biospheric value orientations were significantly related to students energy conservation behaviors (R^2 = .29, $F(7,541) = 33.12$, $p < 0.001$).

Personal norms was the significant predictor in terms of explaining the highest ratio for criterion variance (β=.40; *part correlation* =.32). The population value of β (95% ci) for personal norms was calculated among .37 and .59 which excluded zero. Consequently, energy conservation behaviors could be predicted from personal norms which were statistically significant according to conventional standards (Smithson, 2003).

Nonetheless, biospheric value orientation (β=.16; *part correlation* =.13; 95% ci: .09 and .29) and ascription of responsibility (β=.11; *part correlation* =.08; 95% ci: .02 and .22) made significantly and positively contribution with the causal model. As shown in the Table 4.9, 29% of the variance in energy conservation behaviors could be explained by predictor variables which are namely; personal norms, biospheric value orientations and ascription of responsibilities.

Table 4.9 *The Results of Multiple Regression Analyses*

	St β	***Part-Cor.***	***t***	***p***	**Adj. R^2**	**F**	**p**
Criterian V: Conservation					.29	33.12	.000
PN	.40	0.32	8.92	.000*			
AR	.11	0.08	2.45	.014*			
AC	.02	0.02	0.49	.622			
NEP	-.05	-.04	-1.20	.231			
Egoistic	-.03	-.03	-0.71	.478			
Altruistic	.02	.01	0.38	.706			
Biospheric	.16	.13	3.68	.000*			

*significant at the alpha level. (Note: PN: Personal norm. AR: Ascription of responsibility. AC: Awareness of consequences. NEP: New environmental paradigm.)

Table 4.10 indicates the results of the series multiple linear regression test. Regarding the students' personal norms (R^2 = 0.34, $F(6,542) = 48.36$, $p < 0.001$), it was revealed that personal norms were significantly and positively related with ascription responsibility (β=.26; *part correlation* =.21; 95% ci: .16 and .30), awareness of consequences (β=.31; *part correlation* =.24; 95% ci: .26 and .46) and biospheric value orientations (β=.15; *part correlation* =.12; 95% ci: .06 and .23). Therefore, the predictor variables of the participants' personal norms were found as ascription responsibility, awareness of consequences and biospheric value orientations.

On the other hand, with regard the students' ascription of responsibility results (R^2 = 0.32, $F(5,543) = 52.72$, $p < 0.001$), it was found that there was a significant and positively association with only awareness of consequences of students (β=.46; *part correlation* =.40; 95% ci: .48 and .69). The predictor of the students' ascription of the responsibilities was only awareness of consequences about energy conservation.

Table 4.10 *The Result of Series of Multiple Regression*

	St β	***Part-Cor.***	***t***	***p***	**Adj. R^2**	**F**	**p**
Criterian V: Personal Norms					.34	48.36	.000
AR	.26	0.21	6.09	.000*			
AC	.31	0.24	6.95	.000*			
NEP	.06	.05	1.58	.113			
Egoistic	-.05	-.05	-1.45	.147			
Altruistic	-.02	-.02	-.57	.567			
Biospheric	.15	.12	3.58	.000*			
Criterian V: Responsibility					.32	52.72	.000
AC	.46	.40	11.29	.000*			
NEP	.07	.06	1.69	.091			
Egoistic	-.04	-.04	-1.12	.261			
Altruistic	.09	.08	2.24	.025			
Biospheric	.09	.07	2.15	.032			
Criterian V: Awareness of Consequences					.25	47.15	.000
NEP	.36	.35	9.51	.000*			
Egoistic	.13	.13	3.47	.001*			
Altruistic	.12	.10	2.92	.004*			
Biospheric	.18	.15	4.17	.000*			
Criterian V: NEP					.06	13.33	.000
Egoistic	-.04	-.04	-9.83	.326			
Altruistic	.17	.14	3.48	.001*			
Biospheric	.12	.10	2.54	.011*			

*significant at the alpha level. (Note: PN: Personal norm. AR: Ascription of responsibility. AC: Awareness of consequences. NEP: New environmental paradigm.)

With respect to the results of the multiple regression as shown in Table 4.10, awareness of consequences on energy conservation (R^2 = 0.25, F(4,544) = 47.15, p < 0.001) associated with the new environmental paradigm (β=.36; *part correlation* =.35; 95% ci: .33 and .50), egoistic value orientations (β=.13; *part correlation* =.13; 95% ci: .03 and .11), altruistic value orienttaion (β=.12; *part correlation* =.10; 95% ci: .04 and .20) and biospheric value orientation (β=.18; *part correlation* =.15; 95% ci: .08 and .22). The predictors of awareness of consequences on energy conservation of students' significantly and positively related with environmental beliefs and universal values of participants.

Finally, environmental beliefs of students (R^2 = 0.06, F(3,545) = 13.33, p < 0.001) was found as in a association with altruistic (β=.17; *part correlation* =.14; 95% ci: .06 and .22) and biospheric (β=.13; *part correlation* =.10; 95% ci: .02 and .16), value orientations. Based on the calculations, it was obvious that there were a significant and positive relationship between new environmental paradigm and biospheric and also altruistic value orientations.

4.4 Chapter Summary

In conclusion, half of the students stated that regulations in school to encourage energy saving are sufficient and students' evaluation about use of materials and tools that support energy efficiency in school was almost equal in terms of sufficient or insufficient. Nonetheless, participants expressed that they used internet as a primary source of energy conservation related information. Except from internet, students also gathered information related with energy information from in order of television, teacher, books, scientific journals, school boards, city boards.

Descriptive results of energy conservation scale indicated that participants sometimes performed behaviors related with energy conservation. In view of sub-scales of energy conservation behaviors, it could be stated that students efforted more

behaviours about direct use of energy than indirect use of energy behaviors. In terms of universal values, students were more frequently care about biospheric and altruistic oriented values than egoistic oriented values. On the other hand, based on descriptive statistics of ascription of responsibility toward energy and energy related concerns participants were agree with and feel personally obliged to energy related topics. Results of the awareness of consequences scale showed that students had higher level of awareness of consequences about energy conservation and energy related concerns. In addition, results about personal norm scale showed that participants were agree with the concerns about feeling responsibility to make energy conservation while they were undecided about active participation in energy conservation. Furthermore, when descriptive statistics of new environmental paradigm questionnaire was analyzed students had positive environmental attitudes, almost positive environmental assessment but they were undecided about environmental beliefs in dimension of "interaction between human and nature".

In order to determine estimators of energy conservation behaviors of middle school students multiple linear regression was conducted. There were not only significant but also positive relationship between energy conservation behaviors and personal norms, ascription of responsibility and biospheric values. In detail, the present study indicated that personal norms and biospheric value orientations had more explanation ability of energy conservation behaviors of participants than ascription of responsibility did. Interestingly, there were not found any association with energy conservation behaviors and awareness of consequences, new environmental paradigm, egoistic values and altruistic values.

CHAPTER 5

CONCLUSION, DISCUSSION AND IMPLICATIONS

In this section, summary of the study, conclusion of the present research, discussion of the research findings, implications of the study and recommendations for further studies were presented.

5.1. Summary of the Study

The main purpose of the study is to determine middle school students' energy conservation behaviors and the determinants of students' energy conservation behaviors. Value-Belief-Norm Theory was used to explain predictors of energy conservation behaviors in terms of value orientations, personal norms, ascription of responsibilities, awareness of consequences, environmental beliefs.

There were 549 public middle school students participated in this study from district Sarıyer in İstanbul, Turkey. A survey study and series of multiple regression analysis were conducted to investigate the relationship between energy conservation behaviors and value orientations, personal norms, ascription of responsibilities, awareness of consequences, environmental beliefs.

The results of the study revealed that participants had positive beliefs on human-nature relations. On the other hand, they moderately tended to perform energy conservation behaviors and moderately had egoistic value orientations. In comparison, it was found that students had higher level of biospheric and altruistic value orientations, responsibility, personal norms and awareness through environment. The results of the multiple linear regression analysis were also showed

that Value-Belief-Norm Theory was able to explain energy conservation behaviors of middle school students. Students' energy conservation behaviors were found in a significant association between their biospheric value orientations, personal norms and ascription of responsibility. Nonetheless, series of multiple regression analysis were conducted for predictor variables of the theory and significant relationship was found between at least two predictor variables.

5.2. Conclusion and Discussion

The present study was conducted to examine students' energy conservation behaviors and the predictors of these behaviors. Middle school students were asked to reveal their opinions about school environment in terms of energy conservation. Majority of the students stated that the regulations at school to encourage energy saving were sufficient. Moreover, the percentages of the participants were almost equal who stated that the use of materials and tools that support energy efficiency in school sufficient or insufficient.

In general, middle school students had a moderate level of energy conservation behaviors. According to the results of descriptive statistics, these students were found to engage in behaviors regarding direct commitment for energy conservation more when compared to indirect commitment. For example, majority of the participants stated that they turn off the unnecessary lights and unplug the power tools when they were finished. In contrast, almost half of the students never or rarely follow energy related publications and the topics such as energy resources and energy saving in their school. The low consequences of indirect commitment to energy saving behavior may be due to their reluctance or inadequacy to guide others. The contrast between direct and indirect energy usage behaviors may also be the subject of research for future studies.

In this study, the data were gathered from children with low socio-economic status. However, it was reported that individuals who were not in high socio-economic status were more likely to perform energy conservation behaviors (Martinsson et al., 2011). Therefore, favorable results pertinent to energy conservation for direct use of energy may due to being in low socio-economic status. Furthermore, students were taught about environmental and energy related subjects during the science courses. Consequently, these students were expected to perform much more favorable energy consumption behaviors and had better results in terms of direct and indirect energy conservation as emphasized in science courses.

This study indicated that middle school students gave more importance to biospheric and altruistic value orientations than egoistic value orientations. In another words, they cared about nature and living things. High biospheric values of the students may be due to the fact that the area they are living in is located close to the coast and greenery part of Istanbul. Therefore, the students are able to interact with nature and these may cause to increase in biospheric value orientations. Looking at the ascription of responsibility, majority of the students stated that they had a sense of responsibility about energy related topics. To illustrate, they agreed that they were responsible from energy related problems and for solving these problems. Moreover, middle school students were found to have higher level of awareness about energy related concerns such as energy conservation, problems about energy and energy resources, global warming and climate change. It was also found out that they were having the awareness of consequences of energy usage and for climate change. For the "Personal Norms" scale, participants were partially feel moral obligation in terms of energy related concerns. Results were positive for the sub-scales which were namely feeling to make energy conservation students and actively participate in energy conservation almost equal.

In order to identify the major predictor variables of energy conservation behaviors of middle school students multiple regression analysis was administered by using Value-Belief-Norm Theory. Concerning the results there were significant association

between energy conservation behaviors of participants and ascription of responsibility, personal norms and biospheric value orientations. Similar to previous study done by Sahin (2013) with pre-service teachers, the present research supported the idea that middle school students were morally obligated, had environmentally responsibilities and cared about human and non-human living things in terms of energy conservation. To support, biospheric motive concerns was also found as in a positive correlation with pro-environmental behaviors in different studies (Milfont et al., 2006; Schultz et al., 2004). Nonetheless, Schultz and colleagues (2005) stated that having high biospheric value orientations lead to more sensitivity about human and non-human living things. Another research results showed that predictor variables responsible environmental behaviors' of middle school students were found biospheric and altruistic motive concerns not egoistic concerns (Bahar & Sahin, 2017). On the contrary, in the same research not only personal norms and biospheric value orientations but also it was found that egoistic value orientation was one of the predictors of teacher candidates' energy conservation behaviors (Sahin, 2013). Egoistic and biospheric concerns were found as elementary school students' motive concerns about environmental constructs by Onur et al. (2012). However, it was claimed that individuals who predominantly had egoistic value orientations had less conservative behaviors towards environment (Nordlund & Garvill, 2002). On the contrary, different studies supported that student who had biospheric and altruistic oriented values more likely to express pro-environmental behaviors (Gutierrez 1996; Thompson and Barton, 1994).

Although Murray and Murray (2007) stated that values which are shaped by attitudes and beliefs are meaningful predictors for behaviors, claim that it was a controversial issue whether the values are the main determinants of behavior or the attitudes which composed from values and beliefs affect behavior. In contrast, the research results done by Schultz and Zelezny (1999) concluded that biospheric and altruistic value orientations effects personal encouragement in terms of pro-environmental behaviors. Morover, altruistic and biospheric value orientations were found in a negative relationship with conservation (Schultz, 2001). Considering the supportive

evidences, researches conducted and revealed that biocentric value oriented people are more probably perform positive environmental behaviors (Steel, 1996; Milfont, Duckitt & Cameron, 2006).

At the present study, personal norms dimension of the scale were found in positive relationship between participants' energy conservation behaviors. To support, personal norms was found as a predictor variable on energy conservation behaviors (Nordlund & Garvill, 2002, 2003; Sahin, 2013). In a nut shell, participants felt moral obligation to save energy during consumption. Moreover, in the present research' results it was determined that personal norms were positively associated with ascription of responsibilities, awareness of consequences and biospheric value orientations which had similar results for personal norms and supported by the Sahin's study (2013) . In addition, Schwartz (1977) stated that energy conservation behaviors shaped by personal norms. Ibtissem (2010) emphasized that environmentally responsible behavior may realizable by activating personal norms.

Ascription of responsibility was another predictor of energy conservation behavior of students in this study. Hines and colleagues (1986/87) study results supported that higher personal responsibility lead to higher tendency to perform the more environmentally friendly behaviors. Ascription of responsibilities was found in a linear relationship with awareness of consequences. The results of the multiple linear regression analysis of the present study converges with Sahin's research (2013) whose one of the predictor variable was also found as awareness of consequences for ascription of responsibilities.

To sum up, Value-Belief-Norm Theory successfully explain the predictors of energy conservation behaviors of middle school students. In order to determine and improve students' energy conservation behaviors it is crucial to do more research and investigate the association of energy conservation behaviors of the students in Turkey. To be ecologically sustainable, a sustainable change must take place in people's values, attitudes, lives, norms and beliefs and this change is also need not

only locally but also globally social movement. In this perspective, students should be aware of results and consequences of own consuming behaviors. Behavioral change in energy usage is possible to alter attitudes, raise consciousness and encourage people to engage in subject matter about energy.

5.3. Implications

The results of this study have some significant implications to curriculum developers, teachers, school administrators and the researchers who interested in energy related issues, energy education and environmental education. This research may provide to schools what can be done to improve environmental behaviors and reduce energy consumption. Increase in awareness for both energy problems and energy, education has a great importance to act proper energy saving behaviors (DeWaters & Powers, 2011).

In the current study, it was found that students' energy conservation behaviors was not at the desired level. It could be possible to change in behaviors toward reducing use of energy by education. Educational regulations could be able to provide and increase the level of understating and awareness of energy conservation behaviors. Middle school science curriculum could be developed to improve students' energy conservation behaviors, environmental beliefs, attitudes, content knowledge, consequences of energy related issues and personal norms towards environment. Curriculum developers could reorganize the curriculum with emphasis on energy related problems and without isolated from nature.

Furthermore, biospheric value orientations were found to have important role in to improve energy conservation behaviors. Therefore, students could be participated in some activities such as indoor and outdoor activities, real life experiences, field trips, and argumentations and discussions about energy related problems. As stated by Bögeholz (2006), "aesthetic nature experiences" enhance individuals' biospheric

values and so students could be able to participate in environmental activities. Increase in biospheric values results in more aware, knowledgeable and sensitive students to environmental problems. Increasing in students' environmental responsibilities, problem solving skills and awareness to nature are possible with human-nature interactions.

5.4. Recommendations

Based on the findings of this study, there are some useful suggestions for further researches. This study has limited participants who were only middle school students in a small region and it is not possible to generalize the research results. In order to increase generalizability, the study could be applied to much more students in different districts and cities in Turkey with using *random sampling method*.

Future studies can be conducted to examine different determinants of energy conservation behaviors of students and based on the results strategies can be developed to increase students' energy conservation behaviors. Future researchers could conduct the study in different types of school such as public schools, private schools, urban/rural area schools in order to examine predictors of students' energy conservation behaviors and differences of students' behaviors. Future studies may conduct with qualitative research techniques in addition to questionnaire. In order to get more detailed information about participants such as family income, hometown etc. interview could be done and whether these variables have an effect on energy conservation behavior could be investigated.

Impacts of indoor and outdoor activities, real life experiences and field trips on energy conservation behaviors may be tested with an experimental research. Future studies may be conducted to examine effects of grade level differences and demographic variables on use of energy. There is much more evidences needed to determine energy conservation behaviors and the reasons for these behaviors. In the

future studies energy literacy and energy knowledge of the students could be examined.

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APPENDICES

APPENDIX A: ENERJI KULLANIMI ANKETI

Enerji Kullanımı Anketi

Değerli öğrenciler,

Bu anket sizlerin enerji kullanımına yönelik tercihlerinizi belirlemeye yönelik akademik bir çalışmadır. Okul yönetimi ile hiçbir ilgisi yoktur. Bu bir sınav değildir. Cevaplarınız gizli tutulacaktır. İfadeleri dikkatlice okuyunuz ve samimiyetle cevap veriniz.

Katkılarınız için teşekkür ederiz.

I. Kişisel Bilgiler

1. Cinsiyetiniz nedir?

☐ Kız ☐ Erkek

2. Yaşınız:

3. Sınıfınız:

4. Ailenizdeki toplam kişi sayısı:

☐ 2 ☐ 3 ☐ 4

☐ 5 ☐ 6 ☐ 6'dan fazla

Anne ve babanızın eğitim düzeyi nedir?

5. Anne	6. Baba
☐ Hiç okula gitmemiş	☐ Hiç okula gitmemiş
☐ İlkokul	☐ İlkokul
☐ Ortaokul	☐ Ortaokul
☐ Lise	☐ Lise
☐ Üniversite	☐ Üniversite

7. Enerji tasarrufu ile ilgili en çok hangi kaynaklardan bilgi ediniyorsunuz? Birden fazla işaretleme yapabilirsiniz.

☐ İnternet ☐ Okul panolarından ☐ Öğretmenimden

☐ TV ☐ Yaşadığım şehirdeki panolardan ☐ Kitaplardan

☐ Bilimsel dergilerden (Bilim Çocuk, National Geographic, vb.) ☐ Diğer: (Lütfen belirtiniz).....

III. Temel Değerler

KENDİ HAYATINIZI YÖNLENDİRİRKEN aşağıdaki unsurların, sizin için ne kadar önemli olduğunu verilen ölçüte göre lütfen belirtiniz. Öncelikle tüm maddeleri okuyunuz. Daha sonra sizin için en önemli ve en önemsiz olan unsurları belirleyiniz. Diğer maddeleri bu unsurları göz önünde bulundurarak değerlendiriniz. Eşit derecede önemli bulduğunuz maddeleri aynı ölçütte değerlendirebilirsiniz.

[Hiç önemli değil (1) - Çok önemli (5)]

		Hiç önemli değil				Çok önemli
1.	Yardımseverlik (Başkalarının refahı için çabalamak)	1	2	3	4	5
2.	Çevre kirliliğinin önlenmesi	1	2	3	4	5
3.	Mal mülk ve para sahibi olmak (Zenginlik)	1	2	3	4	5
4.	Başkalarına hükmetmek/onları kontrol etmek (Sosyal güç)	1	2	3	4	5
5.	Doğaya uyum sağlamak (Doğayla bir bütün olmak)	1	2	3	4	5
6.	Herkes için eşit fırsatlar sağlamak (Eşitlik)	1	2	3	4	5
7.	Liderlik yapmak (Otorite sahibi olmak)	1	2	3	4	5
8.	Haksızlıkları düzeltmek, güçsüzlere yardım etmek (Sosyal adalet)	1	2	3	4	5
9.	Diğer türlerle uyum içinde yaşamak (Yeryüzüne saygı)	1	2	3	4	5
10.	Çevreyi korumak (Doğayı gözetmek)	1	2	3	4	5
11.	Barış içinde bir dünya (Savaşsız ve çatışmasız bir dünya)	1	2	3	4	5
12.	İkna edici olmak (İnsanlar ve olaylar üzerinde etkili olmak)	1	2	3	4	5

IV. Sorumluluklarımız

Aşağıda belirtilen ifadelere ne ölçüde katıldığınızı lütfen belirtiniz.

		Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1.	Enerji sorunlarından diğer insanlarla birlikte ben de sorumluyum.	1	2	3	4	5
2.	Enerji kaynaklarının tükenmesinden diğer insanlarla birlikte kendim de sorumluyum.	1	2	3	4	5
3.	İklim değişikliği ile mücadelede diğer insanlarla birlikte kendi sorumluluklarım da vardır.	1	2	3	4	5
4.	Enerji ile ilgili sorunların çözümlenmesinde benim de sorumluluklarım vardır.	1	2	3	4	5
5.	Bireysel olarak aldığımız önlemler de enerji sorunlarının çözümüne katkıda bulunur.	1	2	3	4	5
6.	Küresel ısınma probleminden diğer insanlarla birlikte kendim de sorumluyum.	1	2	3	4	5

V. Sonuçlar için Farkındalık

Aşağıda belirtilen ifadelere ne ölçüde katıldığınızı lütfen belirtiniz.

		Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1.	İklim değişikliği bütün bitki ve hayvan türleri için bir sorun haline gelecektir.	1	2	3	4	5
2.	Enerji tasarrufu küresel ısınmanın azalmasına katkı sağlayacaktır.	1	2	3	4	5
3.	Enerji tasarrufu yapmak çevre problemlerinin çözümüne katkı sağlar.	1	2	3	4	5
4.	İklim değişikliği ülkemiz için ciddi bir sorundur.	1	2	3	4	5
5.	Enerji tasarrufu yapmamız ülkemizin yararına olacaktır.	1	2	3	4	5
6.	Enerji tasarrufu benim ve ailemin yararına olacaktır.	1	2	3	4	5
7.	İklim değişikliği benim yaşamımı etkileyen ciddi bir sorundur.	1	2	3	4	5
8.	Fosil yakıt kaynaklarının tükenmesi enerji ve ham madde sıkıntısı doğurur.	1	2	3	4	5
9.	Enerji kaynaklarının tükenmesi ciddi bir sorundur.	1	2	3	4	5
10.	Küresel ısınmanın gerçekten bir problem olduğundan eminim.	1	2	3	4	5
11.	İklim değişikliği ile insanların enerji tüketimi arasındaki bağlantıyı biliyorum.	1	2	3	4	5

VI. Kişisel Normlar

Aşağıda belirtilen ifadelere ne ölçüde katıldığınızı lütfen belirtiniz.

		Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1.	Mümkün olan en yüksek miktarda enerji tasarrufu yapmakla yükümlü olduğumu hissediyorum.	1	2	3	4	5
2.	Başkalarının ne yaptığına bakmadan, enerji tasarrufu yapmak için ahlaki yükümlülük hissediyorum.	1	2	3	4	5
3.	Benim gibi herkes enerji kullanımını azaltmak için yapabileceği her şeyi yapmalı.	1	2	3	4	5
4.	Enerji israfı yaptığımda kendimi suçlu hissederim.	1	2	3	4	5
5.	Yeni bir çamaşır makinesi alacak olsam, enerji tasarruflu bir ürün almak için ahlaki yükümlülük hissederim.	1	2	3	4	5
6.	Uzun mesafelerden getirilmesi enerji tüketimine neden olduğu için, ithal ürünleri satın aldığımda kendimi suçlu hissederim.	1	2	3	4	5
7.	Günlük yaşamımdaki davranışlarımda doğayı ve çevreyi göz önünde bulundurmam gerektiğini hissediyorum.	1	2	3	4	5
8.	Enerji tasarrufu yaparsam daha iyi bir insan olurum.	1	2	3	4	5
9.	Fosil yakıtlarının yerine temiz enerji (güneş, rüzgar, jeotermal enerjivb.) kullanmak ahlaki yükümlülüğümüzdür.	1	2	3	4	5

VII. Çevreye Yönelik İnançlar
Aşağıda belirtilen ifadelere yönelik görüşlerinizi belirtiniz.

		Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1.	Dünyanın, insan yaşamını destekleme kapasitesini doldurmak üzereyiz.	1	2	3	4	5
2.	İnsanlar, ihtiyaçlarını karşılamak için doğayı değiştirme hakkına sahiptirler.	1	2	3	4	5
3.	İnsanların doğaya müdahale etmesi genellikle felaketle sonuçlanır.	1	2	3	4	5
4.	İnsan zekâsı ve yetenekleri, Dünya'nın bozulmayacağının garantisidir.	1	2	3	4	5
5.	İnsanlar doğaya çok kötü davranıyorlar.	1	2	3	4	5
6.	Dünyada herkese yetecek miktarda doğal kaynak vardır, yeter ki bu kaynaklardan nasıl yararlanacağımızı bilelim.	1	2	3	4	5
7.	Bitki ve hayvanlar da insanlar kadar yaşama hakkına sahiptir.	1	2	3	4	5
8.	Doğanın dengesi, endüstri toplumlarının etkileri ile rekabet edebilecek güçtedir.	1	2	3	4	5
9.	Bizi diğer canlılardan üstün kılan özel yeteneklerimize rağmen,hâlâ doğa yasaları ile mücadele ediyoruz.	1	2	3	4	5
10.	İnsanların karşı karşıya kaldıkları *"çevresel problemler"* olarak adlandırılan olaylar fazlasıyla abartılmaktadır.	1	2	3	4	5
11.	Dünya, sınırlı alana ve kaynaklara sahip olan bir uzay aracına benzer.	1	2	3	4	5
12.	İnsan olmak doğanın geri kalan bölümüne hükmetmek demektir.	1	2	3	4	5
13.	Doğa çok hassastır ve kolaylıkla zarar görebilir.	1	2	3	4	5
14.	İnsanlar doğayı kontrol edebilmek için doğayı anlamak gerektiğini sonunda öğrenecekler.	1	2	3	4	5
15.	Eğer her şey bugünkü gibi devam ederse, yakında büyük bir ekolojik facia ile karşı karşıya kalacağız.	1	2	3	4	5

APPENDIX B: METU HUMAN SUBJECTS ETHICS COMMITTEE DOCUMENT

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
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27 ŞUBAT 2018

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Doç .Dr. Elvan ŞAHİN ;

Danışmanlığını yaptığınız yüksek lisans öğrencisi Duygu ÖZTÜRK'ün ***"İlköğretim 8. Sınıf Öğrencilerinin Enerji Tasarrufu Davranışlarının Değer, İnanç, Norm Teorisi Çerçevesinde Açıklanması"*** başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülerek gerekli onay **2017-EGT-021** protokol numarası ile **23.03.2018 - 30.12.2018** tarihleri arasında geçerli olmak üzere verilmiştir.

Bilgilerinize saygılarımla sunarım.

Prof. Dr. Ş. Halil TURAN
Başkan V

Prof. Dr. Ayhan SOL
Üye

Prof. Dr. Ayhan Gürbüz DEMİR
Üye

Doç. Dr. Yaşar KONDAKÇI
Üye

Doç. Dr. Zana ÇITAK
Üye

Yrd. Doç. Dr. Pınar KAYGAN
Üye

Yrd. Doç. Dr. Emre SELÇUK
Üye

APPENDIX C: PERMISSION FOR QUESTIONNAIRE

T.C.
İSTANBUL VALİLİĞİ
İl Milli Eğitim Müdürlüğü

Sayı : 59090411-44-E.8198683 25.04.2018
Konu: Anket Araştırma İzni

ORTA DOĞU TEKNİK ÜNİVERSİTESİNE
(Öğrenci İşleri Daire Başkanlığı)

İlgi: a) 16.03.2018 tarih ve 1408 sayılı yazınız.
b) Valilik Makamının 19.04.2018 tarih ve 7975178 sayılı oluru.

Üniversiteniz Eğitim Bilimleri Enstitüsü yüksek lisans öğrencisi Duygu ÖZTÜRK'ün **"Ortaokul 8. Sınıf Öğrencilerinin Enerji Tasarrufu Davranışlarının Değer, İnanç Norm Teorisi Çerçevesinde Açıklanması"** konulu araştırma çalışması hakkındaki ilgi (a) yazınız ilgi (b) valilik onayı ile uygun görülmüştür.

Bilgilerinizi ve araştırmacının söz konusu talebi; bilimsel amaç dışında kullanmaması, **uygulama sırasında bir örneği müdürlüğümüzde muhafaza edilen mühürlü ve imzalı veri toplama araçlarının kurumlarımıza araştırmacı tarafından ulaştırılarak uygulanılması,** katılımcıların gönüllülük esasına göre seçilmesi, araştırma sonuç raporunun müdürlüğümüzden izin alınmadan kamuoyuyla paylaşılmaması koşuluyla, gerekli duyurunun araştırmacı tarafından yapılması, okul idarecilerinin denetim, gözetim ve sorumluluğunda, eğitim-öğretimi aksatmayacak şekilde ilgi (b) Valilik Onayı doğrultusunda uygulanması ve işlem bittikten sonra 2 (iki) hafta içinde sonuçtan Müdürlüğümüz Strateji Geliştirme Bölümüne rapor halinde bilgi verilmesini arz ederim.

M. Nurettin ARAS
Müdür a.
Müdür Yardımcısı

EK:1- Valilik Onayı
2- Ölçekler

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T.C.
İSTANBUL VALİLİĞİ
İl Millî Eğitim Müdürlüğü

Sayı : 59090411-20-E.7975178 19/04/2018
Konu: Anket ve Araştırma İzin Talebi

VALİLİK MAKAMINA

İlgi: a) Orta Doğu Teknik Üniversitesinin 16.03.2018 tarih ve 1408 sayılı yazısı.
b) MEB. Yen. ve Eğ. Tk. Gn. Md. 22.08.2017 tarih ve 12607291/ 2017/25 No'lu Gen.
c) Milli Eğitim Araştırma ve Anket Komisyonunun 13.04.2018 tarihli tutanağı.

Orta Doğu Teknik Üniversitesi Eğitim Bilimleri Enstitüsü yüksek lisans öğrencisi Duygu ÖZTÜRK'ün **"Ortaokul 8. Sınıf Öğrencilerinin Enerji Tasarrufu Davranışlarının Değer, İnanç Norm Teorisi Çerçevesinde Açıklanması"** konulu tezi kapsamında, ilimiz Sarıyer ilçesinde bulunan özel/resmi ortaokullarda öğrenim gören 8. sınıf öğrencilerine; anket uygulama istemi hakkındaki ilgi (a) yazı ve ekleri Müdürlüğümüzce incelenmiştir.

Araştırmacının söz konusu talebi; bilimsel amaç dışında kullanılmaması, **uygulama sırasında bir örneği müdürlüğümüzde muhafaza edilen mühürlü ve imzalı veri toplama araçlarının kurumlarımıza araştırmacı tarafından ulaştırılarak uygulanılması, katılımcıların gönüllülük esasına göre seçilmesi, araştırma sonuç raporunun müdürlüğümüzden izin alınmadan kamuoyuyla paylaşılmaması koşuluyla, okul idarelerinin denetim, gözetim ve sorumluluğunda, eğitim-öğretimi aksatmayacak şekilde ilgi (b) Bakanlık emri esasları dâhilinde uygulanması, sonuçtan Müdürlüğümüze rapor halinde (CD formatında) bilgi verilmesi kaydıyla** Müdürlüğümüzce uygun görülmektedir.

Makamlarınızca da uygun görülmesi halinde olurlarınıza arz ederim.

Ömer Faruk YELKENCİ
Milli Eğitim Müdürü

OLUR
19/04/2018

Ahmet Hamdi USTA
Vali a.
Vali Yardımcısı

Ek:1- Genelge
2- Komisyon Tutanağı

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APPENDIX D: TURKISH SUMMARY / TÜRKÇE ÖZET

Giriş

Çevre, insanlar ve diğer canlı türleri için birçok fayda sağlar. Her şeyden önce, yaşam için gerekli olan temiz hava, beslenme, barınak gibi temel ihtiyaçları karşılar ve doğal kaynakların deposudur. Başka bir açıdan, çevre canlılar için bir yaşam alanı olarak da görülebilir ve ürettiğimiz atık maddelerin üstesinden gelmek için "atık deposu" gibi davranır (Dunlap ve Catton 2002). Örnek olarak, insanlar sera gazlarının miktarını artırarak havaya "atık deposu" olarak yaklaşmışlardır, ancak bu gazlar ortalama küresel yüzey sıcaklığında bir değişiklik meydana getirmiştir. Böyle bir durum, canlıların yaşam alanlarını ve aynı zamanda tüm canlılık faaliyetlerini olumsuz yönde etkilemektedir. Gezegenimizin bir sınırı vardır, yani ekosistemin gıda ve enerji kaynakları sağlamak gibi hayati görevleri yerine getirme kabiliyeti sınırsız değildir (Dunlap & Jorgenson, 2012). Ayrıca aşırı miktarda atık, doğanın geri dönüşüm kabiliyetini yitirmesine sebep olmasından dolayı çevre sorunlarına neden olmaktadır. Dunlap ve Catton (2002), bu kabiliyetin aşırı kullanımının, doğal kaynaklar ve doğal sistemler için de sorun yarattığını belirtmektedir.

Günümüzün en önemli tartışmalarını ortaya çıkaran çevresel sorunların insan faaliyetlerinden kaynaklandığı yönünde yaygın bir düşünce vardır (Schultz, Gouveia, Cameron, Tankha, Schmuck ve Franek, 2005). Enerji tüketimi çok hızlı bir şekilde artarken enerji kaynakları artan enerji ihtiyacını telafi edemeyebilir. Bu nedenle, enerji kaynaklarını korumak ve çevre sorunlarını azaltmak için bazı önlemler alınması gerekmektedir. 1970'lerin başında, birçok gelişmiş ülke ve bilim insanı enerji kriziyle ilgili bazı çözümler bulmak için çalışmaya başlamışlar ve enerji tasarrufu yapmanın çok önemli bir çözüm olduğuna dikkat çekmişler, enerjiden tasarruf etmenin yollarından birinin bireylerin enerji kullanımının azaltılması olduğu konusunda da ortak bir fikre varmışlardır (Erten, 2002).

Enerji kaynağı olarak genellikle yenilenemeyen enerji kaynakları kullanılmaktadır (Hinrichs ve Kleinbach, 2013). Ancak, enerji ihtiyacı azalmamakta ve fosil yakıtlar nedeniyle sera gazı salınımı artmaktadır. 1960'larda çevrenin tahribatına dair artan bir farkındalığın ardından, çevresel ve ekolojik hareketler başlamıştır. Örneğin, küresel çevre kaygıları ile ilgili olarak Stockholm Konferansı yapıldı (UNEP, 1972). Sürdürülebilir kalkınmanın yüksek oranda ilişkili kavramlar ortamı ve kalkınmasından oluştuğu anlamında "Ortak Geleceğimiz" Bruntland Raporunda sürdürülebilir kalkınmaya değinilmiştir (1987). Gündem 21'e göre eğitimin sürdürülebilir gelişimi ve önemi daha da önem kazanmış ve enerji konusu ele alınmış, enerji elde etme ve kullanım yolunun sürdürülebilir olmadığı vurgulanmıştır (UNCED, 1992).

Enerji, günlük yaşamda büyük öneme sahiptir ve yenilenemeyen enerji kaynakları olarak kabul edilen benzin, doğal gaz, kömür gibi fosil yakıtlar çoğunlukla enerji kaynağı olarak kullanılmaktadır. Farhar'a (1994) göre, "enerji kaynaklarının tükenmesi", "sera gazı salınımı" ve "küresel iklim değişikliği" gibi çevresel sorunların nedeni temel olarak enerji üretim ve tüketim sırasında oluşmaktadır. Fosil yakıtların kullanılması, zaman içinde çeşitli çevresel etkileri olan sera gazlarında artışa neden olmaktadır. Sera gazı artışı sadece insanlar üzerinde değil, tüm canlılar ve ekosistemler üzerinde olumsuz etkilere sahiptir. Enerji tüketimi gerektiren faaliyetlerdeki artış, doğal kaynakların tükenmesine neden olmakla birlikte iklim değişikliği gibi pek çok çevre sorununa da yol açmaktadır (IPCC, 2014).

Wang ve Moriarity (2017) tarafından bildirilen son eğilimlere göre, hem OECD hem de OECD üyesi olmayan ülkelerde enerji kaynakları ısıtma, elektronik cihazların çalıştırılması gibi evsel faaliyetler için kullanılmaktadır. Öte yandan, elektrik ihtiyacındaki ve tüketimindeki artış, aile gelirindeki yükseliş ve teknolojik cihazlardaki ilerlemeler nedeniyle ortaya çıkmakta ve bunun nedeni olarak sera gazı salınımı artmaktadır. Teknolojinin gelişmesiyle birlikte, enerji ihtiyacı artmakta ve aydınlanma, çamaşır makinesi, buzdolabı, televizyon vb. Teknolojik cihazlar için elektrik enerjisi kullanılmaktadır (Şahin, 2013).

Dünya nüfusu günden güne artma eğilimindedir ve bu da öğrenci ve okul sayısında artış için küresel bir potansiyel yaratmaktadır. Enerji kullanımının neden olduğu çevre ile ilgili problemlerle başa çıkabilmek için öğrencilerin çevre okuryazarı olmaları gerekir. Stevenson (2007) tarafından belirtildiği gibi çevre okuryazarı olan kişi, çevre sorununu önlemek için üst düzey sorumlu çevresel davranışa sahiptir. Roth'a (1968) göre "çevre okuryazarı vatandaş", çevre konusunda temel bir bilinç, farkındalık ve anlayışa sahip olan kişi olarak tanımlanmaktadır. Aynı şekilde, Dickey ve Roth (Roth, 1992'de belirtildiği gibi) çevre okuryazarlığının "bilgi, duyarlılık, farkındalık, endişeler ve çevre ile ilgili kişisel sorumluluk" gibi birçok unsuru olduğunu vurgulamıştır. Enerji kullanımını ve enerji ile ilgili çevre sorunlarını azaltmak için tüm vatandaşların ve öğrencilerin de bir takım sorumluluk almaları gerekir. Bir enerji okuryazarı vatandaş olmak, enerji kullanımının, enerjinin ve enerjinin korunmasına ilişkin bilginin aşırı kullanımının etkilerini anlamak, uygun enerji kaynaklarını seçmek ve karar vermek için önemli bir öneme sahiptir (Barrow ve Morrisey, 1989; DeWaters & Powers, 2013).

Bu çalışmada "Değer-İnanç-Norm Teorisi" kullanılmıştır. Teori evrensel değerleri, sonuçların farkındalığını, sorumluluk bildirimi, kişisel normları, yeni çevresel paradigmayı ve norm aktivasyon modelini içerir. Değer-İnanç-Norm Teorisi, çevre davranışlarının ana belirleyicilerini açıklamak için kullanılır. Bu teori, çevresel nedenlerle ilgili endişeleri, çevreye karşı sorumlu davranışları ve bireylerin doğaya olan ilgilerini açıklayabilmektedir. Bu yönüyle bu çalışmanın amacı, ortaokul öğrencilerinin enerji tasarrufu davranışlarını değer-inanç-norm teorisi kullanarak açıklamak, öğrencilerin enerji tasarrufu davranışlarının yordayıcılarını tanımlamak ve öğrencilerin enerji tasarrufu davranışları ve evrensel değerler, kişisel normlar, sorumluluk bildirimi, sonuçların farkındalığı ve çevresel inançlar arasındaki ilişkiyi incelemektir. Bu nedenle yapılan çalışmanın araştırma soruları aşağıda belirtildiği gibidir.

1) Ortaokul öğrencilerinin enerji tasarrufu davranışları nelerdir?

2) Ortaokul öğrencilerinin evsel enerji kullanımına ilişkin değer, inanç ve normları nelerdir?

3) Ortaokul öğrencilerinin enerji tasarrufu davranışları, değerleri, inançları ve kişisel normları arasındaki ilişki nedir?

Çalışmanın Önemi

Çoğunlukla fosil yakıtların kullanımı sırasında salınan ve çevre sorunlarına neden olan sera gazları, enerji üretirken ve tüketirken oluşmaktadır. Fosil yakıtlar yaygın olarak kullanılan bir enerji kaynağı olmasına rağmen, enerjinin tasarrufu yaparak karbondioksit salınımı azaltılabilir (Hinrichs & Kleinbach, 2013). Bu nedenle, enerji tüketimi ve sera gazı salınımının en aza indirilmesi gerekmektedir. Bodzin, Fu, Peffer ve Kulo (2013) tarafından belirtildiği gibi, okul ve fen bilimleri dersleri, öğrencilerin enerji tasarrufu davranışları oluşturması ve geliştirmesi, enerji tasarrufu konusunda farkındalık yaratması için çok önemlidir. Bu nedenle, bu çalışma ortaokul öğrencilerinin enerji tasarrufu davranışlarını ve enerji tasarrufu davranışlarının tahmin edicilerini anlamayı amaçlamaktadır. Eğitim, çevre sorunları hakkında farkındalığı artırmak ve sürdürülebilir bir yaşam tarzı olan vatandaşlar oluşturmak için büyük bir etkiye sahiptir. Bu nedenle, bu çalışma ortaokul öğrencilerinin enerji tasarrufu davranışlarını ve enerji tasarrufu davranışlarının tahmin edicilerini anlamayı amaçlamaktadır.

Davranış, çevremizdeki değişimler üzerinde etkili olan seçimlerimiz hakkında bir rehberdir (Rosa ve Dietz, 1998). Çevresel meselelerle ilgili davranışlar çevresel değişime neden olur (Stern, Young ve Druckman, 1992) ve davranışlar insanın değerleri ile şekillenebilir (Schultz ve Zelezny, 1999; Stern, 2000). Bu açıdan, insanların davranışları, farkındalığı ve çevresel değerleri sürdürülebilir bir hareket

yapmak için hayati önem taşır. Sürdürülebilirlik konusundaki tutum ve davranışları değiştirerek, farkındalık yaratarak, davranış ve sorumluluk alarak, bilgiyi geliştirmek, sürdürülebilir bir dünya oluşturmak için farkındalık yaratmak gereklidir. Eğitim, çevresel davranışları yaratmada kilit noktalardan biri olarak görülmektedir. Bu bağlamda çalışmanın amacı, Türkiye'deki ortaokul öğrencilerinin enerji tasarrufu ile ilgili değerlerini, inançlarını, normlarını ve davranışlarını belirlemektir.

Türkiye ilköğretim fen bilimleri dersi öğretim programı ile ilgili olarak (Milli Eğitim Bakanlığı, 2018), öğrencilerin yerel ve küresel çevre sorunları, enerji kaynakları, kaynakların korunması, enerji tasarrufu, kaynakların verimli kullanılmaması durumunda karşılaşılabilecek çevre sorunları, sera etkisi, küresel ısınma, iklim değişikliğinin nedenleri ve insan ve çevre üzerindeki etkileri, sürdürülebilirlik vb. alanlarda konu bilgilerini geliştirmek amaçlanmaktadır. Mevcut çalışma öğrencilerin enerji tüketim davranışlarını belirlemek ve bu davranışların arkasındaki nedenleri ortaya koymaktır. Özellikle Türkiye'de ilköğretim öğrencileri için konuyla ilgili sınırlı sayıda araştırma yapılmıştır ve bu çalışmanın önemli olduğuna, literatüre katkı sağlaması ve program geliştiricilere yardımcı olacağına inanılmaktadır.

Alan Taraması

Artan çevre sorunları ile çevre eğitimi 1970'lerin başından beri önem kazanmıştır. Eğitim, çevre sorunlarını fark edip çözebilmek, doğayı ve doğal kaynakları korumak ve sürdürülebilir bir yaşam tarzı düzenlemek için kilit noktadır. Çevre sorunlarını çözüme ulaştırmak ve çevre bilincini artırmak ancak eğitim ve çevre eğitimi ile mümkündür (Orr, 1992). Çevre eğitimi, çevre sorunlarının üstesinden gelmenin adresidir ve bireyler çevre sorunlarını doğru şekilde çözmek için bilgi sahibi olmalı ve günlük hayata aktif olarak katılmalıdır (UNESCO, 1978). Çevre sorunlarıyla mücadelede eğitimin önemi Stockholm Konferansı'nda da belirtilmiştir (UNEP, 1972).

Tiflis Bildirgesi'nde çevre eğitiminin temel amaçları; bilgi, bilinç, değer, tutum, çevre ve çevre sorunlarına katılım becerileri, çevre sorunlarının çözümünü tahmin etmek ve katkıda bulunmak ve çevre standartlarında iyileştirme yönetiminde yer almak vb. olarak belirlenmiştir (UNESCO, 1977). Ek olarak, çevre eğitimi, bireyler için çevre bilgisi oluşturmaya yardımcı olur, ayrıca çevre bilgisi sağlayarak bireylere yaşam kalitesi ile çevre kalitesi arasındaki dengeyi sürdürmek için yardımcı olur (Hungerford, Peyton ve Wilke, 1980). Çevre eğitimi, insanları çevre okuryazar olmalarını teşvik etmek amacıyla ortaya çıkmıştır (Teksoz, Şahin ve Tekkaya-Öztekin, 2012). Prerdproa (2009) tarafından yapılan çalışma sonucu çevre eğitimine katıldıktan sonra öğrencilerin çevre hakkındaki bilginin artmış olduğunu göstermiş ve Bunprasert (2012) ise elektrik tasarrufu ve atık bilgilerinin de arttığı sonucuna varmıştır. Çevre eğitmine katılmış ve katılmamış bir grup katılımcı ile yapılan bir çalışmanın sonuçları da çevre eğitimi alan katılımcıların, sahip olmadıklarından daha yüksek sonuçlara sahip olduğunu göstermiştir (Culen ve Mony, 2003). Çevre eğitimi çevre okuryazarı bireyler yetiştirilmesinde büyük bir öneme sahiptir.

Dünya nüfusu ve küresel enerji talepleri artmakta, ancak doğa tarafından sağlanan kanaklar sınırlıdır. Eğitimdeki enerji verimliliği programları, enerji ile ilgili olumlu davranışlar ortaya çıkarabilir, enerji kullanımını ve sera gazı salınım seviyesini azaltabilir. Küresel ısınmayı azaltmak için "enerji, enerji eğitimi ve enerji verimliliği" konularının önemli olduğu, eğitimin enerji problemleri ve enerji konusunda farkındalığın artması, uygun enerji tasarrufu davranışlarını gerçekleştirmede büyük önem taşıdığı vurgulanmaktadır (DeWaters & Powers, 2011). Enerji eğitimi farklı ülkelerde 1979'dan sonra uygulanmaya başlamıştır (Hsu, Huang, Fu ve Teng, 2010). Ayrıca, enerjiyi ilgilendiren konularda insanların bilgi, tutum ve davranışlarını belirlemek için yapılmış vardır. 4. sınıftan 6. sınıfa kadar olan öğrencilere 9 günlük bir enerji tasarrufu gezi programı uygulanmış ve bu eğitimin öğrencilerin enerji koruma tutumları üzerindeki etkisi araştırılmıştır. Araştırmanın sonuçları, öğrencilerin enerji tasarrufu eğitim programından sonra enerji tasarrufu konusunda olumlu tutum sergilediklerini göstermiştir (Collins ve ark. 1979). Kushler (1980) tarafından yapılan bir başka araştırma, enerji tasarrufu

eğitiminin öğrencilerin enerji ile ilgili tutum ve davranışları üzerinde olumlu etkisi olduğu ve öğrencilerin eğitim almış öğrencilerin daha fazla enerji tasarrufu eğiliminde olduğu sonucuna varmıştır.

Ancak, "bilgi-tutum-davranış" doğrusal modeli karmaşık insan davranışlarının nedenlerini açıklamak için yeterli değildi. 1994 yılında Stern ve Dietz, enerji tasarrufu davranışları gibi çevresel açıdan çevre dostu davranışları belirlemek için değerler ve çevresel tutumlarla ilgili bir "değer temelli teori" ortaya koydu. Bu çalışmanın teorik çerçevesi olan "Değer-İnanç-Norm Teorisi"; değerleri, kişisel normları, sonuçların farkındalığı, çevresel inançları, yeni çevresel paradigmayı, sorumluluk bildirimini içerir. Stern ve Dietz (1994) ayrıca, insanın değer yönelimleri tarafından şekillendirilen çevre yanlısı davranışlara katılımının olduğunu iddia etti. Çevresel davranışların farklı çalışmalarda biyosferik değerler ile pozitif korelasyon gösterdiği sonucuna varılmıştır (Milfont, Duckitt ve Cameron, 2006; Schultz, Shriver, Tabanico ve Khazian, 2004). Türkiye'deki ilköğretim öğrencilerinin çevre davranışlarını ve doğaya olan ilgilerini incelemek amacıyla bir anket çalışması yapılmıştır (Bahar ve Şahin, 2017). Egoistik değerlere sahip katılımcıların çevresel olarak sorumlu davranışları gösterme eğiliminde olmadıkları vurgulanmıştır. Hines, Hungerford ve Tomera (1986/87) tarafından yapılan çalışma sonuçları ise kişisel sorumluluk düzeyi yüksek olan bireyin çevre dostu davranışlar sergileme ihtimalinin daha yüksek olduğu sonucuna varmıştır. Şahin (2016), fen bilgisi öğretmen adaylarının cinsiyete dayalı hane halkı enerji korunumu davranışlarını tanımlamak amacıyla bir çalışma yürütmüştür. Çalışmanın sonuçları, kadın katılımcıların enerji koruma davranışlarının biyosferik değer yönelimleri ve kişisel normlar ile pozitif ilişkili olduğunu ortaya koymuştur.

Şahin (2013), öğretmen adaylarının enerji tasarrufu davranışlarını değer-inanç-norm teorik çerçevesinde incelemek için yaptığı çalışmanın analizi kişisel normlar, egoist ve biyosferik değer yönelimlerinin bu davranışları başarıyla açıklayabildiği sonucuna varılmıştır. Yapılan çalışmalarda enerji tasarrufu davranışalrı ve çevresel davranışlar ile ilgili farklı sonuçlar elde edilmiş olmasına rağmen birçok çalışmada biyosferik değerlerin davranışlar ile pozitif ilişki içerinde olduğu tespit edilmiştir. Bu

çalışmanın da enerji tasarrufu davranışlarını ve bu davranışların belirleyicilerini açıklayabilmesi beklenmektedir.

Yöntem

Çalışmada ortaokul öğrencilerinin enerji tasarrufu davranışları ve bu davranışların yordayıcıları tespit edilmeye çalışılmıştır. Çalışmanın katılımcıları, İstanbul Sarıyer ilçesindeki devlet okullarında olan 549 ortaokul öğrencisidir.

Veri Toplama Araçları

Bu çalışmada 5'li Likert-tipi yedi ölçme aracı kullanılmıştır. Bunlar: demografik bilgi anketi, enerji tasarrufu davranış anketi, evrensel değerler anketi, sorumluluk bildirimi anketi, sonuçların farkındalığı anketi, kişisel normlar anketi ve yeni çevre paradigması anketidir. Ana çalışma uygulanmadan önce anketlerin pilot çalışması İstanbul Sarıyer ilçesindeki devlet okullarında olan 149 ortaokul öğrencisine uygulanmıştır.

Demografik bilgi anketinde öğrencilerin cinsiyeti, aile üyelerinin sayısı, ebeveynlerin eğitim düzeyi, enerji tasarrufu hakkında bilgi kaynakları, enerji tasarrufunu teşvik etmek için okuldaki düzenlemeler hakkındaki ve okulda enerji verimliliğini destekleyen materyal ve araçların kullanımı hakkında fikirleri ile ilgili bilgi edinmek amacıyla uygulanmıştır. Öğrenci cinsiyet dağılımları neredeyse eşittir ve aileler genellikle 4 ve 5 kişilik birylerden oluşmaktadır. Ebeveynlerin eğitim düzeyleri ise çoğunlukla ilkokul, ortaokul ve lise düzeyindedir.

Enerji tasarrufu davranış anketi Ibıtissem tarafından geliştirilmiştir (2010). Türkçe uyarlaması ise Şahin tarafından yapılmıştır (2013). Pilot çalışma sonunda yapılan değişliklerden sonra sekiz maddeden oluşan enerji kullanım anketinin iki faktörlü olup .76 Cronbach alpha değerine sahip olduğu tespit edilmiştir.

Kişisel normlar, sorumluluk bildirimi ve sonuçlar için farkındalık anketleri Steg, Dreijerink, and Abrahamse (2005) tarafından geliştirilmiştir. Anketlerin Türkçe çeviri ve uyarlaması Şahin (2013) tarafından yapılmıştır. Pilot çalışmalar sonucunda kişisel norm anketindeki dokuz madedin iki faktörlü olduğu ve anketin .77 Cronbach alpha değerine sahi olduğu belirlenmiştir. Sorumluluk bildirimi anketi ise 6 maddeden oluşan tek boyutlu bir ankettir ve .79 Cronbach alpha değerine sahiptir. Sonuçlar için farkındalık için 11 maddelik, iki faktör yapısan sahip, .81 Cronbach alpha değeri olan bir anket kullanılmıştır.

Yeni çevresel paradigma anketi için Dunlap, Liere, Mertig ve Jones (2000) tarafından geliştirilen 15 maddelik, üç boyuttan oluşan ve .64 Cronbach değerine sahip bir anket uygulanmıştır. Temel değeler anketi ise kısa versiyonları Stern, Dietz ve Guagno (1998) tarafından uyarlanan ve Steg, Dreijerink ve Abrahamse (2005) tarafından uygulanan evrensel değerler anketi öğrencilerin yaşamlarını yönlendiren değerlerini değerlendirmek için kullanılmıştır. 12 maddeden oluşan anketin üç boyutu vardır ve her bir boyutun Cronbach alpha değerleri egoistik için .61, biyosferik için .72 ve özgecil değerler için .60 olarak hesaplanmıştır.

Bulgular

Öğrencilerin okul ortamını enerji tasarrufu uygulamaları açısından değerlendirklerinden çoğu (% 52,1) okulda enerji tasarrufunu teşvik eden düzenlemelerin yeterli olduğunu belirtti. Katılımcıların% 35,1 'i yetersiz bulurken, öğrencilerin% 12,8' i yeterli olduğunu belirtti. Öğrencilerin neredeyse yarısı (% 45,67) okulda enerji verimliliğini destekleyen materyal ve araçların kullanımının yetersiz olduğunu, katılımcıların% 42,36'sının yeterli olduğunu, katılımcıların% 11,97'sinin okulda enerji verimliliğini destekleyen malzeme ve araçların kullanımı oldukça yeterli bulduklarını belirttiler. Ayrıca öğrenciler enerji tasarrufuna yönelik bilgi kaynaklarını çoğunlukla internetten ve televizyondan (% 20,6), öğretmenden (% 15,8), kitaplardan (% 13,6), bilimsel dergiden (% 8,6), okul panolarından (% 7,5), yaşadığı şehirdeki panolardan (% 3,8) olduğunu belirttiler.

Enerji tasarrufu davranış ölçeğinin ortalaması 3,10 bulundu ve ölçeğin standart sapması 0,74 olarak hesaplandı. Sonuçlar, ortaokul öğrencilerinin çoğunlukla enerji tasarrufu ile ilgili orta düzeyde davranışlara sahip olduklarını ve öğrencilerin bu davranışları sıklıkla yapmadıkları sonucuna varıldı. Temel değerler anketinin sonuçlarına göre, her bir boyutun ortalama puanları egoistik değer için 3,06, biyosferik değer için 4,47 ve 5 puanlık bir ölçekte özgecil değer için 4,59 olarak hesaplanmıştır. Çalışmanın sonuçları, öğrencilerin sadece kendileri için değil aynı zamanda insan dışındaki diğer tüm canlılar açısından doğaya karşı duyarlılık gösterdiğini göstermiştir. Sorumluluklar anketi için çalışmanın sonuçları ortaokul öğrencilerinin ortalama 4,09 (SD = .68) ile yüksek sorumluluk sahibi olduğunu göstermektedir. Sonuç olarak, katılımcılar enerjiyle ilgili konulara şahsen kendilerini yükümlü hissettiler. Elde edilen sonuçlara göre, öğrenciler enerji ile ilgili sonuç farkındalığının yüksek düzeyde olduğunu ortaya çıkarmış ve toplam ölçek ortalaması 4.25 olarak hesaplanmıştır (SD = .53). Kişisel normlar ölçeğinin toplam ortalaması 3.82 ve standart sapma .61 olarak hesaplanmıştır. Sonuçlar, öğrencilerin enerji tasarrufu ve enerji kullanımı ile ilgili normlara sahip olduğunu göstermektedir. 15 maddelik 5'li Likert tipi yeni çevre paradigması anketinin ortalaması 3.81, standart sapma ise .46 olarak hesaplanmıştır. Öğrencilerin çevreye karşı duyarlılıkları olduğu saptanmıştır.

Bu çalışmada enerji tasarrufu davranışlarının belirleyicilerini incelemek için çoklu doğrusal regresyon testi uygulanmıştır. Sonuçlara göre sorumluluklar, kişisel normlar ve biyosferik değer yönelimleri öğrencilerin enerji tasarrufu davranışları ile önemli ölçüde ilişkili bulunmuştur (R^2 = .29, $F(7,541) = 33.12$, $p < 0.001$). Kişisel normlar, ölçüt varyansı için en yüksek oranı açıklamak açısından anlamlı bir belirleyicidir (β=.40; *part correlation* =.32 ; %95 ci: .37, .59). Biyosferik değerlerin (β=.16; *part correlation* =.13; 95% ci: .09 and .29) ve sorumlulukların (β=.11; *part correlation* =.08; 95% ci: .02 and .22) anlamlı ve pozitif katkı yaptığı tespit edilmiştir.

Diğer boyutlar için de yapılan çoklu regresyo analizi sonuçlarına göre kişisel normların (R^2 = 0.34, F(6,542) = 48.36, p < 0.001), sorumluluklar (β=.26; *part correlation* =.21; 95% ci: .16 and .30), sonuçlar için farkındalık (β=.31; *part correlation* =.24; 95% ci: .26 and .46) ve biyosferik değerlerle (β=.15; *part correlation* =.12; 95% ci: .06 and .23). anlamlı ve positif ilişkili olduğu bulumuştur. Sonuçlar için farkındalık boyutunun ise (R^2 = 0.25, F(4,544) = 47.15, p < 0.001) eni çevre paradigması (β=.36; *part correlation* =.35; 95% ci: .33 and .50), egoistik değerler (β=.13; *part correlation* =.13; 95% ci: .03 and .11), özgecil değerler (β=.12; *part correlation* =.10; 95% ci: .04 and .20) ve biyosferik değerlerler (β=.18; *part correlation* =.15; 95% ci: .08 and .22) ile pozitif ilişkili olduğu ortaya çıkmıştır. Son olarak öğrencilerin çevresel inançlarının (R^2 = 0.06, F(3,545) = 13.33, p < 0.001) özgecil (β=.17; *part correlation* =.14; 95% ci: .06 and .22) ve biyosferik değerler β=.13; *part correlation* =.10; 95% ci: .02 and .16) ile pozitif ilişkili olduğu sonucuna ulaşılmıştır.

Tartışma ve Sonuç

Araştırma sonuçları göstermiştir ki ortaokul öğrencileri ortalama düzeyde enerji tasarufu davranışı sergilemeketedir. Tanımlayıcı istatistiklerin sonuçlarına göre, bu öğrencilerin dolaylı olarak enerji tasarrufu davranışlarında bulunmalarına kıyasla daha çok doğrudan enerji tasarrufu davranışlarında bulundukları tespit edildi. Örneğin, katılımcıların çoğunluğu gereksiz ışıkları kapattıklarını ve işleri bittiğinde elektrikli aletlerin fişini çektiklerini belirtti. Buna karşılık, öğrencilerin neredeyse yarısı hiçbir zaman ya da nadiren enerjiyle ilgili yayınları ve okullarında enerji kaynakları ve enerji tasarrufu gibi konuları takip etmediği sonucuna ulaşılmıştır. Doğrudan ve dolaylı enerji kullanım davranışları arasındaki karşıtlık, gelecekteki çalışmalar için araştırma konusu olabilir.

Bu çalışma ortaokul öğrencilerinin biyosferik ve özgecil değer yönelimlerine egoistik değer yönelimlerinden daha fazla önem verdiklerini göstermiştir. Öğrencilerin yüksek biyosferik değerlerlere sahip olmanın nedeni, yaşadıkları alanın İstanbul'un

kıyılarına ve yeşil alanlarına yakın olmasından dolayı olabilir. Sorumluluk anketi sonuçların bakıldığında, öğrencilerin çoğunluğu enerji ile ilgili konularda sorumluluk duyduklarını ifade etmişlerdir. Örnek olarak, enerjiyle ilgili sorunlardan ve bu sorunların çözümünden sorumlu olduklarını ankete yansıtmışlardır. Ortaokul öğrencilerinin, enerji tasarrufu, enerji ve enerji kaynakları ile ilgili sorunlar, küresel ısınma ve iklim değişikliği gibi enerjiyle ilgili endişeler konusunda yüksek bir farkındalığa sahip oldukları tespit edilmiştir. Katılımcılar enerji ile ilgili endişeler açısından ortalama düzeyde ahlaki zorunluluk hissettiklerini belirtmişleridir. Sonuçlar ile ilgili olarak, katılımcıların enerji tasarrufu davranışları ile sorumlulukları, kişisel normları ve biyosferik değer yönelimleri arasında anlamlı ve pozitif bir ilişki olduğu sonucuna varılmıştır. Bu çalışmanın sonuçlarına benzer olarak biyosferik değerlerin farklı çalışmalarda çevre yanlısı davranışlarla pozitif korelasyon içinde olduğu bulunmuştur (Milfont ve ark. 2006; Schultz ve ark. 2004; Bahar ve Şahin, 2017). Ayrıca kişisel normların da enerji tasarrufuna yönelik davranışlarında yordayıcı bir değişken olduğu bulunmuştur (Nordlund ve Garvill, 2002, 2003; Şahin, 2013). Hines ve arkadaşlarının (1986/87) yaptığı çalışma sonuçları, kişisel sorumluluğun çevre dostu davranışlarda bulunma eğiliminin artmasına neden olduğunu desteklemiştir.

Özetle, değer-inanç-norm teorisi, ortaokul öğrencilerinin enerji tasarrufu davranışlarının yordayıcılarını başarıyla açıklamaktadır. Türkiye'deki öğrencilerin enerji tasarrufu davranışlarını belirlemek ve geliştirmek için, daha fazla araştırma yapmak ve enerji tasarrufu davranışları arasındaki ilişkiyi araştırmak çok önemlidir. Bu açıdan, öğrenciler kendi tüketim davranışlarının ve sonuçlarından haberdar olmalıdırlar. Enerji kullanımındaki davranış değişikliği, tutumları değiştirmek, bilinci arttırmak ve insanları enerji konusuyla ilgilenmeye teşvik etmek ile mümkündür. Bu çalışmada, öğrencilerin enerji koruma davranışlarının ortalama düzeyde olduğu tespit edilmiş olup eğitim ile enerji tasarrufu davranışları hakkında yeterli bilgi ve farkındalık oluşturularak bu davranış olumlu yönde geliştirilebilir. Ayrıca, biyosferik değer yönelimlerinin enerji tasarrufu davranışlarını iyileştirmede önemli bir rol oynadığı görülmüştür. Bu nedenle, öğrenciler iç ve dış mekan

etkinlikleri, gerçek yaşam deneyimleri, saha gezileri, enerji ile ilgili problemler hakkındaki araştırma ve tartışmalar gibi etkinliklere katılmalara sağlanarak biyosferik değer tutumlarında olumlu değişlikler elde edilebilir.

Daha sonraki araştırmsalarda öğrencilerin enerji tasarrufu davranışlarının belirleyicilerini ve öğrencilerin davranışlarının farklılıklarını incelemek için araştırmalar devlet okulları, özel okullar, kentsel ve kırsal alan okulları gibi farklı okul türlerinde yapabilirler. Gelecekteki çalışmalar, ankete ek olarak nitel araştırma teknikleriyle de yapılabilir. Aile geliri, memleket vb. konular ile ilgili katılımcılardan detaylı bilgi almak için görüşme yapılabilir ve bu değişkenlerin enerji tasarrufu davranışı üzerinde etkisi olup olmadığı araştırılabilir. İç ve dış mekan etkinliklerinin, gerçek yaşam deneyimlerinin ve saha gezilerinin enerji tasarruf davranışlarına etkileri deneysel bir araştırma ile test edilebilir. Sonraki çalışmalarda, öğrencilerin enerji okuryazarlığı ve enerji bilgisi de incelenebilir.

APENDIX E: **TEZ İZİN FORMU /** THESIS PERMISSION FORM

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Bölümü / Department : İlköğretim Fen ve Matematik Alanları Eğitimi / Elementary Science and Math Education

TEZİN ADI / TITLE OF THE THESIS (**İngilizce** / English) : ORTAOKUL ÖĞRENCİLERİNİN ENERJİ TASARRUFU DAVRANIŞLARININ BELİRLEYİCİLERİ: DEĞER-İNANÇ-NORM KURAMI AÇISINDAN GÖSTERGELERİ / PREDICTORS OF MIDDLE SCHOOL STUDENTS' ENERGY CONSERVATION BEHAVIORS: INDICATIONS FROM VALUE-BELIEF-NORM THEORY

TEZİN TÜRÜ / DEGREE**:** **Yüksek Lisans** / Master ■ **Doktora** / PhD ☐

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