THE ROLE OF FUTURE TIME PERSPECTIVE, ENVIRONMENTAL ATTITUDES, PERCEIVED KNOWLEDGE, SELF-EFFICACY OF COOPERATION AND GENDER IN PREDICTING UNIVERSITY STUDENTS' BELIEFS AND BEHAVIORAL INTENTION ABOUT GLOBAL CLIMATE CHANGE

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ABSTRACT

THE ROLE OF FUTURE TIME PERSPECTIVE, ENVIRONMENTAL ATTITUDES, PERCEIVED KNOWLEDGE, SELF-EFFICACY OF COOPERATION AND GENDER IN PREDICTING UNIVERSITY STUDENTS' BELIEFS AND BEHAVIORAL INTENTION ABOUT GLOBAL CLIMATE CHANGE

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The main purpose of the present study was to explore the role of future time perspective, perceived knowledge about global climate change, environmental attitudes, and self-efficacy of cooperation in predicting the university students' beliefs about occurrence, causes and consequences of global climate change and behavioral intention to mitigate global climate change after controlling for gender.

For this purpose, a quantitative study was designed and conducted with the participation of 1580 undergraduate students of METU and the data was gathered through the data collection instrument named *Future Perspective Related Beliefs and Behavioral Intention about Global Climate Change Scale.*

The results revealed that self-efficacy of cooperation, ecocentric attitude and perceived knowledge, among others, are mainly three influential factors for the undergraduate students' beliefs about global climate change. The contribution of

future time perspective, although low, was statistically significant in predicting behavioral intention to mitigate global climate change.

The results also suggested that ecocentric attitude and perceived knowledge, among others, are mainly two influential factors for the undergraduate students' beliefs about global climate change. Future time perspective's contribution although low, was found to be significant in undergraduate students' beliefs about global climate change.

Keywords: Future Time Perspective, Self-Efficacy of Cooperation, Climate Change Beliefs and Behavioral Intention, Environmental Attitudes, Higher Education for Global Climate Change.

ÖZ

GELECEK ZAMAN PERSPEKTİFİ, ÇEVRESEL TUTUMLAR, BİLGİ DÜZEYİ ALGISI, İŞBİRLİĞİ ÖZYETERLİĞİ VE CİNSİYETİN ÜNİVERSİTE ÖĞRENCİLERİNİN KÜRESEL İKLİM DEĞİŞİKLİĞİNE İLİŞKİN İNANÇLARI VE DAVRANIŞ NİYETLERİNİ YORDAMADAKİ ROLÜ

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Bu çalışmada, gelecek zaman perspektifi, algılanan bilgi düzeyi, çevresel tutumları ve işbirliği özyeterliğinin (self-efficacy of cooperation), üniversite öğrencilerinin küresel iklim değişikliğine ilişkin inançları ve davranış niyetlerini yordamadaki rolü incelenmiştir.

İlişkisel olarak tasarlanan bu çalışmaya Orta Doğu Teknik Üniversitesi'nden toplam 1580 lisans öğrencisi katılmıştır. Veri toplamak için Gelecek Perspektifi ile İlişkilendirilmiş Küresel İklim Değişikliği İnançları ve Davranış Niyetleri Ölçeği kullanılmıştır. Küresel iklim değişikliği inançları ve davranış niyetleri ile yordayıcıları arasındaki ilişkiyi incelemek amacı ile hiyerarşik regresyon analizi yapılmıştır.

Çalışmanın sonuçları, ekosantrik çevre tutumu ve algılanan bilgi düzeyinin, üniversite öğrencilerinin iklim değişikliği inançlarını yordamada en belirleyici iki

faktör olduğunu göstermiştir. Gelecek zaman perspektifinin, küresel iklim değişikliği inançlarını yordamada istatistiksel olarak önemli bir belirleyici olduğu sonucuna varılmıştır.

Ayrıca, işbirliği özyeterliği, ekosantrik çevre tutumu ve algılanan bilgi düzeyinin, üniversite öğrencilerinin, küresel iklim değişikliğine ilişkin davranış niyetlerini yordamada en belirleyici üç faktör olduğu sonucuna varılmıştır. Gelecek zaman perspektifi, küresel iklim değişikliğine ilişkin davranış niyetlerini yordamada istatistiksel olarak önemli bir belirleyici olmuştur.

Anahtar Kelimeler: Gelecek Zaman Perspektifi, İşbirliği Öz-Yeterliği, Küresel İklim Değişikliği İnançları, Küresel İklim Değişikliği Davranış Niyeti, Küresel İklim Değişikliği için Yükseköğretim.

To the memory of my dearest father
Sefa Can (1943-1994)

and

To my inspirational twins
Yosun & Derin
who made my life meaningful

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INTRODUCTION

1.1 Background to the Study

Climate change is a global threat of the twenty-first century with long-term impacts for the sustainable development of countries in the world. In the presence of global climate change, international and national institutions, policy makers, higher education researchers and academics have increasingly redirected their attention to social and economic sustainability in the world (Gray, 2010). Since the sustainable development provides a future sighted and long term perspective on development concerning the issues like energy resources, disaster management, population growth and consumption, global climate change threats brought the issue back to the sustainable development instead of the short term development efforts (IPCC, 2001).

On sustainable development several international conferences were organized and many declarations were promulgated. The Our Common Future Report in 1987 was pursued by the Agenda 21 of the United Nations Conference on Environment and Development (UNCED) in 1992, the Rio Earth Summit. Agenda 21 offered a guidance for sustainable development with a significant concentration on environmental aspects (Drexhage, & Murphy, 2010). One of the important achievement of Rio Summit was agreement on the UN Framework Convention on Climate Change (UNFCCC). In 1997 UNFCC led to the Conference on Climate Change in Kyoto, resulted in the Kyoto Protocol.

In line with the UNFCCC and the Kyoto Protocol, there are two main strategies for response to address adverse impacts of global climate change. *Adaptation* is a set of measures enabling societies to cope with negative effects of climate change. It relates to know or learn how to live with or be prepared for unavoidable effects of global climate change; and find the ways to protect individuals and places by decreasing

their vulnerability to climate change effects. Thus, adaptation includes both building adaptive capacity so that increasing of individuals' ability to adapt changes and implementing adaptation decisions (Yanda, 2010). *Mitigation* is a set of measures for preventing avoidable effects of global climate change through interventions to reduce or stabilize greenhouse gases concentrations (IPCC, 2007). For any mitigation efforts, appropriate education is required to help people in learning to alter their current lifestyles (Anderson, 2010).

The Role of Education in Adaptation and Mitigation of Global Climate Change

For adaptation and mitigation efforts to be effective, establishment of national and international policies, development and transfer green technologies and financial incentives are needed, but they are not sufficient for responding the challenges of sustainable development and global climate change (Buckler, & Creech, 2014; Nolet, 2009). Since human actions are linked to causes of greenhouse gas emissions, deep and lasting behavioral changes are also necessary for adaptation to and mitigation of global climate change (Nolet, 2009). Education is considered as a key instrument for bringing about this behavioral change (Buckler, & Creech, 2014); and also found its place in climate change adaptation and mitigation agenda as an effective strategy (Chew-Hung, 2014).

As a matter of fact, for last four decades, increasing environmental concern around the world has raised the importance of education. Education has been seen as the primary agent in transformation towards sustainable development. The main idea behind this thought is that education enables individuals to gain awareness and take informed decisions in the face of global climate change. Therefore, education plays an important part in achieving sustainable development (Nolet, 2009) and the term *Education for Sustainable Development* (ESD) is referred to an overarching framework for various aspects of education related to environmental, economic and social aspects of sustainable development (Sterling, 2004). The Climate Change Education for Sustainable Development (CCESD), on the other hand, emerged as an integral part of ESD. During the UNESCO World Conference on ESD held in Bonn in 2009, climate change was accepted as a key action theme of the UNDESD with an emphasis on education as an essential element of the global response to climate

change (UNESCO, 2014). CCESD is considered as an important tool for enabling students to be aware of global climate change threat, know about root causes, negative consequences, and gain relevant skills and dispositions to act for mitigation and adaptation of global climate change (Kagawa, & Selby, 2010).

Recent studies indicate that limited understanding about causes and its potential impacts of climate change and fault beliefs by people across different countries of the world is a real challenge. Acceptance of climate change as a real threat, believing its existence, and knowing causes and consequences are very significant for climate change adaptation and mitigation. Therefore, exploring underlying factors shaping or affecting beliefs and behavioral intentions of people is needed for designing educational interventions for a change in individuals' attitudes and behaviors (Gifford et al., 2011; van der Linden, 2014).

Since 1990s, many studies have conducted to explore the underlying factors of beliefs and behavioral intentions about climate change (e.g., Bord, Fisher, & O'Connor, 1998; Heath, & Gifford, 2006; Whitmarsh, 2009a; Maibach, Roser-Renouf, & Leiserowitz, 2009; Swim et al., 2011; Weber, & Stern, 2011).

Underlying Factors for Beliefs and Behavioral Intentions about Climate Change

Majority of previous studies have addressed mainly three major beliefs about climate change: beliefs that global climate change exists, is stemmed from human behaviors, and will have negative consequences. Since previous research indicated a close association between people's beliefs and their behaviors (Ajzen, & Fishbein, 1980; Ajzen, 2005), and given that three beliefs about climate change plays important role in mitigation and adaptation of global climate change, in this study, three beliefs about global climate change are employed as both dependent variables and as three predictor variables of behavioral intention to mitigate global climate change.

There are some empirical studies explored the effect of climate change beliefs on behavioral intention in literature. Krosnick and colleagues (2006) found that stronger beliefs that climate change was occurring led to believing more that global climate change is a serious problem, which led to being more proponent of national policy of

reducing climate change policies. Heath and Gifford (2006) detected that belief of occurrence of global climate change is occurring predicts behavioral intention to mitigate global climate change.

As significant amount of research findings indicated, being knowledgeable on global climate change has been an important predictor of climate change mitigation intentions (e.g., Whitmarsh, 2009a; Hidalgo, & Pisano, 2010; Heath, & Gifford, 2006).

Ecocentric and anthropocentric environmental attitudes have been reported as strongly associated with concern for, awareness of risks, and supportive action for risk prevention related to global climate change (Nilsson, von Borgstede, & Biel, 2004; Heath, & Gifford, 2006; Brody, Zahran, Vedlitz, & Grover, 2008)

Self-efficacy of cooperation, used in the social dilemma literature, denotes the belief that individual's cooperative action will have a meaningful impact and contribution in achieving a collective goal (Kerr, 2009). It is differentiated self-efficacy concept of Bandura. The original self-efficacy concept denotes the individuals' beliefs in their capacities to perform a certain behavior. Greater self-efficacy of cooperation has been found to associate with behavioral intention to prevent adverse effects caused by global climate change (Heath, & Gifford, 2006).

Gender-sensitive perspective has long been included in research pertaining to global climate change, however, in recent times, it has received increasing attention and become a key concern in climate change studies. A gender-sensitive response in climate change mitigation necessitates to realize gender inequalities and how these inequalities can further be worsened with negative effects of global climate change. In addition, it also necessitates an awareness of how gender inequalities can intensify global climate change's harmful effects on men and women. As an example, in some parts of worlds, girls do not have opportunity to go to school, therefore they may have no basic knowledge about how to mitigate or adapt the harmful effects of global climate change. Hence, women with no knowledge, cannot make contribution to diminish harmful effects of global climate change (BRIDGE, 2008). Accordingly, gender has been reported by the majority of the recent studies pertaining to beliefs

and behavioral intentions about global climate change as having an influential effect (e.g., Liu,& Sibley, 2010; Maibach, Leiserowitz, Roser-Renouf, & Mertz, 2011). Moreover, future time perspective (FTP) studies have indicated the gender effect (Zimbardo, Keough, & Boyd, 1997), as well. Therefore, in predicting beliefs and behavioral intention about global climate change, a gender-sensitive perspective is taken-up in this thesis and gender is accepted as one of the factors.

Previous studies have suggested mainly two general factors related individuals' beliefs about climate change, or barriers causing limited understanding of climate change: uncertain and complicated nature of the climate change phenomenon, and psychological factors related to future time perspective of individuals.

Future Time Perspective

Construal Level Theory (CLT) outlines four *psychological distances*: *temporal* (later rather than now), *spatial* (elsewhere rather than here), *hypothetical* (possible rather than certain), and *social* (others rather than me/my family) (Liberman, & Trope, 2008). Considering climate change within the framework of CLT, climate change is typically perceived as a remote risk, one that is not relevant to them personally, where they live, and not in the present time but some time in future (Milfont, 2010).

Social dilemmas refer to the situations in which individuals' immediate interests conflict with long-term interests of other people in community (Komorita & Parks, 1994). Considering pro-environmental behavior as a social dilemma suggests that when individuals are offered a choice between more or less environmental friendly behaviors, in order to make a decision, they confront two basic conflicts of interest: *a social conflict* between individual and collective interests and *a temporal conflict* between immediate and future consequences of an individual's behaviors. As a matter of fact, almost any pro-environmental behavior causes a temporal conflict, as in most cases, long-term interests requires the sacrificing of short-term interests (Balliet, & Ferris, 2013).

Since the temporal conflicts are related to the consideration of long-term outcomes of behaviors; and temporal psychological distance plays a central role in exploring time

perspective phenomena, an individual's future time perspective is particularly relevant to an individual's beliefs and decision to conduct a behavior to mitigate and adapt to global climate change (Beckenkamp, 2011).

Future Time Perspective Theory defines future time perspective (FTP) as the ability to envision one's own future and create ways to making that vision a reality, set emotional links between activities in the present and open-ended goals of the future (Zimbardo, & Boyd, 1999), and to consider the future implications of their actions (Strathman et al. 1994).

The *Consideration of Future Consequences* (CFC) (Strathman, Gleicher, Boninger, & Edwards, 1994) is a FTP construct widely used in the pro-environmental literature for last two decades. CFC refers to the extent to which people prefer to construct the future by considering distant versus immediate consequences of behaviors and the extent to which behavior is influenced by such perceived outcomes (Strathman et al., 1994). Several studies indicated CFC as a powerful predictor of pro-environmental behaviors especially when immediate and distant consequences are in conflict with each other (Rappange, Brouwer, & Van Exel, 2009). Pro-environmental related behaviors have been investigated from a future time perspective by several researchers. Ebreo and Vining, (2001), and Lindsay and Strathman (1997), for example, explored recycling behavior from a future time perspective. Joireman, Lasane, Bennett, Richards, and Solaimani (2001), and Strathman and colleagues (1994) did so, with engagement in political activities to support environmental protection, Khachatryan and colleagues (2013) investigated biofuels use behavior from future time perspective, and Joireman, van Lange and van Vugt (2004) and Collins and Chambers (2005) did so for public transportation use.

According to Morselli (2013), FTP is a learnable attitude that influences individual behavior. Everyday interactions with peers and parents, and as a general culture play important role in influencing and shaping individuals' future time perspective (Chen, & Vazsonyi, 2011). According to the FTP theories, individuals learn from their social and cultural environment to sacrifice the immediate gratification like having fun, in order to achieve greater future personal benefits such as getting a better job and a higher future socio-economic status (Zimbardo, & Boyd, 1999). In addition,

education is considered as a significant tool for acquiring students' future time perspective. As Bembenutty and Karabenick (2004) suggested,

> "*…teachers could teach children to develop an awareness of their future goals… Further, teachers could focus their instruction on highlighting the importance of intrinsic motivation in conjunction with the instrumentality of the task for future outcomes.*" (p.52).

In this thesis therefore, FTP is considered as an important factor in predicting the undergraduate students' beliefs and behavioral intentions about global climate change.

Climate Change Education for sustainability in the Turkish Context

After Turkey's ratification of the UNFCCC in 2004, several activities related to CCESD have been realized and were reported in Turkey's Initial National Communication. Turkey's *National Climate Change Strategy* (2010-2020) and *Climate Change Action Plan* (2011-2023) set the strategic objective of integration of climate change mitigation and adaptation topics into higher education curriculum. In accordance with this strategic objective, it has been planned that the faculty needs concerning climate change will be identified and new graduate programs and new undergraduate courses will be opened at higher education institutions (Ministry of Environment and Urbanization, 2012, 2013).

Nevertheless, there has been few studies constructed so far in Turkey, to investigate university students' beliefs and behavioral intentions about global climate change. Most of the studies investigated pre-service teachers (i.e., faculty of education students) to find out knowledge, awareness, understanding, misconceptions about climate change (Senel, & Gungor, 2009; Kahraman et al., 2008; Bozdogan, 2009; Sever, 2013). Most recently, although few, there are more comprehensive studies, for example, Sahin (2013) explored pre-service teachers' energy conservation behavior with relation to climate change education, and Ozdem and colleagues (2014) investigated the seventh grade students' concerns, beliefs, attitudes, values and actions about climate change. Furthermore, within the context of this thesis, it is also worth to consider the suggestion made Uslu-Ok (2013) that, teachers should support

the development of future goal setting in culturally diverse classrooms, actively and in innovative ways, by highlighting future goals and positive connections between learning and achieving personally valuable goals in the near and far future.

Turkey's national strategy and action plans concerning climate change and the research on CCESD have suggested that there is a need on this issue.

1.2 Purpose of the Study

Within the above mentioned context, in the face of negative consequences of global climate change which have been usually perceived as a temporally distant threat, climate change education as a promising remedy to mitigate and adapt to negative consequences, should include and focus future time perspective as an important learning objective and learning outcome.

As an emerging economy with rapid industrialization mainly depending on nonrenewable energy resources and socially and environmentally vulnerable country, Turkey urgently needs to mobilize its young population for adaptation and mitigation of global climate change. The climate change education, therefore, can be a strong instrument to enable large population of young people to acquire knowledge, values, and skills to create a sustainable future.

In the light of literature review, research on FTP to date has not particularly addressed the beliefs and general behavioral intentions of undergraduate students about global climate change. The existing research has usually been conducted with populations in the North American and European countries; therefore, there is a need to carry out a study in different contexts and associated with beliefs and behavioral intentions of undergraduate students.

Considering the importance of future time perspective in climate change education and the research gap in the literature, this research was intended to shed light on how and to what extent future time perspective might be useful in explaining their beliefs and behavioral intentions to mitigate global climate change.

Accordingly, this thesis has mainly two goals. The first goal is to investigate the role of future time perspective along with perceived knowledge and environmental attitudes in predicting the undergraduate students' beliefs about occurrence, causes and consequences of global climate change.

The second goal is to explore the role of future time perspective along with perceived knowledge, environmental attitudes, self-efficacy of cooperation, and beliefs about occurrence, causes and consequences of global climate change in predicting the undergraduate students' behavioral intention to mitigate global climate change.

As the literature suggested gender effect in risk perception, environment behavior, environment attitude and future time perspective, with the aim of controlling gender effect in relationship between the dependent and predictor variables, gender was treated as a control variable in this study.

Moser and Dilling (2007) suggested that the term global climate change has been preferred by the most of researchers to encompass changes related to the atmosphere and global climate as global climate change is considered as more comprehensive term than global warming. Therefore, in this dissertation, global climate change and global warming have been used interchangeably.

It is important to note that this study attempts to explore mainly beliefs and behavioral intentions of the undergraduate students about global climate change, and basically depends on self-reported data, and thus, aims at revealing an overall picture of undergraduate students' beliefs, attitudes, self-efficacy and knowledge in a self-evaluative perspective. In accordance with this general rationale of the study, "self-reported/perceived knowledge", instead of "actual knowledge" is utilized as a variable of this study. To explore the disparity or association, or make a comparison of predictive role between actual and self-reported knowledge is beyond the scope of the present study.

This study seeks the undergraduate students' behavioral intention within the context of future time perspective, as behavioral intention is a more general and comprehensive concept rather than limiting students' certain specific behaviors

pertaining to climate change mitigation, and because, behavioral intention is future-directed, and related to planning and goal-setting to perform certain behaviors in future time.

In this study, self-efficacy of cooperation is employed as a predictive variable of behavioral intentions of undergraduate students, not a variable of undergraduate students' beliefs about global climate change, as the concept is related to cooperative behaviors of individuals in a community, and the relevant literature indicated its relation with behaviors and behavioral intentions.

This study attempted to shed light into following research questions:

1. How well do perceived knowledge and environmental attitudes predict the *belief about occurrence* of global climate change, controlling for gender?

2. How well do perceived knowledge and environmental attitudes predict the *belief about causes* of global climate change, controlling for gender?

3. How well do perceived knowledge and environmental attitudes predict the *belief about consequences* of global climate change, controlling for gender?

4. To what extent does the future time perspective predict three beliefs about global climate change (i.e., belief about occurrence, causes and effects about global climate change) over and above the other variables, controlling for gender?

5. How well do perceived knowledge, environmental attitudes, three beliefs about global climate change and self-efficacy of cooperation predict the behavioral intention about global climate change, controlling for the gender?

6. To what extent does the future time perspective predict the behavioral intention about global climate change over and above the other variables, controlling for gender?

1.3. Significance of the Study

Effective sustainability education depends on understanding the beliefs, values and attitudes of the students (Beck, & Cable, 2011; Heimlich, & Ardoin, 2008), many environmental and sustainability education and learning activities make use of learners' existing beliefs, values and attitudes as a basis to design curriculum (Pike, Doppelt, & Herr, 2010). Environmental policy decisions also require an understanding of underlying value orientations and attitudes of the public. Researchers on environmental education present foundation information concerning learners' attitudes, beliefs, values, and behaviors, however, this approach may require even more attention of education researchers who investigate climate change education program and curriculum designing (Brownlee, Powell, & Hallo, 2013).

The objective of most of climate change education is behavior change and majority of researchers have referred values, attitudes, and beliefs as determinants of behavioral intentions and behaviors (Hines, Hungerford, & Tomera, 1987). Many educational psychology theories confirms this idea, and education researchers have empirically tested these underlying factors for last four decades. For example, the value-belief-norm theory suggests that values, attitudes, and beliefs lead social norms and responsibility, and ultimately affect behaviors (Stern, & Guagnano, 1995). The theory of planned behavior put forward a similar causal chain, and proposes that beliefs lead attitudes concerning the social acceptability for engaging a behavior, the desirability of the result linked with the behavior, and the perceived ability to conduct the behavior, which often impact behavioral intentions (Ajzen, 2005).

For this reason, according to many social theories it is advantageous for educators to understand their students' attitudes especially if they target at influencing and reinforcing students' behavior (Powell, & Ham, 2008). This is particularly crucial for climate change, because solutions for climate change generally rest in requirement of human behavior change, either in the way of adaptation and/or mitigation of climate change (Hulme, 2009).

Educational "*messages can and should target beliefs…that shape attitudes, beliefs regarding perceived norms, and beliefs regarding the ability to control behavior…to*

provoke changes in attitudes and behavior." (Knudson, Cable, & Beck, 2003, p.70). In the final analysis, to understand students' beliefs and behavioral intentions pertaining to climate change helps educators for promoting climate friendly behaviors.

In this respect, the present study attempted to investigate the factors that influence the undergraduate students' beliefs and behavioral intentions, the findings of this study could provide information to guide material development and support educational programs focused on climate change in Turkey.

Environmental protection implies future concern, in which natural resources are preserved and secured for future generations. Even the most cited definition of sustainable development takes account of future concern, stating that "sustainable development should meet the needs of the present without compromising the needs of future generations." In this respect, sustainability concept is about both short term and long term time perspective; and requires individuals to pay attention to the short term and the long-term gains and effects of their choices, and to take responsibility for the effects of their decisions and actions on future generations (Gibson, 2006). Therefore, future time perspective is also considered as an important element in ESD (Frisk, & Larson, 2011; Wiek, Withycombe, & Redman, 2011).

In addition, future time perspective is particularly of importance for global climate change. As its consequences will be felt at least next thousands years (IPCC, 2007), for mitigation and adaptation of negative consequences of climate change, individuals should take into account long-term consequences of their behaviors (Milfont, & Demarque, 2015).

Furthermore, the past few years have seen an increase in studies examining the extent to which future concerns are associated with environmental engagement. These studies have suggested some evidence that future time perspective influences proenvironmental attitudes and behaviors of individuals (Corral-Verdugo, Fraijo-Sing, & Pinheiro, 2006; Milfont, & Gouveia, 2006; Strathman, Gleicher, Boninger, & Edwards, 1994).

Long-term and a deep-rooted social change for sustainability can be enhanced progressively through education (Dobson, 2003). In the face of global climate change, higher education institutions should take the responsibility to educate young generation in a way to equip them with necessary knowledge, skills and competences that enable them to encounter the future challenges and unforeseeable harmful effects of global climate change. In order to realize such a task, first of all, it is important to know what university students really believe and think about global climate change.

Examining university students' beliefs, future time perspectives, self-efficacy, behavior intention and attitudinal orientations would shed light to evaluate and improve educational programs and curriculum in higher education, and the results of this study can be a guide because Turkish literature does not serve any research that seek students' future time perspective related to global climate change. The results of this present study may provide useful feedback to teacher educators for evaluating their existing programs and developing effective future programs in Turkey.

Finally, most of the studies in the literature have addressed the underlying factors of behaviors pertaining to climate change for adaptation and mitigation in the perspective of developed countries. However, there is also need for research investigating environmental behaviors in developing country contexts as gaining people support for both mitigation and adaptation policies in developing countries is important due to their rapid growth of emissions, and development of adaptation strategies. Therefore, the findings from the Turkish undergraduate students could provide insight into the other developing countries with respect to climate change education concepts in the universities. The present study, hence, contributes to the perception of university students towards global climate change by using the Turkish context.

1.4. Definition of Terms

Global Climate Change: A pattern of change affecting global or regional climate, as measured by criteria such as average temperature and rainfall, or an alteration in frequency of extreme weather conditions. This variation may be caused by both natural processes and human activity (IPCC, 2007)

Global Warming: The steady rise in global average temperature in recent decades, which experts believe is largely caused by man-made greenhouse gas emissions (IPCC, 2007).

Greenhouse gases (GHGs): Natural and industrial gases that trap heat from the Earth and warm the surface. The Kyoto Protocol restricts emissions of six greenhouse gases: natural (carbon dioxide, nitrous oxide, and methane) and industrial (perfluorocarbons, hydrofluorocarbons, and sulphur hexafluoride) (IPCC, 2007).

Mitigation: Action that will reduce man-made climate change. This includes action to reduce greenhouse gas emissions or absorb greenhouse gases in the atmosphere (IPCC, 2007).

Adaptation: Action that helps cope with the effects of climate change - for example construction of barriers to protect against rising sea levels, or conversion to crops capable of surviving high temperatures and drought (IPCC, 2007).

Future time perspective (FTP): Ability to foresee and anticipate the future. It reflects people's tendency to plan for and achieve future goals (Zimbardo, & Boyd, 1999) and to consider the future implications of their actions (Strathman et al., 1994).

Consideration of future consequences (CFC): refers to the extent to which people prefer to construct the future by considering distant versus immediate consequences of behaviors and the extent to which behavior is influenced by perceived outcomes (Strathman et al., 1994).

Self-efficacy of cooperation: Belief that an individual's cooperative behavior has a significant effect on the outcome of a large group (Kerr, 2009).

Beliefs about global climate change: Beliefs that global climate is occurring, is caused by human activities, and will bring about negative consequences.

Behavioral intention about global climate change: The degree to which an individual has made a conscious plans to perform or not to perform some specified future behavior for mitigation of global climate change.

Perceived knowledge about global climate change: Self-reported knowledge about the state, causes and consequences of global climate change.

Environmental attitudes: A set of values and feelings of concern for the environment and motivation for actively participating in environment improvement and protection.

Ecocentric attitude: An environmental attitude that values the nature for its own sake and judges the nature deserves protection because of its intrinsic value (Thompson, & Barton, 1994).

Anthropocentric attitude: An environmental attitude that places humans at the center of all creation, and judges the nature deserves protection because of the long-term consequences it may have on other people.

CHAPTER II

REVIEW OF LITERATURE

This chapter presents a comprehensive review of the literature on the beliefs and behavioral intentions about global climate change, future time perspective theory with relation to social dilemma and construal level theory, and the consideration of future consequences, self-efficacy of cooperation, perceived knowledge, environmental attitude and gender, as the determinants of beliefs and behavioral intention about global climate change. This chapter is organized under five main parts. In the first part, global climate change, sustainable development, relationship between sustainable development and climate change, education for sustainable development and climate change education, role of higher education in ESD and climate change education and ESD in Turkey are discussed. In the second part previous studies on ESD and climate change education in Turkey, and on beliefs and behavioral intentions about global climate change in the world are discussed. The third part presents the theoretical framework for future time perspective with relation to social dilemma concept and construal level theory is presented. In the fourth part, the research on the factors (consideration of future consequences, self-efficacy of cooperation, perceived knowledge, environmental attitudes, and gender) affecting beliefs and behavioral intentions about global climate change are discussed. In the final part of the chapter, a summary of literature review is presented.

2.1. Global Climate Change and Turkey

Scientific recognition of global climate change and possible consequences rooted in the nineteenth century. In 1872, Fourier, first recognized the warming effect of increasing greenhouse gases, then, in 1896 Arrhenius, first calculated the effects of increasing greenhouse gases, and predicted that a doubling CO_2 would cause increase in global temperatures of 5 to 6°C (Hulme, 2009; Robertson, 2014). However, international recognition of climate change as a global threat was not assured until 1988 when the Intergovernmental Panel on Climate Change (IPCC) was established and international agreement on the United Nations Framework Convention on

Climate Change (UNFCCC) of 1992 appeared. The IPCC is an intergovernmental body that have assembled peer reviewed scientific research findings on climate change and published periodically assessment reports and therefore, provides the most authoritative picture of contemporary climate change research available at this time.

According to the IPCC assesment reports, changing weather patterns, natural hazards such as increased heat waves, flooding, drought, intense tropical cyclones, sea levels rising and biodiversity loss are the impacts of global climate change. The global climate change is stemming from the acceleration of greenhouse gases emissions from mainly human activities (IPCC, 2013). Children, women and elderly people, particularly in developing countries are the most vulnerable group to harmful effects of climate change. In the long run, it is expected that these impacts combined with population growth pressure will result in more degradation in environmental and deterioration in livelihoods, and will increase socioeconomic problems or create new problems such as migration and security at local, national and global levels (IPCC, 2013).

Turkey, located in eastern Mediterranean, is considered to be a vulnerable country due to the adverse effects of climate change in the Mediterranean Basin which the IPPC (2007) reported as to be prone to reduce in precipitation, heat waves and droughts. Considering Turkey's arid and coastal regions, climate change can influence seriously many of its ecosystems, particularly the unique wetlands, steppes, and mountain ecosystems. In addition, expected decrease in precipitation and drought poses a significant economic and social threat in the Central Anatolia and Southeastern Anatolia regions where livelihood mainly depends on mainly agricultural production (Sen, 2013).

Population growth with rapid urbanization and rapid economic growth with industrialization depending predominantly on fossil fuels consumption have a large effect on these adverse effects of climate change in Turkey (Ministry of Environment and Forestry, 2010). In this respect, national efforts on climate change adaptation are urgently required (Ministry of Environment and Urbanization, 2013).

2.1.1 Sustainable Development

In the face of global climate change, international and national institutions, policy makers, higher education researchers and academics have increasingly redirected their attention to social and economic sustainability in the world (Gray, 2010). Since the sustainable development provides a future sighted and long term perspective on development concerning the issues like energy resources, disaster management, population growth and consumption, global climate change threats brought the issue back to the sustainable development instead of the short term development efforts. (IPCC, 2001).

Despite the world wide recognition of the importance of sustainable development, there has been no common agreement on definition of the concept and of its key dimensions (Burns, 2012). With the universally accepted definition sustainable development is "*development that meets the need of the present without compromising the ability of future generations to meet their own needs*" (WCED, 1987, 43.). By this definition, four critical points are highlighted: to identify what to develop, and what to sustain, to determine the links between those to be sustained and those to be developed, and to anticipate future settings for these links. In the heart of the sustainable development lies an ideal to meet basic human needs while preserving the life support systems of planet (Kates et al., 2005). The most powerful facet of sustainable development is the effort for making compatible two conflicting targets: economic development and wellbeing of environment both in present time and in future (Parris, & Kates, 2003; Leiserowitz, Kates, & Parris, 2006; Blewitt, 2008; Agyeman, 2013; Barth, 2015).

Sustainable development as a concept stands on a three-pillar structure with economic, human or social, and ecological dimensions (Kates et al., 2005). The economic dimension emphasizes improvement of economic welfare; human dimension aims at social justice and equality with enhancement of human awareness on environmental problems; and finally, ecological dimension focuses on preserving resilience and integrity of ecological systems (O'Riordan, 2004; Blewitt, 2008). The sustainable development necessitates a balanced and integrated approach from mainly social, economic and environmental perspectives.

The sustainable development term can be traced back to international nature conservation movements in the 1960's (Adams, 2001). The conceptual framework developed by means of a serious of international conferences and initiatives took place between 1972 and 1992.

The UN Conference on Human Environment, held in Stockholm in 1972 introduces the principles addressing environmental concerns, specifically depending on the carrying capacity of the planet. The conference was a tool for setting up the UN Environmental Programme (UNEP), as well as founding some agencies of environmental protection. In 1980, UNEP adapted the World Conservation Strategy (WCS).

The World Conservation Strategy highlighted human development as human life improvement and natural resources conservation simultaneously. In this context, conservation means "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, WWF, & UNEP, 1980, p.1).

In 1987 the World Commission on Environment and Development (WCED) prepared *Our Common Future* report, provided the most popular definition of Sustainable development, as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (p. 45). This report gave the momentum for Rio Summit in 1992. The UN Conference on Environment and Development (UNCED), known as the Rio Earth Summit, developed a global action plan for sustainable development; and created the Rio Declaration, Agenda 21, and the Commission on Sustainable Development. Specially, Agenda 21 offered guidance for achieving of sustainable development with a significant concentration on environmental aspects (Drexhage, & Murphy, 2010). However, during the following Kyoto Conference on Climate change in 1997 it was seen that progress in the achievement of Agenda 21 goals was very poor.

During the 1990s, the sustainable development, especially with the WCED definition, emphasized the making the needs of present and future generations

compatible. According to Dempsey and colleagues (2011), the emphasis made on intergenerational equity by the WCED definition highlights the social aspects, with a particular attention to the core aspects of social equity and social justice; and individual participation in the social, economic and political life.

Following the Kyoto Conference on Climate change of 1997, in 2000 the Millennium Development Goals (MDGs) which is milestone for addressing social aspects of sustainable development, established for the 2000-2015 period. The MDGs was based on a set of rights and needs covering issues such as poverty, health and discrimination. In 2002, Johannesburg World Summit on Sustainable Development (WSSD) marked a major change in the scope of sustainable development from environmental issues toward social and economic development (Kates et al., 2005).

More recently, in 2012, the United Nations Conference on Sustainable Development (UNCSD) was held in Rio de Janeiro. The purpose of the conference, known as Rio+20 was to gain political commitment for sustainable development, make evaluation the improvements and implementation deficits, and determining new challenges. In Rio+20, Sustainable Development Goals (SDGs) was adapted; through the conference report *The Future We Want*, multidimensionality of sustainability which refers to three dimensions of sustainable development: economic, social and environmental was emphasized (Robertson, 2014).

As the reviewing the evolution of the sustainable development concept in a historical perspective indicates that sustainable development necessitates a balanced and integrated approach from mainly social, economic and environmental perspectives or aspects. According to Kates and colleagues (2005), the main idea of the sustainable development is to meet basic social and economic human needs while preserving the life support systems of the planet (Figure 1.1).

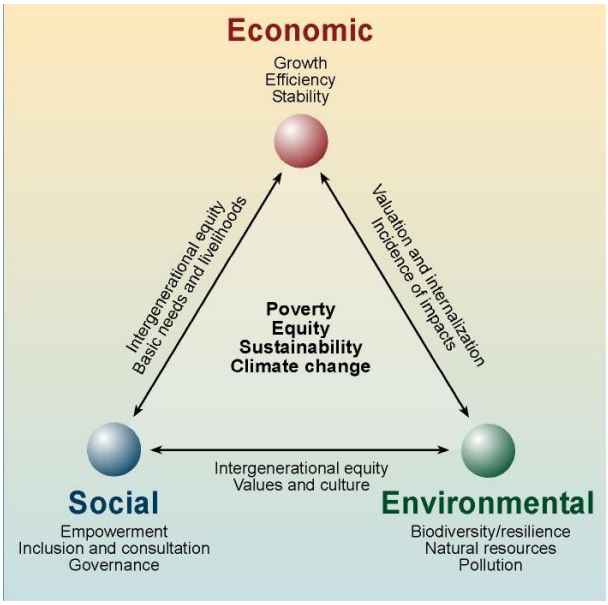


Figure 1.1 Key elements of sustainable development and interconnections (IPCC, 2001)

As it is depicted in Figure 1.1, each of the social, environmental and economic aspects of sustainable development has distinct driving forces and objectives. The economic aspect aims at improving human welfare by means of increasing in consumption of goods and services. The environmental aspect strives for protection of the integrity and carrying capacity of ecological systems (Munasinghe, & Swart, 2000). The social aspect focuses on empowerment of individuals for participation in social life without any social inequality (O'Riordan, 2004). The interactions among these three domains or aspects are significant for a balanced and sustainable development. Poverty, climate change, sustainability and equity are the most pressing issues placed in the center of the triangle because they are dependent and linked to three aspects (IPCC, 2001).

Costanza and colleagues (2014) argue that three aspects of sustainable development are interdependent and should be satisfied together in an integrated and balanced way, because any one or two aspects of the sustainable development is not sufficient. A high quality of life for a few people is not fair or sustainable, likewise, low quality of life for everyone suffering equally is not sustainable, and also high quality of life for everyone is not sustainable as this will damage the environment. Edwards (2005)

suggests that these three aspects of the sustainable development are nested and extremely interdependent. Flint (2013) claims that sustainability is related to planning for the well-being of future generations through reflection in the past, and defines three key areas for a true sustainable way of life:

- *Economic Development and Equity*: Current global economic systems require an integrated approach in a way that promotes responsible long term improvement while ensures economic equity among world nations.
- *Conserving Natural Resources and the Environment*: For protecting environmental heritage and natural resources for future generations, feasible solutions in economics should be created to diminish consumption of natural resources, to prevent pollution, and protect natural habitats.
- *Social Development*: While satisfying the basic human needs (i.e., jobs, food, shelter, education, energy, health care, water, and sanitation), the cultural and social diversity should be preserved, and human rights must be respected and members of society should be empowered to have a role in determining their futures (p.50).

2.1.2 The Relation between Global Climate Change and Sustainable Development

Global climate change is a consequence of unsustainable development of humanity. At the expense of economic prosperity of human being, natural resources were deplored and ecological systems were deteriorated. As Edenhofer and colleagues (2012) put forward, human society confronts a dilemma. For economic growth and development energy using which is based on mainly non-renewable fossil fuels is needed, but these energy resources release high degree of greenhouse gas emission to the atmosphere, in turn this causes global climate change with negative social and environmental consequences (e.g., food and water shortage, natural diseases) for particularly many poor people in developing countries. On the other hand, however, if the usage of non-renewable energy resources are restricted, many poor countries will not have opportunity of relatively cheap economic growth and reduction of poverty.

By the same token, during the United Nations Conference on Sustainable Development in 2012 in Rio de Janeiro, participating world leaders recognized that energy use, climate change mitigation, and adaptation cannot be separated from poverty reduction and other dimensions of sustainable development such as agriculture and food security, water availability, human health, and conservation of biodiversity. They agreed that if natural resources use are maintained within acceptable environmental boundaries, a sustainable development path together with sustainable economic growth will be realized (Edenhofer et al., 2012).

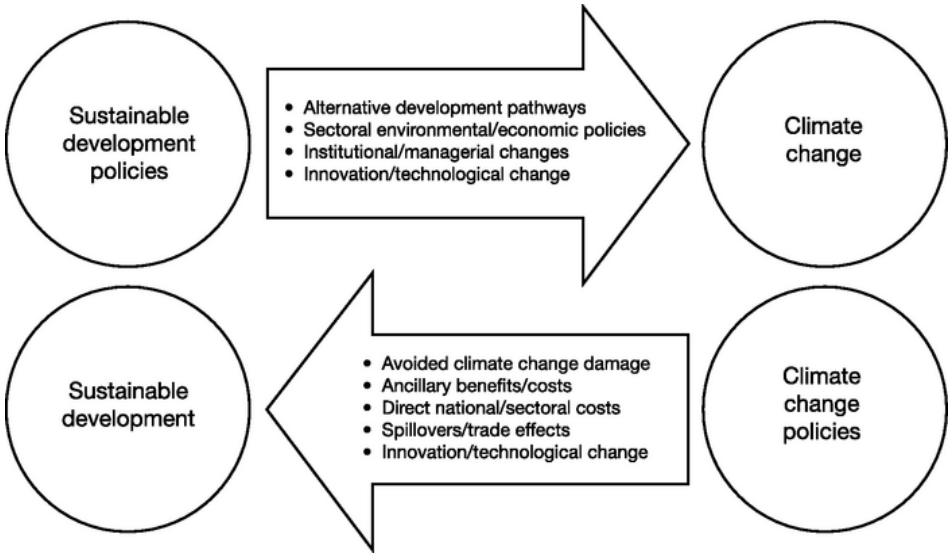


Figure 1.2 Relation between sustainable development and global climate change (IPCC, 2007)

As it is showed in Figure 1.2, sustainable development and climate change are interlinked issues and therefore, there is a two-way relationship between climate change and sustainable development. Climate change has negative impact on environment and living conditions of individuals hence, threatens social and economic dimensions of sustainable development (IPCC, 2013). Development policies that are not sustainable, influence both greenhouse gases emissions causing climate change and vulnerability. Both adaptation and mitigation policies can be more effective when national and regional policies are more sustainable (Swart, & Raes, 2007). The reason for this situation is that negative effects of climate change on a country, policy and strategies for preventing and diminishing these effects will influence the country's ability to achieve the goals of sustainable development. On

the other hand, following of goals of sustainable development will impact success of climate policies of a country (IPCC, 2007). Therefore, there is a growing recognition that joint policies that address both sustainable development and climate change are required (Swart et al., 2009).

In brief, decreasing greenhouse gas emissions and adapting to the unavoidable impacts of climate change are important components of sustainable development (IPCC, 2001). Sustainable development without climate protection or climate protection not included in a larger social and environmental development context most likely be failed. For this reason, both the mitigation and adaptation measures and policies should be designed to support and contribute sustainable development (Zhang, 2009; Edenhofer et al., 2012).

2.1.3 Education for Sustainable Development (ESD)

There are two main strategies for response to address adverse impacts of global climate change. *Adaptation* is a set of measures enabling societies to cope with negative effects of climate change. It relates to know or learn how to live with or be prepared for unavoidable effects of global climate change; and find the ways to protect individuals and places by decreasing their vulnerability to climate change effects. Thus, adaptation includes both building adaptive capacity so that increasing of individuals' ability to adapt changes and implementing adaptation decisions (Yanda, 2010). *Mitigation* is a set of measures for preventing avoidable effects of global climate change through interventions to reduce or stabilize greenhouse gases concentrations (IPCC, 2007). For any mitigation efforts, appropriate education is required to help people in learning to alter their current lifestyles (Anderson, 2010).

For adaptation and mitigation efforts to be effective, establishment of national and international policies, development and transfer green technologies and financial incentives are needed, but they are not sufficient for responding the challenges of sustainable development and global climate change (Buckler, & Creech, 2014; Nolet, 2009). Given that human actions are partly linked to causes of greenhouse gas emissions, deep and lasting behavioral changes are necessary for adaptation to and mitigation of global climate change, as well (Nolet, 2009). Education is considered

as a key instrument for bringing about this behavioral change (Buckler, & Creech, 2014); and also found its place in climate change adaptation and mitigation agenda as an effective strategy (Chew-Hung, 2014).

As a matter of fact, for last four decades, increasing environmental concern around the world has raised the importance of education. Education has been seen as the primary agent in transformation towards sustainable development. The main idea behind this thought is that education enables individuals to gain awareness and take informed decisions in the face of global climate change. Therefore, education plays an important part in achieving sustainable development (Nolet, 2009) and the term *Education for Sustainable Development* (ESD) is referred to an overarching framework for various aspects of education related to environmental, economic and social aspects of sustainable development (Sterling, 2004).

The roots of ESD can be traced to the environmental education efforts during the 1970's. The United Nations' Belgrade Charter of 1975 developed a global framework for environmental education and set the goal of environmental education as "*to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones*." (UNESCO, 1975, p.3). The 1977 Intergovernmental Conference on the Environmental Education in Tblisi provided goals for how to carry out the mandate of the Belgrade Charter. In both of the international initiatives, the main focus was primarily environmental problems and environmental education, while society and economics were received less emphasis (McKeown, & Hopkins, 2003).

A decade later, with the 1987 *Our Common Future* report of the World Commission on Environment and Development (WCED) the concept of sustainable development became popular concept. Following international policy document on education came out of the first Earth Summit in Rio in 1992, namely the UN Conference on Environment and Development (UNCED). This summit promulgated the Agenda 21, a comprehensive action plan for creating a sustainable future globally, nationally and locally. Agenda 21 recognized that for achieving sustainable development, balanced

environmental, social and economic considerations are needed, and that education is an essential tool for sustainable development (UNESCO, n.d.-a).

Soon after the Earth Summit, the term Education for Sustainable Development (ESD) emerged internationally (Sterling, 2004) referring to learning that leads to human, social and economic development that is integrated with environmental concerns in a holistic interdisciplinary way (Hopkins, Damlamian, & Lopez-Ospina, 1996).

2002 World Summit on Sustainable Development (WSSD) in Johannesburg highlighted the fact that there were few progress toward the reorientation of education for sustainability, as had been called for in the Rio Summit's Agenda 21 (Sterling, 2004). For this reason, the WSSD, called for "a deeper, more ambitious way of thinking about education" (UNESCO, 2002, p.8). Therefore, for the period of 2005-2014 the United Nations Decade of Education for Sustainable Development (UNDESD) was declared with the aim of seeking to "*integrate the principles, values, and practices of sustainable development into all aspects of education and learning.... [to] encourage changes in behavior that will create a more sustainable future in terms of environmental integrity, economic viability, and a just society for present and future generations*" (UNESCO, 2008, p. 1). Key features of ESD were specified as:

- Striving for provision of high quality education that is interdisciplinary and holistic in nature, enhances critical thinking and problem solving, and is locally relevant participatory;
- Emphasizing values of respect for others, for difference and diversity, and for the environment;
- Being shaped by diverse perspectives and applied in a range of learning spaces, from formal and informal, and early childhood through adult life (UNESCO, 2006).

Both Agenda 21 and DESD put forwarded that ESD is not a single subject or a new curriculum area such as environmental studies for schools, but rather a more

integrated approach for providing high quality education and training in a rapidly changing world.

2.1.4 Climate Change Education for Sustainable Development (CCESD)

At the UNESCO World Conference on ESD in 2009 in Bonn, climate change was accepted as a key action theme of the UNDESD with an emphasis on education as an essential element of the global response to climate change. UNESCO developed its strategy for the period 2009-2014, and climate change, disaster risk reduction and biodiversity were priority themes of this strategy. The Climate Change Education for Sustainable Development (CCESD) Programme was established. The main objective of the CCESD Programme was to enhance policy makers and teacher education institutions' capacities to strengthen their educational responses to mitigation and adaptation for climate change in countries selected for the pilot programme (UNESCO, n.d.-b). Hence, Climate Change Education (CCE) emerged as an integral part of ESD rather than being an independent field.

The main international policy framework for CCE is the Article 6 on education, training and public awareness of UNFCCC. Article 6 is a binding instrument through which the Convention fosters action to develop and implement educational and training programs for effective mitigation and adaptation for climate change. Thus, Article 6 of the UNFCCC was arranged for promoting, developing and implementing education programs focused on climate change at all levels, from primary school to higher education, public awareness campaigns, public access to relevant information, public participation, training of encompassing experts and enhancement of international cooperation. For the implementation of Article 6 of the Convention, several country-driven work programs were initiated. New Delhi Work Programme was admitted in 2002; amended New Delhi Work Programme launched in 2007; and most recently, in 2012 Doha Work Programme has been commenced (UNFCCC, 2012). Doha Work Programme emphasizes the goal of CCE as "*to promote changes in lifestyles, attitudes and behaviour needed to foster sustainable development and to prepare ….youth, women… and communities to adapt to the impacts of climate change*." (UNFCCC, 2012, Decision 15/CP.18).

In response to these international political developments in ESD and CCE, educational research on conceptual framework and practical implications of CCE has been flourished. CCE at present is a secondary topic in practice and educational research. In research literature, CCE has been addressed as a domain of science education. In practice CC is placed within ESD as a secondary theme within curriculum. However, due to the growing interest, CCE is expected to develop into a central focus of education and become an independent area of education (UNESCO, 2012).

Currently, there are three main approach concerning CCE in the world. The first tendency is that CCE is a major theme within science education. In the USA, for example, CCE has been viewed as education about scientific understanding of global climate change (Feinstein, 2009). Likewise, in China CCE is embedded in science promotion activities aiming for raising awareness and motivating students (Yi, & Wu, 2009). The second approach is that CCE is an integral element of ESD with an interdisciplinary nature. In UK, Australia and South Korea CCE is integrated with ESD topics such as ethics, social equality and behavioral change (Chambers, 2009; Blum, & Husband, 2009; Kim, & Kim, 2009). The third tendency is that CCE is an independent element under ESD which serves as a framework and a collective term for a various independent areas relating to sustainable development. In Denmark, for example, although CCE is implemented under the national ESD strategy, it is not placed within ESD initiatives, instead it is offered under an initiative of promotion of a general science education (Breiting et al., 2009).

Reflecting these approaches, Selby and Kagawa (2013), have recently developed a conceptual model for implementation of CCESD (Figure 1.3). With this model, Selby and Kagawa conceptualized CCE as an influential factor for deep personal change and societal transformation towards new worldview in which individuals discover a sense of what they value; reshape their aspirations and purposes; and envision different futures (Kagawa, & Selby, 2010).

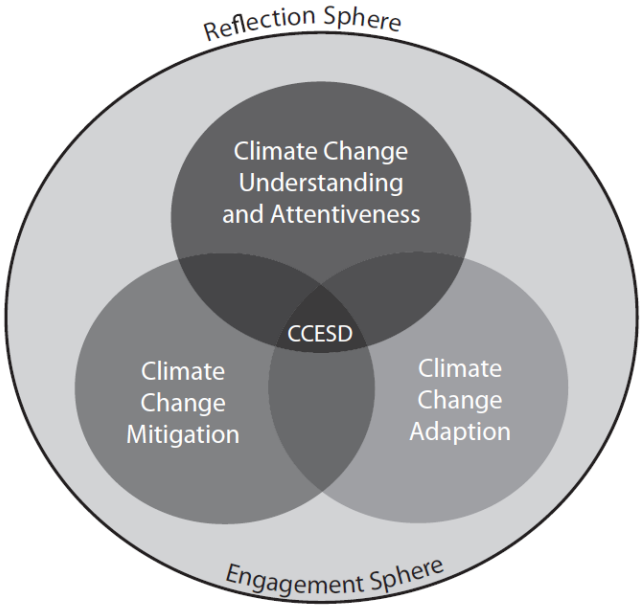


Figure 1.3 Holistic Model for Climate Change Education for Sustainable Development (Selby, & Kagawa, 2013).

As Figure 1.3 shows the CCESD is mainly dealt within two contexts of reflection and engagement. In engagement sphere, there are three overlapping elements, namely understanding, mitigation and adaptation of climate change. At intersection of these three elements, CCESD is situated.

The *understanding and attentiveness* dimension of this model is related to the creation of the mindset and awareness of climate change. It deals with widespread misconceptions, climate change denial and inaction.

The *mitigation* dimension involves identifying the causes of climate change and developing the knowledge, skills and attributes required for individual and societal action to mitigate these causes. For mitigating causes, curriculum topics include energy consumption with an emphasis of using non-polluting and renewable energy sources, environmental conservation and forestation. In addition, the relationship of excessive greenhouse gas production with economic and social structures, cultural patterns, lifestyles, consumerism, wealth distribution, and value systems is examined.

The *adaptation* dimension is about developing the knowledge, skills and attributes for adapting to negative impacts of climate change. This dimension focuses strongly on dealing with local problems and issues with science education approach, and

targets such educational outcomes as learning about agricultural practices in drought times or behaviours for flood management. Apart from technical aspects, it deals with a deep rethinking of cultural practices and traditions.

According to Selby and Kagawa (2012), these three dimensions are complementary and, as students study with and through them, these three dimensions enable student to pass from engagement to reflection phase which is fundamental aspect of transformative learning. To be more precise, students first engage with the full seriousness of the climate change threat, then they search for new meanings and values; and then they act personally and collectively against global climate change.

In addition to several approaches and studies for conceptualization of CCESD, there are some efforts to develop the basic features for CCESD. For example, Kagawa and Selby (2010) outline key features of CCESD as:

- A focus on present threatening conditions and addressing root causes of climate change,
- An interdisciplinary and multidisciplinary approach for understanding causes, implications and ways forward,
- An ethical concern for intra-genarations and intergenerational equity and justice,
- A focus on both local and global issues,
- A social and holistic learning process,
- A new transformative learning culture for uncertainties of global climate change.

All of the above-stated initiatives in international policy arena and in the field of educational research are the efforts for creating a sustainable future in the face of global climate change challenge. In all these efforts, education is seen as a future promising solution, a remedy, and the most effective means for shaping the world of tomorrow. Because education is a powerful tool for upbringing future generation being aware of global climate change threat, knowing about root causes, negative consequences, and having capacity to act for mitigate and adopt to global climate change.

2.1.5 Role of Higher Education in ESD and CCESD

Higher education play an important role in creating sustainable future, because university graduates of tomorrow are most likely to be in decision making positions in the public and private sectors and might shape the national policies about sustainable development (Scott et al., 2012). As a matter of fact, higher education equips and empowers variety of future professionals who will improve, direct, work, teach in public and private institutions of a country, thereby they will influence the direction of a sustainable society. More importantly, through faculties of education, higher education trains future teachers, therefore has an indirect effect on the teaching and learning processes of K-12 level education. Furthermore, higher education has a critical role to play in developing and disseminating knowledge and values in societies; and accommodates unique academic freedom with variety of thoughts and skills for creating new ideas, reflecting and reacting on and finding solutions for social problems (Erdogan, & Tuncer, 2009).

It is estimated that there are about 135 million university students worldwide, including 6.7 million Turkish students, in more than 17000 higher education institutions, and the number of university students is predicted to increase to reach 263 million by 2025 (Tremblay, Lalancette, & Roseveare, 2012). Taking into consideration of size and potential for impact of higher education institutions in the worldwide, the unique role of higher education playing in creating sustainable future can be well understood (Buckler, & Creech, 2014).

The role and purpose of higher education in complex modern societies have been a disputable issue for a long time. Many researchers have discussed if the main role of higher education is preparing students for only employment or preparing them for a just and sustainable future (Cortese, 2003; Bergan, & Damian, 2010; Sterling, & Maxey, 2013). Jickling and Wals (2008) emphasized that today higher education only prepares students to participate in labor market to feed the global economy and serve for employers' needs. Hence, education is no more a public good, and the state's role in providing citizens with best possible education is diminished. The role of higher education should be enabling students to reflect critically on what is

happening to the planet and to themselves, and provide capacity to act upon problems.

In a project on the public responsibility for higher education and research, the Council of Europe specified four main purposes of higher education as preparation for sustainable development, preparation for life as active citizens in democratic societies, personal development, and development of a broad and advances knowledge (Bergan, & Damian, 2010). In most recent publication UNESCO defines the responsibilities of higher education institutions as preparing students for the future; exploring causes of global challenges and developing solutions through research activities; and having excellence in sustainable development practices by means of good governance, community outreach activities and sustainable campus operations (Buckler, & Creech, 2014).

The United Nations Global Compact (2012) elaborated a comprehensive framework for responsibilities of higher education within sustainable development context (Table 1.1). As indicated in the table, for ensuring a sustainable future, higher education institutions have major social, economic and environmental responsibilities as an organization, educational and research institution, and agent of social change (United Nations Global Compact, 2012).

Table 1.1 Responsibilities of Higher Education Institutions for Sustainable Development (The United Nations Global Compact, 2012)

Scope of Responsibility		
Social	*Environmental*	*Economic*
Higher Education Institution Responsibility		
As Organization		
Personal well-being	Waste and pollution	Financial transparency
Personal development	Natural resource preservation	Financial sustainability
Health & safety	Energy	Community development
Human rights	Climate change	Anti-corruption
Social & cultural diversity	Biodiversity preservation	Governance
Employability		
As Educational Institution		
Socially responsible behavior of graduates and partners	Inclusion of environmental sustainability issues in the managerial decisions made by graduates	Participation of graduates in the economic and ethical development of society
Personal and professional well-being of graduates		
Levers of Action		
As Organization		
Social Capital	**Environmental Capital**	**Economic Capital**
Working and learning conditions	Transportation policy	International strategy
Diversity policy	Building solutions	Local community involvement
Access to knowledge	GHG emissions management	Investment and remuneration policy
Intellectual development	Sustainable purchasing	Quality and efficiency management
Social dialogue		Risk management
Stakeholder engagement		Sustainable performance indicators
In Educational Programs and Research		
Intellectual Capital		
Pedagogical approach	Research themes	Evolving information sources
Curriculum content	Transversal research	Provident of standards
Learning by doing	Exemplary behavior	

The role of higher education in sustainable development has been emphasized at several UN international conferences since 1970's. The higher education's role in promoting sustainable development was first formally emphasized at Stockholm Conference (1972). This was followed by the Belgrade Charter (1975) and the UN Conference on Environment and Development (UNCED) (1992). Particularly, following UNCED Education for Sustainable Development (ESD) has gained an importance worldwide. As a response to these international calls, starting in 1990 Talloires Declaration which was endorsed by more than 320 higher education institutions in 47 countries, several other international declarations, initiatives and charters were prepared and signed –up to present time, by nearly a thousand universities around the world– as a sign of the commitment to include environmental sustainability as a central goal of higher education. These international declarations are: Talloires Declaration (1990), Halifax Declaration (1991), Kyoto Declaration (1993), Swansea Declaration (1993), COPERNICUS Charter (1994), Thessaloniki Declaration (1997), Lüneburg Declaration (2000), Barcelona Declaration (2004), Graz Declaration (2005), Turin Declaration (2009) and Abuja Declaration (2009) (Tilbury, 2012; Lozano et al., 2014). The common points and the major themes of actions suggested in these declarations have been reviewed by some researchers (Calder & Clugston, 2003; Wright, 2004; Lozano et al., 2014) and eight common themes have been found:

- *Focus on environmental degradation, threats to society, and unsustainable consumption;*
- *Ethical or moral obligation of university leaders and faculties to work towards sustainable societies, including the intergenerational perspective;*
- *Inclusion of SD throughout the curricula in all disciplines;*
- *Encouragement of SD research;*
- *Move towards more sustainability orientated university operations;*
- *Collaboration with other universities;*
- *Stakeholder, e.g. public, governments, non-governmental organizations (NGOs) and businesses, collaboration, engagement and outreach; and*
- *Interdisciplinarity in community outreach* (Lozano et al., 2013, p.11)

More recently, the United Nations Decade of Education for Sustainable Development-UNDESD (2005-2014) was launched with a focus on educational

institutions at all levels worldwide to engage with ESD. During this decade, higher education institutions in the USA focused on developing carbon-reduction strategies, with a particular attention to direct CO_2 emissions generated by university operations. In 2007, with the support of Second Nature, the *American College and University Presidents' Climate Commitment (ACUPCC)* was initiated, presently around 700 higher education institutions signed ACUPCC. About 150 signatory universities designed courses and programs for encouraging students in conducting sustainability and climate research; further 82 signatories integrated student learning outcomes for sustainability into the university's general education requirements, and 100 signatory universities organized regular faculty development programs on sustainability education to all teaching staff (Buckler, & Creech, 2014; Dyer, & Andrews, 2011).

According to the UNESCO *Global Monitoring and Evaluation Report* prepared in 2014 for taking stock of achievements of ESD during UNDESD, about 70 % of UNESCO member states reported that there has been a progress in higher education, and nearly half of those reporting advances said that there has been significant progress or full implementation of ESD across higher education. In fact, during the ten years of UNDESD, as the UNESCO report highlighted, higher education institutions made important efforts for engaging sustainability in campus operations, integration of ESD into learning and teaching, and research. On the other hand, however, the main challenge of ESD is reported as disciplinary boundaries –or lack of interdisciplinary– as a barrier for exploration of complex issues, and to the preparation of learners with the capacity to address complexity (UNESCO, 2014).

This problem has been confirmed by many researchers, as well. For example, McKeown and Hopkins (2003) explained that interdisciplinary content of ESD does not easily fit into a discipline-oriented educational process educators, and resulted in integration only one or two dimensions of sustainable development into curriculum. As reported by Erdogan and Tuncer (2009) this is one of the obstacles for holistic integration of sustainable development in curriculum of the Turkish faculties of education. As the study of Erdogan and Tuncer revealed that teaching staff included only environmental dimension of sustainable development into lectures. Likewise, in

a most recent study, Cavas, Ertepinar and Teksoz (2014) found that teaching staff of social science and fine arts faculties in Turkey usually integrate only social dimension of sustainability (e.g., globalization, environmental philosophy, social justice) into their lectures. As the researchers analyzed, lack of interdisciplinary view of sustainability might be a reason for lecturers' belief that sustainability has a quite limiting role in their teaching.

By the same token, Gillenwater (2011) cited lack of transdisciplinary as a hindrance of integration climate change education into university curriculum; and criticized that universities and other educational institutions have not assumed required transformations to be needed to prepare a future workforce required for addressing the mitigation of global climate change challenges. Interdisciplinary nature of the global climate change problem necessitates innovations in higher education curricula. This issue is not unique to climate change but many universities integrate learning across disciplinary boundaries. Teaching about climate change is pedagogical challenge because it requires an understanding of many traditional fields, such as chemistry, engineering, biology, economics, political science, behavioral science and finance. Nevertheless, global climate change and greenhouse gases are considered as engineering specific subjects and largely built upon traditional majors such as environmental engineering and business administration (Gillenwater, 2011).

In brief, what is common among higher education institutions of other parts of the world, is also valid for the Turkish universities. Embedding all dimensions of sustainability into university curriculum is essential for students to be aware how economic, social and environmental issues and problems are closely interconnected; and how individual behaviors influence local and global citizens in present and in future (Moore, 2005). This point is particularly critical for climate change education. Global climate change is truly a sustainability-related issue with regard to its harmful consequences for humans, environment and economy, therefore to mitigate of adapt to climate change a holistic perspective (i.e., social, economic and environmental consideration) is required (Pruneau et al., 2001; Lemma, 2015).

Higher education plays a critical role in mitigation and adaptation of global climate change. The key contribution of higher education is to equip students (future decision-makers, professionals and citizens) with necessary knowledge, skills and dispositions for a true understanding of the root causes, consequences and implications of climate change on society, economy and environment; to encourage changes in students' attitude and behavior; and to help them in acting to mitigate and adapt to climate change (Yanda, 2010; Sahin, 2013). There are some research in literature emphasizing the importance of education. For example, Filho, Manolas, and Pace (2009) and Sahin (2013) highlight the importance of education, awareness and training in changing behaviors. There is also a number of studies reveal how climate change education causes conceptual and attitude change (Pruneau et al., 2001; Devine-Wright et al., 2004; Lester et al., 2006; Cordero et al., 2008). In addition, knowledge and concern are often studied with relation to climate change action as attitudinal change can cause habitual change that can lead to behavioral change (O'Connor, Bord, & Fisher, 1999; Fransson, & Garling, 1999; Dietz, Dan, & Shwom, 2007).

2.1.6 ESD and Climate Change Education in Turkey

As in the whole world, higher education has a unique role to play in creating sustainable future in Turkey, especially when size and potential for impact of higher education institutions in Turkey are taken into consideration. Turkey has the most youth population in Europe with almost 13 million people aged between 15 and 24 representing 17% of the population. In addition, there 6.7 million students studying in 184 higher education institutions located in every 81 cities of Turkey (Turkish Statistical Institute, 2014).

According to UNEP, youth population constituting the half of world population will play an important role if the widespread behavioral change for more sustainable lifestyles and consumption habits is brought about (UNEP, 2011).

As an emerging economy with rapid industrialization mainly depending on non-renewable energy resources and socially and environmentally vulnerable country, Turkey urgently needs to mobilize its young population for adaptation and mitigation

of global climate change. The climate change education, therefore, can be a strong instrument to enable large population of young people to acquire knowledge, values, and skills to create a sustainable future. Therefore, university students as a target population of the present research are very important.

Acknowledging the potential impacts of climate change, Turkey ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 2004, and more recently, the Kyoto Protocol in 2009. Since 2007, education and training activities for promoting public awareness on global climate change have been carried by non-governmental organizations within the framework of the amended New Delhi Work Programme on Article 6 of the UNFCCC. Media has supported these efforts.

Since 2009, several projects targeting primarily university students, primary students, women, farmers, and local authorities have been conducted for adaptation of global climate change. For promoting public awareness, arts performances and audio-visual activities such as photography and cartoon competitions, and ballet, with climate change themes have been carried out. Totally 15 million people participated in training, education and awareness raising activities on climate change which have been carried out in cooperation with non-governmental oragnizations, public and private instiutions since 2007. By the enactment of Environment Law in 2006, environmental topics have been included in the curriculum of public K-12 schools, and for public education, environmental issues have been promoted in audiovisual media (Ministry of Environment and Urbanization, 2013).

Related to higher education, Turkey's *National Climate Change Strategy* (2010-2020) and *Climate Change Action Plan* (2011-2023) set the strategic objective of integration of climate change mitigation and adaptation topics into higher education curriculum. In accordance with this strategic objective, it has been planned that the faculty needs concerning climate change will be identified and new graduate programs and new undergraduate courses will be opened at higher education institutions (Ministry of Environment and Urbanization, 2012, 2013).

The above-stated national policy and planning efforts are shown that legal ground is about to be ready in Turkey, and success of implementation or achievement in

embedding climate change education into higher education curriculum depends on academic staff and students of higher education.

2.2 Previous Studies on ESD and Climate Change Education

Research on education for sustainable development and climate change education has been started in 2000s in Turkey. Most of these studies mainly focused on primary and middle school students, and small number of studies focused on university students, especially pre-service teachers, and teaching faculty. The bulk of research is about environmental knowledge, attitudes (Tuncer, Sungur, Tekkaya, & Ertepinar, 2004, 2005, 2007; Alp, Ertepinar, Tekkaya, & Yilmaz, 2006), values, environmental concerns (Onur, Sahin, & Tekkaya, 2012), school type and gender effects on attitudes (Tuncer, Ertepinar, Tekkaya, & Sungur, 2005), and pro-environmental behaviors (Alp, Ertepinar, Tekkaya, & Yılmaz, 2008) of primary and middle school students.

Several studies were conducted on environmental literacy (Tuncer, Tekkaya, Sungur, Ertepinar, & Kaplowitz, 2009; Tuncer, Tekkaya, Sungur, Cakiroglu, & Ertepinar, 2009; Teksoz, Sahin, & Ertepinar, 2010; Teksoz, Boone, Yilmaz-Tuzun, & Oztekin, 2013), beliefs (Tuncer, Tekkaya, & Sungur, 2006), knowledge about concepts and problems (Yilmaz, Morgil, Aktug, & Gobekli, 2002); and energy conservation behaviors (Sahin, 2013) of pre-service teachers.

A limited number of research exists about awareness (Erdogan, & Tuncer, 2009); sustainability perception (Tuncer, 2008) and pro-environmental behaviors (Sahin, Ertepinar, & Teksoz, 2012) of university students.

Likewise, there is a limited number research about climate change education. Majority of them focused on middle and secondary school students (Kilinc, Stanisstreet, & Boyes, 2008; Aydin, 2010), and some other focused on pre-service teachers (Senel, & Gungor, 2008; Kahraman et al., 2008; Bozdogan, 2009; Sever, 2013), and investigated knowledge, understanding, awareness, perception, ideas, thoughts, and beliefs about climate change. Most recently, although few, there are more comprehensive studies, for example, Sahin (2013) explored pre-service

teachers' energy conservation behavior with relation to climate change education, and Ozdem and colleagues (2014) investigated the seventh grade students' concerns, beliefs, attitudes, values and actions about climate change. All of these studies indicated that although students are aware of global climate change and concerned about consequences, they hold some misconceptions related to global climate change; they do not have adequate knowledge about causes and consequences, and more importantly, they are not aware of the link between individual behaviors and the causes of climate change.

Findings of the studies conducted during the last decade in Turkey have been confirmed by a recent national survey which investigated 3166 people aged between 15 and 69 living in rural and urban areas in Turkey. According to survey results, 39% of the participants defined climate change as seasonal change and 13% had no idea about climate change. Only 12% knew the causes of climate change, merely 10% was aware of climate change effects on their life, and knew how to take action to mitigate and adapt to climate change. The survey concluded that people in Turkey have concern and interest but no adequate knowledge about climate change (Ministry of Environment and Urbanization, 2012). In addition, a more recent international poll on global climate change perception revealed that 40% of Turkish respondents agreed that climate change is a natural phenomenon and 20% believed that climate change is caused by natural processes (Ipsos MORI, 2014).

In fact, this is not unique to Turkey, there is still a minority in the world who believe that global climate change is caused by natural processes, or it is not occurring at all (Leiserowitz, Maibach, Roser-Renouf, Smith, & Hmielowski, 2011; Shao, 2012). According to a survey of 2010, 19% of Americans think that climate change is not happening, and another 19% does not know if it is happening (Leiserowitz et al., 2010). Likewise, 18% of Australians and 15% of British people do not believe that climate change is happening (Reser, Bradley, Glendon, Ellul, & Callaghan, 2012). In addition to these two faulty beliefs about occurrence and causes of global climate change, there is another belief about global climate change: belief that global climate change will bring about negative consequences. This belief has been generally defined as risk perception (Bord et al., 2000; Leiserowitz, 2005). The findings of the

most current public opinion poll indicated that 64% of the Americans do not see global warming as a threat; 69% of them believe that there is a solid evidence for existence of climate change (Gallup Poll, 2013). 50% of all Europeans does not think that climate change is one of the world's most serious problems (Eurobarometer, 2014).

International scientific consensus confirmed that global climate change is mainly caused by human activities resulting in the release of greenhouse gas emissions such as carbon dioxide, and methane (IPCC, 2013). For example, in UK, one third of carbon emissions come from private travel and energy consumption in houses (Defra, 2013). For this reason, in order to mitigate climate change, change in behavior and consumption patterns is crucial (Gifford, Kormos, & McIntyre, 2011). Recent studies in the USA and the UK indicate changes in individual lifestyles can reduce national carbon dioxide emissions by around 30% (Dietz et al., 2009; Dietz, Stern, & Weber, 2013; Gardner, & Stern, 2008).

Limited understanding of climate change both in its causes and its potential impacts and fault beliefs by people across different countries of the world is a real challenge. Acceptance of climate change as a real threat, believing its existence, and knowing causes and consequences are very significant for adaptation and mitigation of climate change. Therefore, exploring the determinant factors shaping and affecting beliefs and behaviors of people is needed for designing educational interventions for a change in individuals' attitudes and behaviors (Gifford et al., 2011; van der Linden, 2014).

Since 1990s, many studies have conducted to explore the underlying factors of beliefs and behavioral intentions about climate change. These studies have mainly investigated the beliefs that global climate change is occurring and is human caused, seriousness of climate change, concerns for the consequences of climate change, belief about negative consequences of global climate change, and beliefs about the causes and behavioral intentions to mitigate climate change (Bord, Fisher, & O'Connor, 1998; O'Connor et al., 1999; Bord, O'Connor, & Fisher, 2000; Brechin, 2003; Krosnick, Holbrook, & Leiserowitz, 2005, 2006; Lorenzoni, & Pidgeon, 2006; Heath, & Gifford, 2006; Dietz, Dan, & Shwom, 2007; Nisbet, & Myers, 2007;

Kellstedt, Zahran, & Vedlitz, 2008; Semenza, Hall, Wilson, Bontempo, Sailor, & George, 2008; Maibach, Roser-Renouf, & Leiserowitz, 2009; Whitmarsh, 2009a, 2009b; Swim et al., 2009; Maibach, Leiserowitz, Roser-Renouf, & Mertz, 2011; Weber, & Stern, 2011).

There are also some studies explored the effect of climate change beliefs on behavioral intention in literature. Krosnick and colleagues (2006) found that stronger beliefs that climate change was occurring led to increased beliefs about the seriousness of climate change, which led to increased support for policies to reduce climate change. Leiserowitz (2006) found that general beliefs about climate change (including belief that it is occurring and is not just a natural process) predicted climate change risk perceptions and preferences for national policies to mitigate climate change. Viscusi and Zeckhauser (2006) found that belief that climate change would cause the increases in hurricane activity predicted willingness to pay a gas tax to mitigate climate change. Some studies found that belief that climate change will bring about negative consequences predicted intention to act to reduce climate change (O'Connor et al., 1999; & O'Connor et al., 2002). Heath and Gifford (2006) found that belief that climate change is occurring or is likely to occur predicts intention to act to reduce climate change but the belief that climate change is caused by humans did not predict behavioral intention. Sundblad, Biel, and Gärling (2008) found that climate change beliefs predicted behavioral intention indirectly through risk perceptions (i.e., belief in negative consequences). In sum, most researchers have found that beliefs about climate change lead to behavioral intention and increased policy support for mitigation of climate change.

2.3 Theoretical Framework for Beliefs and Behavioral Intention about Global Climate Change

The findings of previous studies have suggested mainly two types of factors related individuals' beliefs about climate change, or barriers causing limited understanding of climate change: nature of the climate change phenomenon and psychological factors related to time perspective of individuals.

Climate change is in many respects different from other environmental problems and often described as a complex problem as it lacks both a definite assessment and a clear point where the problem is solved (Dietz, & Stern, 1998). First of all, climate is a statistical and technical concept defined by distributions of temperature and precipitation in a region over time. Long term climate is not easily detected by personal experience, but only through personal observation and evaluation. In addition, climate has always been changing. Since the scientific models explains climate change as a complex and uncertain issue, people find *difficult to* put together the information on climate change and to *evaluate the risks* and consequences of possible hazards caused by the changes in climate (Swim et al., 2009).

Secondly, the impact of climate change varies, while some regions suffer more severe effects of climate change, in the other parts of world its impacts are modest. Besides, some negative effects are projected to occur in the future. The impacts of global climate change are much more gradual than other environmental problems, so this makes it more *difficult to realize*. Thus, most people consider climate change impacts as both uncertain and as being mostly in the future and geographically distant, all factors that lead people to ignore them (Zimmerman, 2011).

Thirdly, scientific knowledge on the human role in causing climate change is always expanding, and as a result, the emerging knowledge becomes *uncertain* and complex. As a result of contradictions and uncertainties in scientific knowledge, people have less concern for global warming and tendency to disconnect themselves from the causes of climate change (Whitmarsh, 2009).

Previous studies addressed mainly three major beliefs about global climate change, therefore, the present study explores undergraduate students' beliefs under three dimensions as beliefs about occurrence, causes and consequences of global climate change. In addition, as majority of research indicated a close association between people's beliefs and their behaviors (Ajzen, 2005; Ajzen, & Fishbein, 1980), and given that three beliefs about climate change plays important role in mitigation and adaptation of global climate change, it is very important to explore the beliefs of university students about climate change.

People's misperceptions about causes and consequences are explained within two contexts, namely social dilemma and construal level theory in the literature.

2.3.1 Social Dilemma as a Contextual Framework for Beliefs about Global Climate Change

Today many environmental problems pose a social dilemma. This is especially true for climate change. The globally most challenging social dilemma is the prevention of dangerous climate change. From a global perspective, reduction of substantial greenhouse gas emissions may have negative short-term effects on world countries' economic growth, but failure to accomplish this reduction may cause dangerous climate change later lead to substantial human, ecological and economic losses (Kortenkamp, & Moore, 2006; Hendrickx, & Nicolaij, 2004).

Social dilemma is defined generally as the situations in which short-term individual and long-term collective interests conflict (Komorita & Parks, 1994; Messick & McClelland, 1983). Considering pro-environmental behavior as a social dilemma suggests that when individuals are offered a choice between more and less environmental friendly behaviors, in order to make a decision, they are faced with at least two basic underlying conflicts of interest: *a social conflict* (between individual and collective interests) and *a temporal conflict* (between immediate and future consequences of their actions).

In most of the cases involving social conflicts, the collective interests requires individual sacrifice, with the benefits to all but no guarantee that others will also contribute (Milinski et al., 2008). One of the most problematic aspect of social dilemmas is that many of behaviors personally attractive and convenient, such as private car use, are detrimental to the environment shared by all members of society. For example, the decision to use private car or public transportation affects not only wellbeing of private car use but also wellbeing of other people, as more people commute by car, people may experience consequences of environmental pollution and traffic congestion. Individual interest is generally more favorable for a choice for car using, because it may provide travel convenience, flexibility and travel time. However, it is in the interest of all people if more people decide to use public

transportation which would minimize the contributions to pollution and congestion (van Vugt, van Lange, & Meertens, 1996). According to van Lange and Joireman (2008) the main problem lies in the fact that individuals cannot see the social interdependencies, they do not see the impact of their decisions on the outcome of others, or other people are affected by their decision. More importantly, as van der Wal, Schade, Krabbendam, and van Vugt (2013) proposed, profits gained from environmental exploitation are immediate and certain for individuals, but the benefits of mitigation for climate change, for instance, are in the more distant future, less certain and diffuse, i.e., shared with the entire population rather than being limited to those who make the effort to reduce harmful effects of climate change.

In fact, almost any pro-environmental behavior causes a temporal conflict, as in most cases, long-term interests requires the sacrificing of short-term interests (Balliet, & Ferris, 2013). For example, a conflict emerges when a person decides whether to turn on a heater or put on another piece of clothing. Turning on the heater will provide immediate benefit an individual in the short run, but it may cause more energy consumption and major damage in the future and be detrimental to long-term interests (Carmi, 2013). As Hendrickx and Nicolaij (2004) suggested, temporal conflicts are mainly caused by individual's bias, called *temporal discounting*. The temporal discounting refers to individuals' tendency to lessen (discount) the subjective value of events to exist later in future time. Temporal discounting poses an important hindrance in enhancing pro-environmental behavioral change in such a way that individuals prefer immediate profits over long term gains. The tendency to discount the future is an important contributing factor for individual and societal challenges (van der Wal, Schade, Krabbendam, & van Vugt, 2013). For example, a variety of unhealthy habits such smoking, drinking and over eating, might be tempting to engage for individuals, but in the long run, each of these behaviors can lead to serious problems not only for individuals but also for whole society, as financial and health problems of individuals often carry a social cost (van Lange, & Joireman, 2008). Therefore, considering future consequences of behaviors is important for individuals' willingness to act cooperatively for mitigating harmful effects of global climate change (Beckenkamp, 2011). Since the temporal conflicts are related to the consideration of long-term outcomes of behaviors; and temporal

psychological distance plays a central role in exploring time perspective phenomena, an individual's future time perspective is particularly relevant to an individual's beliefs and decision to engage in behavior for mitigation and adaptation of global climate change.

2.3.2 Construal Level Theory (CLT)

Construal Level Theory (CLT) (Trope, & Liberman, 2008) is a socio-psychological theory that describes how psychological distance influences individuals' thoughts and behavior. Construal Level Theory is based on the premises that human being can directly experience only the present, (i.e., here and now) but not the future. Individuals can make assumptions about the future, remember the past and imagine reactions of other people and judge about what might have been. Predictions, memories and speculations are all mental constructions, away from direct experience of humans; and through these mental constructs, humans can go beyond the direct and immediate situation and imagine psychologically distant objects. If an event is perceived as more psychologically distant, it will be perceived at higher levels of abstraction. To be more precise, if an object is closer to an individual, it will be thought more concretely; and if an object is more distant to an individual, it will be thought more abstract (Trope, & Liberman, 2003; Liberman, & Trope, 2008).

According to CLT, individuals perceive an event away from direct experience on four psychological distances: *temporal distance* (time, i.e., it takes place far into the future); *spatial distance* (physical space, i.e., it occurs in more remote locations); *social distance* (interpersonal distances, i.e., it happens to people less like oneself); and *hypothetical distance* (predicting that an event is less likely or unlikely to occur) (Trope, & Liberman, 2010; Trope, Liberman, & Wakslak, 2007).

CLT proposes that perception of psychological distance has a guiding role for human thoughts and behaviors. When events or objects are perceived as psychologically distant on any of the above-stated four types of distance, these events or objects are interpreted in a different way than when they are perceived as psychologically near. Thus, psychological distance influences individuals' mental construal, or, mindset as high or low level. In this respects, individuals' subjective construals differ in their

level of abstraction (Liberman, & Trope, 2008; Trope, & Liberman, 2003, 2010). One individual can construe an event abstractly, but other can construe the same event concretely. The individuals with *high level construal* can think abstractly. When thinking on this level, people do not focus on details, but look at the bigger picture, and focus on main features of a situation. Individuals with *low level construal* think more concretely, focus on the present in great detail and secondary features less essential to a situation. As an example, bicycling to work can be construed abstractly as reducing an individual's carbon footprint or concretely as pushing pedals (Fujita, Clark, & Freitas, 2014).

When individuals' beliefs about occurrence, causes and consequences of global climate change are considered within CLT framework, due to the nature or characteristics identified above, people construe global climate change as an abstract and psychologically distant phenomenon on all four psychological distances. Basically, as effects of climate change are not felt seriously at the same degree in all countries, climate change becomes removed from individuals' direct experience, they believe that it has not being actually happened. As Milfont (2010) stated, as a general, people typically perceive climate change as a distant threat, one that is not relevant to them personally, where they live, and not in the present time but some time in future.

As a matter of fact, particularly, temporal and spatial psychological distances have implications in practice, as the more people believe that global climate change will impact the people not in present time but in far future, and other people living in geographically far regions, they become less willing to take action here and now (Milfont, Wilson, & Diniz, 2012). Several studies explored the different aspects of psychological distance and its influence on environmental engagement and environmental risk perception (Wade-Benzoni, 2008; Gifford et al., 2009; Milfont, Abrahamse, & McCarthy, 2011; Spence, Poortinga, & Pidgeon, 2011).

Gifford and colleagues (2009) investigated spatial and temporal psychological distances in terms of optimism ("things are better here than there") and pessimism ("things will get worse") for the assessment of environmental conditions in 18 countries. The researchers found that respondents believed that future environmental

consequences are more serious than the consequences appeared at present, and that environmental conditions generally will get worse in other countries than in their country.

Most recently, Spence, Poortinga and Pidgeon (2012) explored how each of four (temporal, social, spatial and hypothetical) psychological distances relate to each other as well as to concerns and behavioral intention about global climate change (as measured by preparedness to reduce energy use to tackle climate change) through interviews with 315 adults from Scotland and Wales. The researchers found a highly significant relations between psychological distances and climate change behavioral intention. Concern about climate change was found as a significant mediating variable which reduced the direct relationship between psychological distance and preparedness to reduce energy use. The researchers found that lower psychological distances was associated with higher levels of concern, and significantly related to behavioral intention (i.e., preparedness to act on climate change).

2.3.3 Future Time Perspective (FTP)

Thinking about and acting upon the future is a key characteristic of human mind. Individuals think of future, have future preferences and targets, and make efforts to realize future targets, and sometimes, individuals have regrets for future was not realized in accordance with their hopes. According to Nurmi (2005), an individual's perspective into the future comprises some cognitive processes, such as anticipation, planning, as well as emotions and attitudes, like optimism, pessimism, hope and hopelessness. Likewise, motivation such as interests, values, and goals plays important role in acting upon future. Future time perspective is closely linked with an individual's development, as through anticipating future one can predict his own development and through targeting at specific future one can direct his/her present behaviors. According to Husman and Shell (2008) thinking about future is particularly important in adolescent and youth, because in this period important decisions are taken about different aspects of life: choosing a career, engagement in an intimate relationship, and friendship, commitment to certain ideas, values, and ideologies, etc. these decisions influence our behavior, activities, our purposes and

plans about future in the short and long run as well, and their consequences affects all our adult life.

Individuals' perceptions of the future time has been examined under two important concepts as *Future Time Orientation* (FTO) and *Future Time Perspective* (FTP) in the literature. Both concepts are relating to the individual psychological phenomenon, i.e., individuals' perception of time, rather than actual physical time as determined by calendar or clock. FTO and FTP have different meanings. FTO is the individuals' tendency and preference of the future over the past and the present in their thought and behaviors, and also is used to explain how individuals approach to the future; whereas, FTP is a broader concept than FTO and refers to the composite cognitive structures that determine the way an individual projects, collects, accesses, values, and organizes events in the future. In its simplest meaning, FTP is individuals' ability to foresee and anticipate the future, and reflects people's capacity to plan for and achieve future goals (Zimbardo, & Boyd, 1999) and to consider the future implications of their actions (Strathman et al., 1994). It is a motivational and an individual-differences construct (Carmi, 2013). Some people can foresee the future implications of their present behavior, understand how their present behavior is meaningfully related to desired future goals, and how their present behavior serves the attainment of those future goals. Other people live in the present and do not anticipate the future consequences of their present behaviors (Milfont, & Demarque, 2015).

Theoretical Background

The concept of psychological time had long been studied and measured in many disciplines such as history, anthropology, psychology, religion and philosophy. The earliest psychologists had viewed the past time as the only determinant of present behavior, and the role of the future in explaining behavior had not been generally accepted in behavioral sciences since the time when the future had been introduced in psychology with Tolman's (1932, cited in Nuttin, 1985) concept of anticipation or expectancy for the future. Tolman had explained future time perspective through memory or conditioned effects of the past, and proposed that because of memory, individuals could reconstruct the succession of changes previously experienced, and

to anticipate these changes in the future. Time perspective as an important psychological variable was first adopted by Kurt Lewin in 1942 (Nuttin, 1985). Lewin claimed that a person's life space covers not only geographical and social environment, but temporal (time) dimension, as well. Lewin acknowledged the influence of both the past and the future on behavior and defined time perspective as "*the totality of the individual's views of his psychological future and his psychological past existing at a given time...*" (Lewin, 1951, p.75)

Drawing from Lewin's seminal work and continued Lewinian conception, Joseph Nuttin (1985) put forwarded that, "*future and past events have an impact on present behavior to the extent that they are actually present on the cognitive level of behavioral functioning"* (p. 54). Nuttin suggested that the future is the primary motivational space of human, and diminishes the significance of the past. Nuttin (1985) highlighted the motivational role of future time perspective by considering it as a significant factor in behavioral construction process, that is, behavioral intention and behavioral motivation. He described human behavior as "…*strongly characterized by a restless striving towards something new in the future, is now to be explained entirely or mainly as a function of what he has previously done*" (p. 61). Nuttin's view on FTP has been adopted by contemporary scholars presently; and temporal (time) perspective has been considered as a fundamental aspect of behavioral intention, more general, of human motivation (Lasane, & O'Donnell, 2005; Seginer, 2008).

In line with Nuttin's approach, various subsequent efforts (Strathman et al., 1994; Zimbardo, & Boyd, 1999; Lasane, & O'Donnel, 2005; Husman, & Shell, 2008) have been made to conceptualize the FTP. There have been a diverse range of studies on the FTP, for example, Eryilmaz (2011) reported 211 different definitions of FTP or FTO in the literature. Recently, Nurmi (1991, cited in Nurmi, 2005) compiled and compared more than 40 FTP studies to identify trends, similarities, and differences (Seginer, 2008).

Nurmi (2005) proposed that FTP, as a broad concept, covers individuals' expectations, hopes, and fears (*content of FTP*), how far into the future individuals can projected their expectations and hopes (*extension of FTP*), how individuals think

of the factors influencing their future (*control beliefs*), how individuals feel about their future (*optimism and pessimism*), and the means that individuals develop to reach their targets.

FTP is a complex phenomenon consisting of three psychological processes as *cognitive, motivational* and *affective*. In the *cognitive process* an individual acquires knowledge about the future, anticipates and estimates possibilities of future events, makes plans and takes decision about his/her future, and seeks future opportunities. In the *motivational process* of future perspective, in turn, an individual sets up future-oriented goals, interests, values, and makes commitments, on the one hand, and he/she may have concerns, doubts, and fears, on the other. In the *affective process* an individual holds many evaluative emotions and attitudes, such as optimism, pessimism, hope, and despair targets (Nurmi, 2005).

These psychological processes consist of three successive stages*: motivation*, *planning* and *evaluation* (Figure 2.1). In *motivation* stage, individuals' anticipation about future starts with the knowledge, beliefs and schemata they formed during their course of life in the society where they live. They compare and evaluate this knowledge with their motives and values originating from their past life and personal characteristics, thus, this evaluation lays the foundation for the construction of future-oriented goals. Comparing one's individual motives and values with one's knowledge about the available future opportunities assists in the identification of life trajectories that will satisfy one's personal needs. One example of such process is the choice of a career. Young people typically have values and interests that orient their exploration of future career opportunities. To sum up, in the motivation stage, individuals compare their interests and values to the future opportunities available to them that will lead to the construction of realistic goals. After setting future-oriented goals, they need to find ways to attain them (Nurmi, 2005).

In *planning* stage, they seek the required means, therefore, explore future opportunities, set up some sub-goals that will lead to goal attainment, planning, strategy building, investment for efforts, and regulation of behavior. For setting a future goal, knowledge about the opportunities for future action plays an important role in efficient planning and decision making. From a developmental perspective,

abilities of individual to perceive cognitively future events and their distances in time, as well as their planning skills, provide a basis for this aspect of future perspective. After individuals have developed necessary skills, the planning of the future can be enhanced by providing individuals with required information about future society and the variety of opportunities it provides for their future development and life decisions. The sources of information for adolescents are parents, peers, school, and media. Therefore, education plays a unique role in shaping young individuals' future perspective (Nurmi, 2005).

In the final stage that is *evaluation*, individuals make use of a variety of evaluative tools to deal with the information they receive about the future, and their success in dealing with future challenges. These evaluative stage may include, however, some illusionary or faulty beliefs and misperceptions in a good future. For instance, people typically assume that negative life events are less likely to happen to them compared with their age mates. Similarly, they typically believe that they will be able to control many factors that influence their future lives. These evaluative mechanisms in turn influence individuals' anticipation of the future, and the construction of future-oriented goals. Education can use these evaluation mechanisms to enhance people's future optimism and future-directed behavior (Nurmi, 2005).

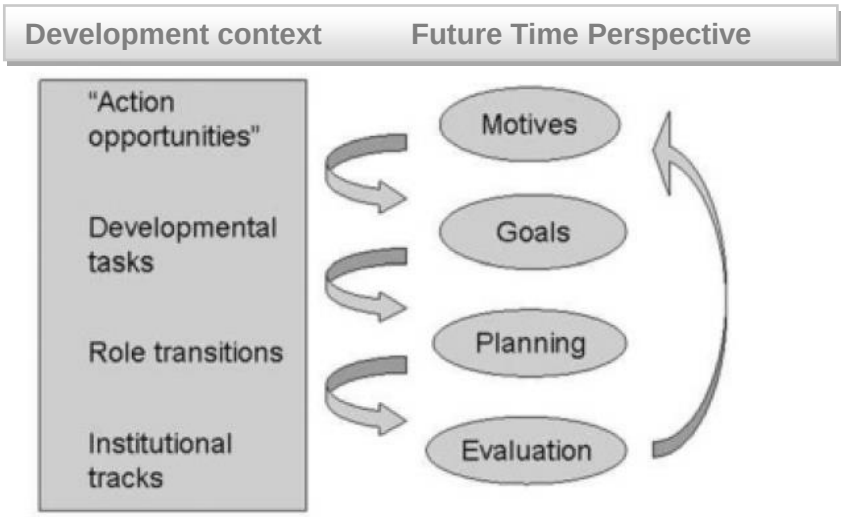


Figure 2.1 Future time perspective in individuals' development context (Nurmi, 2005)

As depicted in the Figure 2.1., development of future perspective is affected by mainly psychological and social factors. FTP requires a basic understanding of time, necessary knowledge about future events, skills for planning, and awareness of one's own abilities to deal with future challenges. In addition, future perspective is required that a person should develop interests and values spanning the near and distant future. Finally, as people move from one stage of life to another, changes in age-related developmental tasks, role transitions, and institutional tracks will affect how they think about the future (Nurmi, 2005).

2.4 Factors Affecting Beliefs and Behavioral Intentions about Global Climate Change

2.4.1 The Consideration of Future Consequences (CFC)

For exploring how psychological time (i.e., individuals' perception of time) impacts the future decisions, consideration of behavioral consequences offers valuable insight. The acknowledgement that decisions taken and goals set in the present have specific consequences in the future is a necessary condition for planning effectively for the future (Portnoy, 2008). If individuals are not aware of their present actions to result in negative consequences in the future, their actions will not be relevant to their future goals, and as a result, their goals will not be accomplished. Not surprisingly, numerous studies have found that those thinking about long term consequences prefer actions that yield positive outcomes in the future, even if they have to deal with negative consequences in the present (Strathman et al., 1994).

As a general environmental issues offer some conflicts between the societal collective interest and individual interests (Milfont, Wilson, & Diniz, 2012). The tradeoff between satisfying immediate desires of individuals and future benefits for society is important concern for mitigation and adaptation of global climate change. Whether individuals take possible distant outcomes into consideration when deciding to engage in certain behaviors, or just concentrating on making use of their immediate benefits without considering future consequences, is regarded to be a more or less stable and measurable individual characteristic (Rappange, Brouwer, & van Exel, 2009). The *Consideration of Future Consequences* (CFC) (Strathman,

Gleicher, Boninger, & Edwards, 1994) is one of the FTP measures for assessing individual differences in construct of future perspective. The CFC is a motivational construct, it enables an individual to perceive what is his or her future might requires or demands behaviorally, in order to attain desired outcomes (Pertrocelli, 2003). More specifically, the CFC refers to

> *…the extent to which individuals consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes. It involves the intrapersonal struggle between present behavior with one set of immediate outcomes and one set of future outcomes* (Strathman et al., 1994, p.743).

The CFC hypothesizes that particular individuals resolve the dilemma between present and future in favor of one or the other is a relatively stable characteristic. Moreover, individuals low in CFC are expected to focus more on their immediate, versus distant, needs and concerns, and are thus expected to act to satisfy these immediate needs. At the extreme end, individuals may not even consider future consequences of their behavior. Conversely, people who are high in CFC are expected to consider the future implications of their behavior and to use their distant goals as guides for their current actions. At the extreme end, they may not consider immediate implications at all (Strathman et al., 1994).

The CFC has been used extensively in various studies in the pro-environmental literature for last two decades, and in these studies individual differences in CFC have been connected to a variety of environmental and sustainability related behaviors.

Strathman and colleagues (1994) found that college students who scored higher in CFC also expressed more pro-environmental attitudes toward offshore drilling. Lindsay and Strathman (1997) studied a sample of Missouri residents by means of a telephone survey and found that higher CFC significantly predicted recycling behavior. Joireman, Lasane, Bennett, Richards, and Solaimani (2001) also used CFC in a sample of college students and reported that higher CFC was positively related to stronger intentions to engage and to more frequent actual engagement in pro-environmental activism. An additional study has shown complex, but meaningful links between CFC and support for structural solutions to transportation dilemmas

(Joireman, Van Lange, Van Vugt, Wood, Vander-Leest, & Lambert, 2001). In a study of 63 adults in the USA, Ebreo and Vining (2001) found that higher CFC was related to more engagement in recycling and waste reduction. Joireman, Van Lange, and Van Vugt, (2004) found that among 189 commuters in the USA, preference for public transportation was higher among those who scored higher in CFC. In a study of citizens in a Mexican city, stronger CFC was positively related to water conservation (Corral Verdugo, Fraijo-Sing, & Pinheiro 2006), affinity toward diversity, and general ecological behavior (Corral-Verdugo, Bonnes, Tapia-Fonllem, Fraijo-Sing, Frias-Armenta, & Carrus 2009). Recent studies confirm that future orientation drives environmental protection (Rabinovich, Morton, & Postmes, 2010) and pro-environmental behavior motivation (Arnocky, Milfont, & Nicol, 2014). More recently, a review on the relationships between CFC together with other future orientation construct, and the variables pertaining to environmental behaviors has been conducted by Milfont, Wilson, and Diniz (2012).

The most recent study investigated 1216 Israeli and Arabic adults to examine whether individual-level future orientation (measured by CFC) had a significant positive effect on individuals' tendency to engage in pro-environmental behavior. The study found a positive correlation between CFC and environmental behaviors, and CFC was strongly related to environmental attitudes and willingness to sacrifice (Carmi, & Arnon, 2014).

To sum up, majority of the studies in the literature, has indicated CFC as a powerful predictor of environmental and sustainability related behaviors, especially when immediate and distant consequences are in conflict with each other. Swim and colleagues (2009) suggest that CFC is related to the individual capacity to assess future scenarios, and therefore, a good predictor for behavioral changes towards mitigation of climate change.

Reviewing the literature has not yielded any previous study investigated CFC in relation with the belief and behavioral intention of global climate change in Turkey. Literature review resulted in three studies on CFC in Turkey, however, these studies explored relationship between CFC and credit using (Dalgar, Alparslan, & Binici, 2011), and role of CFC in morningness orientation and prospective memory (Cinan,

& Dogan, 2013). Therefore, depending on the related literature, it is obviously promising to explore the role FTP in predicting beliefs and behavioral intentions of undergraduate students in Turkey, where there is no studies on the issue.

2.4.2 Self-Efficacy of Cooperation

For any efforts towards adaptation and mitigation of global climate change to be successful, individuals' cooperative actions are crucial. Believing alone that there is a problem needs to be solved is not sufficient, individuals need to believe that their own cooperation will contribute to a solution. As Gifford points out, because global climate change is a worldwide problem, it decreases individuals' belief that they can make a difference, and sometimes causes fatalism (sense of destiny), people believe that nothing can be done by individual, or even collectively to fight against global climate change (2011). This is a real barrier for mitigation and adaptation efforts because if people feel that they cannot change the situation, they feel apathy, and will be less likely to address climate change (Kollmus, & Agyeman, 2002). Therefore, individuals' belief that their actions actually impact climate change is the most important source of motivation in moving people to change their behaviors (Tobler, Visschers, & Siegrist, 2012).

Self-efficacy of cooperation, used in the social dilemma literature, reflects the "*judgment of the degree to which one's cooperative behavior will increase the chances of the group achieving some valued collective outcome*." (Kerr, 1996, p.212). This type of efficacy is different from the original concept of self-efficacy, which refers to "*beliefs in one's capabilities to execute the competencies needed to exercise control over events that affect one's welfare*" (Bandura, 1988, p. 279). Hence, the original concept of self-efficacy is exclusively and primarily a function of one's behavior. However, self-efficacy of cooperation is related to the efficacy of one's own cooperative behavior for achieving a certain behavior for ensuring common good, such as avoiding the disappearance of a shared resource and decreasing carbon emissions, within social dilemma context. In addition, in most of social dilemmas, the main point is not whether individuals have capability to perform the cooperative act, but the main question is whether or how much individual cooperative acts will impact the collective performance (Kerr, & Kaufman-Gilliland,

1994). As stated in previous section, in social dilemma situations, the most difficult social problems arise from a conflict between individual and collective interest. Individuals confronting a social dilemma are faced with a difficult choice between what is best for them personally and what is best for the group. For example, wellness of society depends on low carbon emissions which can be ensured by driving less, which in turn, poses inconveniences for individual. Kerr and Kaufman-Gilliland, points out the irony in social dilemmas that although no individual contribution may solve problems, but it will be impossible to solve problems without large numbers of individual contributions (1994).

According to Social Cognitive Theory (SCT), developed by Bandura (1988), there are two influential psychological concepts in determining human behavior: *self-efficacy*, belief that one is able to perform a certain behavior, and *outcome expectancy*, belief about the possible consequences of their action. Recently, Koletsou and Mancy argued that the individual beliefs measured by self-efficacy and outcome expectancy judgements have not been sufficient for predicting behavioral change in the face of large-scale collective world problems involving social dilemmas like global climate change (2011). In addition, some researchers investigating ways of tackling with climate change have concluded that collective efficacy is likely to be more efficient for tackling climate change through collective action than self-efficacy (van Zomeren, Spears, & Leach, 2008; Reser et al., 2012). *Collective efficacy* is defined as a measure of individual judgements of the ability of a group to conduct a particular behavior (Koletsou, & Mancy, 2011). However, self-efficacy of cooperation is different from this type of efficacy, as well.

Kerr (1996) proposed that the self-efficacy of cooperation is positively and causally related to the rate or probability of cooperation in social dilemmas. Kerr elaborated this concept based on the efficacy-cooperation hypothesis. Efficacy-cooperation hypothesis suggests that cooperation tends to decrease especially in large-scale social dilemmas; because the perception of an individual about his/her cooperation to make a difference (i.e., perception about self-efficacy of cooperation) decreases in a large group (Kerr, 1996). Therefore, greater self-efficacy of cooperation is associated with

the tendency to take more concrete steps toward preventing the negative effects of global climate change (Heath, & Gifford, 2006).

More recently, Dijkstra and Mulders (2014) considered self-efficacy of cooperation as a key concept in understanding individuals' cooperative behavior in social dilemmas, proposed that individuals' perceived efficacy of cooperation is influenced by beliefs about what others do. The researchers warned that these beliefs impact perceptions of efficacy that in turn affect behavior, and suggested that in these cases, communication (or education) affects the beliefs about the behavior of others. Therefore, any type of education efforts in adaption and mitigation of global climate change should enables people to view their contribution to the solution of the problem as critical, and provide learners with examples or cases of successful efforts for mitigation and adaptation of climate change.

The literature pertaining to beliefs and behavioral intentions about global climate change, primarily addresses (personal) *self-efficacy*. In many studies self-efficacy was found to be a good predictor for behavioral intentions about climate change (O'Connor et al., 1999; Sundblad, Biel, & Gärling, 2008; Kellstesdt, Zahran, & Vedlitz, 2008; Brody, Zahran, & Vedlitz, 2008; Milfont, Wilson, & Diniz, 2012). In a recent study evaluated a modified version of the Theory of Planned Behavior by using path analysis on data from 461 college students in the USA, Truelove (2009) found self-efficacy of one's action, along with personal norms, outcome expectancy, and biospheric values as the strongest predictors of global warming related intention. Kellstedt, Zahran, and Vedlitz (2008) investigated 1093 adults in the USA and found that self-efficacy together with perceived knowledge, confidence in scientists, related with and had a significant influence on risk perception of global warming and climate change. A study by Witte and Allen (2000) suggested that people with high self-efficacy (measured as capable of taking effective action to reduce the threat) and felt threatened, were more likely to take action (have intention to act against climate change).

There are a number studies on *collective efficacy* in relation with behavioral intentions pertaining to climate change behaviors. For instance, Lubell and colleagues (2007) found collective efficacy together with perceived risk, trust in

politicians, and knowledge about problem to be directly and positively related to support for policies and behavioral intentions about improvement of air quality. A more recent study by Lubell, Zahran and Vedlitz (2007) revealed that low collective-efficacy beliefs caused an important barrier to greater engagement in pro-environmental actions. In addition, van Zomeren, Spears, and Leach (2008) conducted one field study with 61 university students from the Netherlands and one experiment study with 45 students from the University of Amsterdam. Both the field and experiment study showed that group-efficacy beliefs strongly predicted university students' collective action tendencies towards protest against increase of university tuition fees.

On the other hand, reviewing literature on *self-efficacy of cooperation* with relation to behavioral intention about global climate change has yielded only one study. The study, conducted by Heath and Gifford (2006), investigated 185 adults from Canada and found that self-efficacy of cooperation explained the most variance in behavioral intentions to mitigate global climate change.

The studies exploring any type of efficacy stated above, on climate change are very limited in Turkey. Literature review have resulted in two studies. Recently, Kilinc, Boyes and Stanisstreet (2011) investigated 897 middle and high school students (6-10 graders) from Turkey to explore students' beliefs about the benefits of certain actions for reducing global warming (belief in usefulness of action), their readiness to adopt them (willingness to act), and interrelations between these factors. Although self-efficacy was not one of research variables, the researchers found that perceived self-efficacy for taking a certain global warming related behavior was influential factor in likelihood of undertaking that behavior. The most recent study investigated 646 Turkish seventh grade students to explore students' general environmental concerns, experiences, beliefs, attitudes, worldviews, values, and actions relating to climate change. Perceived individual efficacy and responsibility were employed as a measure of students' motivation for action considering climate change. The study found that fewer students had a sense of efficacy and responsibility as an action motivation (Ozdem et al., 2014).

2.4.3 Perceived Knowledge about Global Climate Change

A significant amount of studies have indicated that knowledge about the causes of climate change is an important predictor of climate change mitigation intentions (Bord, O'Connor, & Fisher, 2000; Hidalgo, & Pisano, 2010; O'Connor et al., 1999; O'Connor et al., 2002; Whitmarsh, 2009). In both research by Bord, O'Connor and Fisher (2000) and O'Connor and colleagues (1999) knowledge about climate change was an independent variable of behavioral intentions. In fact, knowledge was the strongest predictor of behavioral intentions, explaining 11% of the variance to take voluntary action, and 20% of the variance to support new government policies (Bord, O'Connor, & Fisher, 2000). Similarly, Ngo, West and Calkins (2009) also found that knowledge successfully predicted a range of climate change mitigation behaviors. Lazo and colleagues (2000) reported that more knowledgeable persons perceive higher risk than do less knowledgeable persons. Furthermore, the relation between knowledge and behavioral intention is described in the *Theory of Planned Behavior* (Ajzen, 2005). According to the theory, knowledge, in the form of beliefs that a person holds, is a precondition for developing attitudes. Knowledge constitutes the foundation of a process in which attitudes, norms and perceptions of possibilities to act are carefully monitored to clarify and decide between behavioral alternatives.

In terms of the relationship between knowledge and general pro-environmental behavioral intention, a recent meta-analysis found that knowledge of environmental problems had the strongest total effect on intention (Bamberg & Moser, 2007). In regard to global climate change, lack of basic knowledge about climate change has been noted as an important hindrance for mitigation and adaptation of climate change (Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007; Semenza et al., 2008).

2.4.4 Environmental Attitudes

Environmental attitudes are "*the collection of beliefs, affect, and behavioral intentions a person holds regarding environmentally related activities or issues*" (Schultz, Shriver, Tabanico, & Khazian, 2004, p. 31). In the present study, ecocentric and anthropocentric attitudes are utilized as environmental attitude variables. Ecocentrism and anthropocentrism are the two distinct value orientations shaping

individuals' concern for the environment (Thompson, & Barton, 1994). Both ecocentric and anthropocentric individuals are concerned for the environment, but their motivation and values underlying their concern are different. Anthropocentric individuals' concern is to protect environment for maintaining and enhancing quality of life for humans. To be more precise, these individuals would engage in climate change mitigation behavior, only if it has positive consequences for mankind and does not diminish their quality of life or wealth. Ecocentric individuals attach importance to the environment or the nature for its intrinsic value and would engage in climate change mitigation behavior, even if it involves some sort of sacrifice on their part.

According to the literature environmental attitudes are strongly associated with concern for, awareness of risks, and supportive action for risk prevention. For example, Nilsson, von Borgstede, and Biel (2004) found that willingness to support climate change mitigation policy was positively related to ecocentric values; and O'Connor and colleagues (1999) concluded that people with ecocentric attitudes were significantly more willing to support efforts for mitigate greenhouse gas emissions. Bord and his colleagues (1998) found that persons with pro-environmental attitudes were more likely to adopt behaviors and support policies mitigating climate change. Some studies has confirmed that people who ecocentric values are more likely to report concern about the risks and consequences of climate change (Brody, Zahran, Vedlitz, & Grover, 2008; Corner et al., 2011; Poortinga et al., 2011) and are less likely to be skeptical about the reality or seriousness of the problem (Whitmarsh, 2011).

Given that mitigation actions are often difficult and involve some inconvenience and discomfort for individuals (e.g., using public bus instead of private car), and require self-sacrifice, ecocentric individuals are expected to have the intention to take action against global climate change more strongly than anthropocentric individuals. In this respect, in the present study, environmental attitudes are expected to predict both beliefs and behavioral intentions about global climate change.

2.4.5 Gender

Gender-sensitive perspective in climate change research is not new, but its take-up as a key concern is fairly recent. A gender-sensitive response in climate change mitigation requires an understanding of existing inequalities between women and men, and of the ways in which climate change can exacerbate these inequalities. Conversely, it also requires an understanding of the ways in which these inequalities can exacerbate the impacts of climate change on women and men. For example, girls and women may have less access to vital information on mitigation or adaptation strategies. This lack of information and lack of opportunity to feed their knowledge into community or national-level adaptation and mitigation strategies could jeopardize larger processes of reducing climate change and its impacts (BRIDGE, 2008).

Accordingly, gender has been reported in the majority of the recent studies pertaining to beliefs and behavioral intentions about global climate change as having an influential effect. As Zelezny, Chua, and Aldrich (2000) reported, gender has an important effect on environmental attitudes and behaviors. Females have higher environmental concern and pro-environmental behavior than their male counterparts (Milfont, & Duckitt, 2010; Zelezny, Chua, & Aldrich, 2000; Milfont, 2012). Research consistently indicates that women are more likely to believe in global warming (Bord, & O'Connor, 1997; Malka, Krosnick, & Langer, 2009; McCright, 2010; Park, & Vedlitz, 2013; Semenza et al., 2008; Sunblad, Biel, & Garling, 2007), gather information on global warming (Scannell, & Gifford, 2013), engage in consumer behaviors to mitigate global warming (Bord, & O'Connor,1997; Meier, & Christen, 2012; O'Connor, Bord, & Fisher, 1999; Park, & Vedlitz, 2013), and support climate change mitigation policies (Maibach, Leiserowitz, Roser-Renouf, & Mertz, 2011; McCright, Dunlap, & Xiao, 2013). Liu and Sibley (2010) investigated relation between climate change risk perception and willingness to sacrifice in 34 countries and found that females were more willing to sacrifice to protect the environment. Moreover, future time perspective studies indicate the gender effect, for example, Zimbardo, Keough and Boyd (1997) found that in general college-aged men are more present-oriented than their female counterparts, and females are more

future-oriented. In addition, most of environmental behavior studies conducted in Turkey also confirms that gender has significant factor, particularly females have more concern, more positive attitudes and behavior toward environment as compared to males (Tuncer, Ertepinar, Tekkaya, & Sungur 2005; Yilmaz, Sahin, Ertepinar, & Teksoz, 2012; Boone, & Anderson 2004).

Gender difference in environmental research, as Zelezny, Chua, and Aldrich (2000) suggest can be explained by socialization theory perspective. As females are socialized to care others need, they are aware of harmful consequences and of their actions and feel responsible for these consequences, females exhibit more helping behavior and altruism, than males do.

Therefore, in predicting beliefs and behavioral intention about global climate change, a gender-sensitive perspective is taken-up in this thesis and gender is accepted as one of the factors.

2.5 Summary of the Literature Review

Previous studies investigating ways to foster sustainable, and particularly climate change related behavior, typically suggest that sustainable behavior is more likely when people have a future time perspective. Individuals are more likely to make sustainable choices when they have a long term perspective rather than a short term. Furthermore, Construal Level Theory (CLT) suggests that a long term focus makes sustainable choices more likely to occur because a long term focus activates more abstract, high level beliefs and values, whereas a short term focus activates more concrete, low level concerns and motivations. Similarly, as review of literature indicates that particularly, individuals who have high level of the consideration of future consequences are more likely to conduct more sustainable-related behaviors. Because being high in consideration of future consequences entails that people take in the potential future outcomes of their behavior into account and therefore, their current behavior is typically more guided by distant or future goals. As literature review indicates, since sustainability-related behaviors are usually identified by immediate costs and delayed sustainable gains, individuals who have high considerations of future consequences are typically more likely to make sustainable

choices. Furthermore, the reason for individuals not considering global climate change as an urgent threat, or making efforts to mitigate climate change, is individuals' thought or belief that their individual actions are unlikely to have any real impact. As literature review suggests, self-efficacy of cooperation is an important factor for motivating individuals to conduct behaviors for mitigation of global climate change. Because, when individuals believe that their cooperative behavior will make a difference in achieving collective wellbeing, they are most likely to cooperate. Furthermore, according to the literature, perceived knowledge about global climate change and general environmental attitudes are the important factors influencing and shaping individuals' beliefs and behavioral intentions about global climate change. Finally, as in all environmental behavior studies, a gender effect has been emphasized in the literature.

To sum up, in the light of finding of previous studies, in this present study, it is expected that gender, perceived knowledge about global climate change, environmental attitudes and future time perspective (as measured by consideration of future consequences) would predict the undergraduate students' beliefs that global climate change is occurring, mainly caused by humans, and will have negative consequences.

In addition, the beliefs that climate change is occurring and is caused by humans are expected to be the predictors of behavioral intention as indicated by previous research. Once a person believes that climate change is occurring, is caused by humans, and will bring about negative consequences, and believes that he/she has knowledge about climate change are expected to lead behavioral intention about climate change. Second, as literature supports, self-efficacy of cooperation, environmental attitudes and future time perspective (as measured by consideration of future consequences) are also expected to be the further predictors of behavioral intention about climate change.

CHAPTER III

METHOD

This chapter presents the research methodology of the study. The content is comprised of information about overall design of the study, study procedure, variables of the study, population and sample, data collection method, data collection instrument, data analysis techniques, reliability and validity analyses, assumptions and limitations of the study, and external and internal validity of the study.

3.1 Design of the Study

The research design of this study is described as quantitative research based on the nature of research questions addressed, description of the sample and population, data collection procedures, statistical techniques used to analyze data, and generalizations of the study findings.

Since the main aim is to explore the relationship between beliefs and behavioral intentions about global climate change, and future time perspective along with other several other variables (i.e, perceived knowledge, environmental attitudes, and self-efficacy of cooperation), this study was designed as an associational type of research. This research method is basically attempted to examine relationships between variables without manipulating them. It is also named as a predictive type of correlational research that is conducted with the purpose of predicting the outcome variable (Fraenkel & Wallen, 2009).

Therefore, in order to analyze the research questions of this study, or to explore the relationship between the above-mentioned variables, quantitative research method, particularly the associational research design (Fraenkel, Wallen, & Hyun, 2011) was used in this study.

The steps followed in the study therefore has been determined in line with the associational research design and presented below:

1. Identifying the problem to be studied.
2. Reviewing the literature related to the topic.
3. Defining the purpose of the study and research questions based on future time perspective theory and previous research in related literature.
4. Setting up the variables of the study.
5. Adaptation of the research design and method.
6. Selecting the population, sampling method and sample of the study.
7. Adapting data collection instrument.
    - Getting necessary permissions from the authors for scale implementation of pre-developed scales, and for Turkish adaptation of Beliefs about Global Climate Change Measure (BGCCM).
    - Translation and adaptation of the BGCCM, and getting expert views for content and face validity.
8. Implementation of the pilot study for the purpose of testing and securing evidence about the validity and reliability of the data collection instrument.
9. Assessment of the pilot study results.
    - Reviewing the instrument for the validity evidence.
    - Conducting factor analyses to explore and confirm factor structures of the scales.
10. Implementation of the main study, in order to explore the relationship between two outcome variables (beliefs and behavioral intention about global climate change) and five predictor variables (future time perspective, perceived knowledge, self-efficacy of cooperation, and environmental attitudes) through four separate hierarchical multiple regression analyses.
    - Collecting data
    - Tabulating responses
11. Analyzing results
12. Presenting findings

Overview of the steps of research design is presented in Figure 3.1.

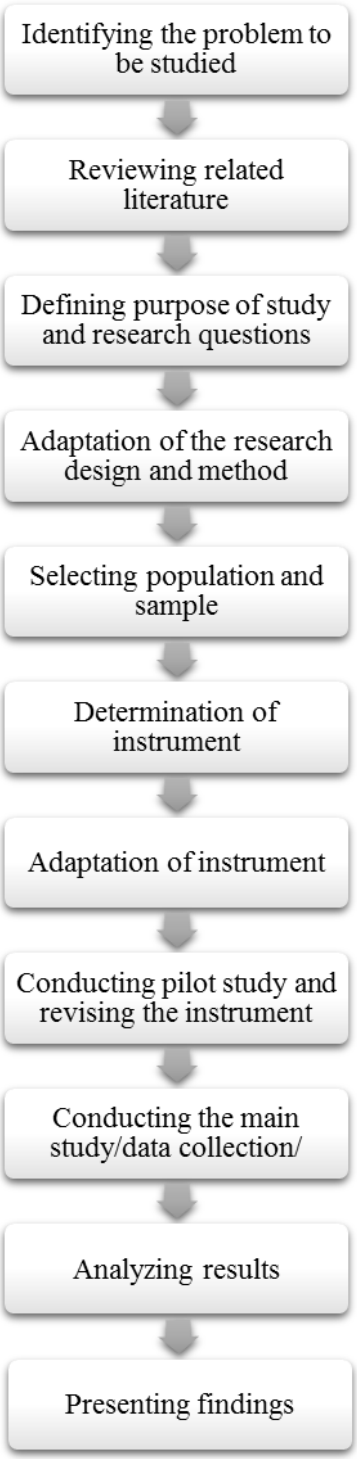


Figure 3.1 Overview of the steps of research design

3.2 Variables of the Study

The variables of this study were determined in accordance with the research questions. Three types of variables (outcome, predictor and control variable) were used in this study and are presented below:

3.2.1 Outcome Variables

Beliefs about global climate change is the first continuous dependent variable and composed of three conceptually different beliefs: (a) the belief that global climate change is occurring, (b) the beliefs about possible causes of global climate change, and (c) the beliefs of possible consequences of global climate change. The level of measurement for these variables is considered as interval.

Behavioral intention to mitigate negative effects of global climate change is the second continuous dependent variable, assessing behavioral intention. The level of measurement for this variable is considered as interval.

3.2.2 Predictor Variables

Self-efficacy of cooperation is a continuous independent variable. The level of measurement for this variable is considered as interval.

Perceived knowledge about causes and effects of global climate change is a continuous independent variable. The level of measurement for this variable is interval.

Environmental attitude is a continuous independent variable consisted of two distinct variables as ecocentrism and anthropocentrism. The level of measurement for this variable is interval.

Future time perspective is a continuous independent variable and measured by the Consideration of Future Consequences Scale. The level of measurement for this variable was considered as interval.

3.2.3 Control Variable

Gender is the control variable nominated as dichotomous variable with categories of male and female. The level of measurement is considered as nominal.

A brief information about the variables, type, definition and references is given in Table 3.1.

3.3 Population and Sample

The target population of the study was all undergraduate students in Turkey. However, it is appropriate to define an accessible population since it is not possible to come into contact with this target population. The accessible population was determined as all undergraduate students at Middle East Technical University (METU) in Ankara, therefore, it is the population which the results of the study were generalized.

METU is one of the largest and the most prestigious universities in Turkey (www.metu.edu.tr). Although it is located in Ankara, not only the students from Ankara but also those living different cities in seven geographical regions all over Turkey study at METU. According to a research on METU students' profile conducted in 2014, 46.6% of METU students is from the Central Anatolian Region, 20.6 of them is from the Marmara Region, 12.0% of them is from the Aegean Region, 9.8% of them from the Mediterranean Region, 1.9% of them from Eastern Anatolian Region, and 1.9% of them from Southeastern Anatolian Region (METU, 2014). Therefore, METU undergraduate students were chosen as the accessible population of this study, because they might be considered as representative of all university students in Turkey in terms of geographical regions.

Table 3.1 Definitions and Types of the Variables with References

Variable	Type	Definition	Reference
Beliefs about GCC	Outcome variable	- Belief that GCC is occurring - Belief that GCC is mainly due to human activities - Belief that GCC has negative consequences	Heath & Gifford, 2006
Behavioral intention about GCC	Outcome variable	Intention to take action against GCC	Heath & Gifford, 2006
Perceived knowledge	Predictor variable	Individual perception of having knowledge about causes and effects of GCC	Heath & Gifford, 2006
Self-efficacy of cooperation	Predictor variable	Belief in one's cooperative behavior has a significant effect on the outcome of a large group	Kerr, 1996 Heath & Gifford, 2006
Ecocentric attitude	Predictor variable	Attitude that values on all living organisms and their natural environment, regardless of their perceived usefulness or importance to human beings	Thompson & Barton, 1994
Anthropocentric attitude	Predictor variable	Attitude that values human beings as the most important feature of the universe, and values the natural environment because of its perceived usefulness or importance to human beings	Thompson & Barton, 1994
Future time perspective	Predictor variable	Ability to plan for and achieve future goals and to consider the future implications of one's actions.	Strathman et al., 1994

Note. *GCC: Global Climate Change*

The undergraduate programs of METU are offered by totally 37 departments under 5 faculties. In order to reflect the departmental and grade level diversity in the sample of the study, the students taking elective courses were chosen intentionally, as these courses are open for all students from different departments and at different grade levels.

The undergraduate students were selected as the participants of this study because, as the future professionals such as teachers, doctors, civil servants and engineers they will teach children, support civil society, and make important decisions which affect entire societies. Hence, it was deemed important to explore the undergraduate students' beliefs and behavioral intention about the global climate change.

The method used for sampling is convenience sampling method, as volunteer undergraduate students were selected because of their availability for the study and proximity to the researcher (Fraenkel & Wallen, 2009). This sampling method is advantageous because the data can be collected in a relatively fast and inexpensive way as compared to probability sampling methods. However, this method has some risks as the sample might not be representative of the population as a whole and could be biased by volunteers (Fraenkel & Wallen, 2009).

The sample of the main study consists of 1580 undergraduate students who are enrolled in totally 5 faculties of METU. The demographic information on gender, department, faculty and grade level for the population and the sample in pilot and main studies are presented in the result chapter of this study.

3.4 Data Collection Procedure

The method used for data collection in this study is survey data collection. According to Fraenkel and Wallen (2009) survey data collection method is used to gather information about population to learn about their characteristics, thoughts, ideas, opinions, attitudes, or former experiences. This method enables researcher to describe and draw conclusions from frequency counts and other types of analysis by means of administering questionnaires. This type of data collection design is

advantageous in gathering data quickly and easily on many variables from a large group of subjects. On the other hand, as the survey was administered at single point in time the findings of study may only present the state-of-art of the target population at the time when the survey was administered.

Firstly, the permission of the Middle East Technical University Human Subjects Ethics Committee was obtained in order to collect the data (see Appendix B).

The pilot study was carried out in order to test the validity and reliability of the instruments during the summer school held in July of 2014. A total of 197 voluntary undergraduate students participated in the pilot study.

In the light of the results proposed in validity and reliability analyses, the main study was conducted. The data were collected between September and November of 2014. A total of 1580 voluntary undergraduate students participated in the main study.

Both pilot and main study were conducted in classroom environment under standard conditions. All undergraduate students filled out the questionnaire on voluntary basis, and all the data were collected by the researcher. It took students approximately 10 minutes to complete the entire questionnaire. The undergraduate students were informed about purpose of the study. All students were instructed to fill out the questionnaire individually, without talking to classmates. Confidentiality of the responses was assured in addition to informing the undergraduate students about the voluntary nature of the participation in the study.

3.5 Data Collection Instrument

In accordance with the data collection method of the study described in previous section, a self-administered questionnaire was used as the data collection instrument. The title of the scale is the *Future Perspective Related Beliefs and Behavioral Intention about Global Climate Change Scale* (see Appendix A). It is a paper and pencil measure and contains a total of 63 closed-ended questions under four distinct dimensions. Each dimension, however, consists of a scale: The first dimension is the *demographic form* consisting of four questions to provide information about

students' gender, age, department and grade level. The second dimension contains the Turkish version of the *Beliefs about Global Climate Change Measure (BGCCM)*. The third dimension consists of the Turkish version of *Environmental Attitude Scale (EAS)*, and the last dimension contains the Turkish version of the *Consideration of Future Consequences Scale (CFCS)*. Each dimension is explained in detail in the following sections. The dimensions, number of items, and the research questions answered through the relevant scales are given in Figure 3.2., and Table 3.2.

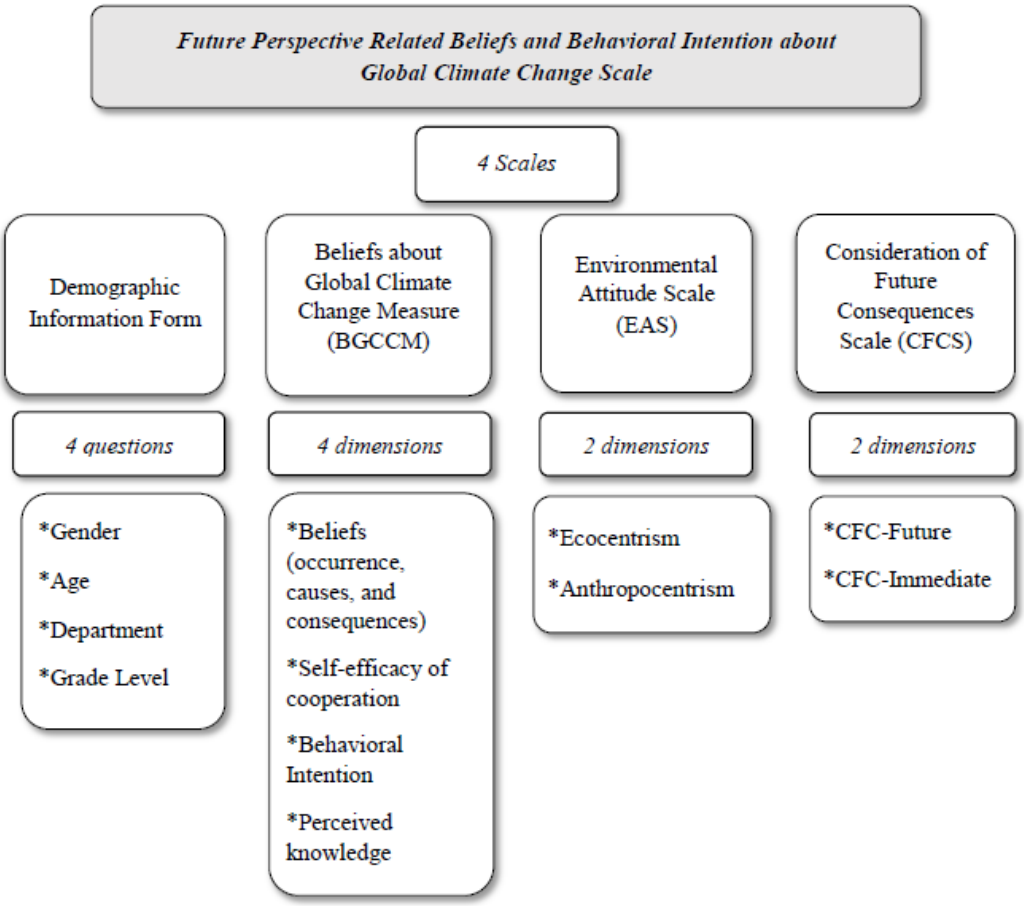


Figure 3.2 Future Perspective Related Beliefs and Behavioral Intention about Global Climate Change Scale: Four Constituent Scales with Dimensions

Table 3.2 Future Perspective Related Beliefs and Behavioral Intention about Global Climate Change Scale: Dimensions and Related Research Questions

SCALES/DIMENSIONS	ITEMS	Research Questions
1. Demographic Information Form	**4**	–
2. Beliefs about Global Climate Change (BGCC)	**23**	RQ1-RQ4
2.1. Belief about occurrence	6	RQ1, RQ4
2.2. Belief about causes	4	RQ2, RQ4
2.3. Belief about consequences	4	RQ3, RQ4
2.4. Self-efficacy of cooperation	4	RQ5
2.5. Intention to act	4	RQ5, RQ6
2.6. Perceived knowledge	1	RQ1-RQ3, RQ5
3. Environmental Attitudes (EA)	**22**	
3.1. Ecocentrism	12	RQ1-RQ3, RQ5
3.2. Anthropocentrism	10	RQ1-RQ3, RQ5
4. Consideration of Future Consequences (CFC)	**14**	RQ4, RQ6
4.1. CFC- Future	7	RQ4, RQ6
4.2. CFC-Immediate	7	RQ4, RQ6

** RQ: Research Question*

3.5.1 Demographic Information Form

Demographic information form consists of four questions designed to acquire the knowledge about gender, age, department and grade level of the Turkish undergraduate students of this study.

3.5.2 Beliefs about Global Climate Change Measure (BGCCM)

Turkish university students' belief about global climate change was measured by the Beliefs about Global Climate Change Measure (BGCCM). The scale, originally developed by Heath and Gifford (2006), was used as the second dimension for the *Future Perspective Related Beliefs and Behavioral Intention about Global Climate Change Scale* of the current study. The original version of BGCCM was developed as a self-report questionnaire by Heath and Gifford in 2006 with the purpose of measuring the beliefs about global climate change. Within the scope of this study, the scale was adapted into Turkish by the researcher as to be the second dimension for

the scale to measure future perspective related beliefs and behavioral intention about global climate change. BGCCM contains a total of 23 questions under six dimensions, and the responses for all questions are given in five-point Likert format ranged from 1 (strongly disagree or very unlikely, depended on the wording of the question) to 5 (strongly agree or very likely).

Beliefs about global climate change were measured with regard to three different beliefs: a) the belief about the occurrence of global climate; (b) the belief about the causes of global climate change; and (c) the belief of its consequences. Hence, these three beliefs constitute the first three dimensions of BGCCM. The dimensions of BGCCM are presented below:

1. *The belief about the occurrence of global climate change* was measured with a set of six items. The mean scores are obtained out of 5 by taking mean of 6 items.

2. *The belief about the causes of global climate change* was assessed with a set of four items. The mean scores are obtained out of 5 by taking mean of 4 items.

3. *The belief about the consequences of global climate change* was assessed with a set of four items. The mean scores are obtained out of 5 by taking mean of 4 items.

4. *Self-efficacy of cooperation* was measured using four items and the mean scores are obtained out of 5 by taking mean of 4 items.

5. *Behavioral intention* to take action to address negative effects of global climate change was measured using four items. The mean scores are obtained out of 5 by taking mean of 4 items.

6. *Perceived knowledge about climate change* was measured by asking the following question: “I would say my technical knowledge about global climate change is” minimal, limited, moderate, extensive, and professional. It was coded from 1 to 5.

Reliability values reported for the original scale by Heath & Gifford (2006) and those found in this study are presented in Table 3.3. Sample items for each dimension of the scale are given in Table 3.4.

Table 3.3 Future Perspective Related Beliefs and Behavioral Intention about Global Climate Change Scale: Authors and Reliability of the Scales

SCALES/DIMENSIONS	AUTHORS		RELIABILITY	
	Original	Turkish Adaptation	Original/TR adaptation	Current Study
2.Beliefs about Global Climate Change Measure (BGCCM)	Heath & Gifford, 2006	Ates, 2014		
2.1. Belief about occurrence			.87*	.84
2.2. Belief about causes			.92*	.78
2.3. Belief about consequences			.82*	.73
2.4. Self-efficacy of cooperation			.80*	.73
2.5. Behavioral intention			.89*	.86
2.6. Perceived knowledge***			–	–
3. Environmental Attitudes Scale (EAS)	Thompson & Barton, 1994	Eryigit, 2010		
3.1. Ecocentrism			.78* .85**	.86
3.2. Anthropocentrism			.67* .73**	.76
4. Consideration of Future Consequences Scale (CFCS)	Joireman, Shaffer, Balliet, & Strathman, 2012	Cinan & Dogan, 2013	.82**	.87
4.1. CFC- Future			.82*	.82
4.2. CFC-Immediate			.80*	.83

Original, **Turkish adaptation, * No reliability value was reported, as it contains only one question.*

Table 3.4 Sample Items for Beliefs about Global Climate Change Measure (BGCCM) (Turkish adaptation)

2.1. Beliefs about Global Climate Change (BGCC)	Sample Item
i. Beliefs about occurrence of GCC	
	Uzun süredir küresel ısınmanın bazı belirtilerinin farkındayım. (I have already noticed some signs of global warming.)
	Önceki yıllara oranla havanın daha sıcak olduğunu düşünüyorum. (It seems to me that temperature is warmer now than in years before.)
ii. Beliefs about causes of GCC	
	Küresel ısınma temelde insan faaliyetlerinin değil, doğal sebeplerin sonucudur. (Global warming is mainly due to natural causes, not human activity.)
	Küresel ısınmanın temel nedeni insan faaliyetleridir. (The main causes of global warming are human activities.)
iii. Beliefs about consequences of GCC	
	Küresel ısınmanın sonuçları çevre için zararlı olacaktır. (The consequences of global warming will be harmful for the environment.)
	Küresel ısınmanın sonuçları genel olarak olumsuzdan çok olumlu olacaktır. (The consequences of global warming will be more positive than negative overall.)
2.2. Self-efficacy of cooperation	
	Küresel ısınmanın olumsuz etkilerini azaltmak için yapabileceğim çok az şey var. (There is very little I can do to mitigate the negative effect of global warming.)
	Küresel ısınma için bir şeyler yapmayı denesem de, bunların işe yarayacağından şüpheliyim. (Even if I try to do something about global warming, I doubt if it will make any difference.)
2.3. Behavioral intention	
	Küresel ısınmayı durdurmak için harekete geçmeyi planlıyorum. (I plan to take some actions to stop global warming.)
	Küresel ısınmanın olumsuz sonuçlarını azaltmak için çaba göstereceğim. (I will make some efforts to mitigate the negative effects of global warming.)

3.5.2.1 Translation and Adaptation of the Beliefs about Global Climate Change Measure (BGCCM)

As the original scale was in English, the following steps were followed for adaptation of the scale into Turkish.

Firstly, after obtaining consent from the authors (Dr. Heath and Professor Gifford) via e-mail, the questionnaire was translated and adapted into Turkish by the researcher of the current study and the dissertation supervisor. Secondly, to establish face and content validity of the instrument, the original and translated items were submitted to the expert opinions. The Turkish version of the questionnaire was controlled in terms of clarity and the meanings of the items by a professor of science education having expertise on education for sustainable development; an associate professor having PhD degree in Environmental Engineering, specialization in sustainability and climate change education, and UNESCO Man and Biosphere Program Committee member; and an associate professor of science education specialized in educational research methods and statistics. Each items was evaluated and revised by the researcher and dissertation supervisor jointly in accordance with the experts' views. This helped to eliminate ambiguities in items, unfamiliar terms and consider the relevancy of items for Turkish social and cultural context. Finally, one instructor from the Department of Foreign Languages checked the adaptation of the questionnaire into Turkish before it was piloted. After the last revision of the instrument was completed, it was piloted.

3.5.2.2 Exploratory Factor Analysis of BGCCM in the Pilot Study

For the construct validity of the BGCCM, the first scale of the data collection instrument, exploratory factor analysis (EFA) was conducted in two stages: 1.Factor extraction, and 2. Factor rotation (Green and Salkind, 2005). For the first stage, principal axis factoring technique (PAF) was conducted in order to decide about the number of factors. In the second sage, factors were rotated with an oblique rotation to make meaningful interpretations for the dimensions.

Prior to performing the above-mentioned analysis, the data were checked in order to identify the erroneous entries; minimum and maximum values, frequencies of variables were skimmed and erroneous entries were not found; and six items (Item 11, 12, 14, 17, 18, 20 and 24) were reverse-coded.

Assumptions of EFA

Assumptions of exploratory factor analysis were checked. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was found as .85, which was met the criteria of being greater than .60 (Hair et al., 2006). In addition, Barlett's Test of Sphericity resulted in a significant value (χ^2 (231) =1803.40, *p=.00*) and this indicated that correlation matrix was significantly different from an identity matrix, i.e., none of the correlations between the items were zero (Tabachnick & Fidell, 2007).

EFA

Principal axis factoring technique was used for the extraction of the factors, referring to Fabrigar, Wegener, MacCallum, and Strahan's (1999) suggestion that it is a more robust factor extraction technique against the violation of the assumption of multivariate normality. Oblique rotation was used as a rotational method to make the interpretation of the analysis easier. Oblique rotation (direct oblimin) was preferred since this method allows for factor correlation (Preacher & MacCallum, 2003). The extraction was made on eigenvalue> 1, scree plot, and percentage of variance (Tabachnick & Fidel, 2007).

Resulted Factor Structure

The oblique rotation resulted in five factor structure which explained 62.82% of the total variance related to beliefs about global climate change. The scree plot indicated a sharp break after the fifth point; therefore, a five factor structure was used to describe the beliefs on global climate change dimensions held by the Turkish university students. Factor loading of the items is presented in Table 3.5 and the eigenvalues, percentages of variance and cumulative percentages for factors are given in Table 3.6.

These five factors suggested by the results of factor analysis were similar to the factors in the original scale. According to factor analysis results, it was not necessary to eliminate any item from the scale. However, Item 17 "Global warming is merely a natural fluctuation, not caused by human activity" ("*Küresel ısınma tamamen doğal nedenlerden kaynaklanan bir sıcaklık dalgalanmasıdır"*) that was under "belief about causes dimension" in the original scale, loaded on "belief about consequences" dimension. When the original and translated item wording were compared in scrutiny, it was seen that the Turkish translation implied a consequence of global climate change. Therefore, it was decided to change the wording of the item and it was re-paraphrased as "*Küresel ısınma doğal nedenlerden kaynaklanmaktadır*" for the main study.

Table 3.5 Factor Loadings for Beliefs about Global Climate Change Measure (BGCCM)

	Factors				
Item No	1	2	3	4	5
16	**.745**				
21	**.725**				
26	**.623**				
12 (R)	**.432**				
14 (R)		**-.655**			
18 (R)		**-.609**			
25		**-.498**			
23		**-.357**			
9			**-.867**		
6			**-.767**		
8			**-.701**		
7			**-.700**		
10			**-.472**		
5			**-.357**		
24(R)				**.817**	
22				**.565**	
17 (R)				**.495**	**.361**
20 (R)				**.398**	
15				**.382**	
13					**.886**
11 (R)					**.774**
19					**.511**

Note. (R) = Reversed Item n=197, items are listed according to their loadings.

Table 3.6 Eigenvalues, Percentages of Variance and Cumulative Percentages for Factors of the Beliefs about Global Climate Change Measure (BGCCM)

Factor	Eigenvalue	% of variance	Cumulative %
1	6.84	31.11	31.11
2	2.56	11.67	42.78
3	2.01	9.14	51.93
4	1.35	6.16	58.09
5	1.04	4.72	62.82

3.5.2.3 Confirmatory Factor Analysis of BGCCM in the Pilot Study

Confirmatory factor analysis (CFA) is and advanced technique used in higher order levels of research in order to test the model proposed by EFA regarding latent variables (Tabachnick & Fidell, 2007). Proposed model in EFA was further tested with confirmatory factor analysis (CFA) in order to test five-factor structure of the beliefs about global climate change scale and to ensure the construct validity of the scale. CFA was conducted by using Analysis of Moment Structures (AMOS) 22 software program. The percentage of missing values less than 5%; therefore, they were replaced with mean scores.

Brown's (2006) recommendations were referred to assess the model fit. The model chi-square, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI) and Non-Normed Fit Index (NNFI) values were taken into consideration while evaluating the fit for five-factor CFA model of BGCCM.

However, the chi-square test is sensitive to sample size in that as sample size increases (generally above 200), the χ^2 statistics has a tendency to indicate a significant probability level (Schumacker & Lomax, 2004; Tabachnick & Fidell, 2007). As chi-square was not an appropriate goodness-of-fit criterion, other fit indices of RMSEA, NNFI and CFI were used to compensate the limitations caused by the chi-square test (Byrne, 2001).

As presented in Table 3.7, the results of CFA showed that chi-square value was significant (χ^2= 380.872, *df*=199, *p*= .00) with the comparative fit index (CFI) value of .89, non-normed fit index (NNFI) value of .89, and root mean square error of approximation (RMSEA) value of .07. According to Kline (2005) NNFI values

falling between 0.94 and 0.90 are considered as acceptable fit; and CFI value should be .95 and above for acceptable fit. RMSEA values between .05 and .08 considered as acceptable fit (Hair et al., 2010). As the criterion values of CFI, NNFI and RMSEA were taken into consideration, the CFA indicated acceptable model fit (Browne & Cudeck, 1993).

Table 3.7 CFA Results for the Beliefs about Global Climate Change Measure (BGCCM)

Scale	χ^2	*df*	χ^2/df	RMSEA	CFI	NNFI
BGCCM	380.872	199	1.914	.07	.89	.89

3.5.2.4 Reliability Analysis of BGCCM in the Pilot Study

In order to test the internal consistency of the Turkish-adapted BGCCM, the first scale of the data collection instrument, reliability analysis was conducted. The reliability analysis yielded sufficient Cronbach alpha coefficients for the five factor model of beliefs about global climate change. Information regarding reliability coefficients of BGCCM factors and related items are presented in Table 3.8.

The overall reliability of BGCCM with 22 items was .88 as indicated by the Cronbach alpha coefficient.

Table 3.8 Reliability Coefficients of the Beliefs about Global Climate Change Measure (BGCCM) with respect to Factors and Related Items

	Reliability	*Alpha If Item Deleted*
Belief about occurrence	.83	
Item 5		.83
Item 6		.78
Item 7		.80
Item 8		.80
Item 9		.76
Item 10		.81
Belief about causes	.81	
Item 11		.75
Item 13		.72
Item 17		.80
Item 19		.76

Table 3.8 (continued)

Belief about consequences	.69	
Item 15		.62
Item 20		**.71**
Item 22		.61
Item 24		.58
Self-efficacy of cooperation	.75	
Item 14		.70
Item 18		.70
Item 23		.72
Item 25		.66
Intention to act	.81	
Item 12		.81
Item 16		.75
Item 21		.76
Item 26		.75

3.5.2.5 Confirmatory Factor Analysis of BGCCM in the Main Study

Further to EFA and CFA with the data in the pilot study, CFA was conducted with the data in the main study in order to test five-factor structure of BGCCM and to ensure the construct validity of the scale. The percentage of missing values was less than 5%; therefore, they were replaced with mean scores.

Brown's (2006) recommendations were referred to assess the model fit. The model chi-square, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI) and Non-Normed Fit Index (NNFI) values were taken into consideration while evaluating the fit for five factors CFA model of BGCCM.

However, the chi-square test is sensitive to sample size in that as sample size increases (generally above 200), the χ^2 statistics has a tendency to indicate a significant probability level (Schumacker & Lomax, 2004; Tabachnick & Fidell, 2007). Since the sample size of this study was large, chi-square was not an appropriate goodness-of-fit criterion, hence it was not considered in the current study and other fit indices of RMSEA, NNFI and CFI were used to compensate the limitations caused by the chi-square test (Byrne, 2001).

As presented in Table 3.9, the results of CFA showed that chi-square value was significant (χ^2= 782.866, *df*=195, *p*= .00) with the comparative fit index (CFI) value of .95, non-normed fit index (NNFI) value of .94, and root mean square error of approximation (RMSEA) value of .04. As the criterion values of CFI, NNFI and RMSEA were taken into consideration, the CFA indicated a good model fit (Browne & Cudeck, 1993).

Browne and Cudeck (1993) reported that the RMSEA of about .05 indicates a close fit of the model and of .08 represents reasonable error of approximation. They suggested not using a model with a RMSEA greater than .10. With this sample of undergraduate students, the RMSEA was found to be .04, indicating good fit. Therefore, CFA results added further evidence on the construct validity of BGCCM.

Table 3.9 CFA Results for the Beliefs about Global Climate Change Measure (BGCCM)

Scale	χ^2	*df*	χ^2/df	RMSEA	CFI	NNFI
BGCCM	782.866	195	4.014	.04	.95	.94

3.5.2.6 Reliability Analysis of BGCCM in the Main Study

In order to test the internal consistency of the Turkish-adapted BGCCM, the first scale of the data collection instrument, reliability analysis was conducted in the main study. The reliability analysis yielded sufficient Cronbach alpha coefficients for the five factor model of beliefs about global climate change. Information regarding reliability coefficients of BGCCM factors and related items are presented in Table 3.10. For the main study, the overall reliability of BGCCM with 22 items was .90 as indicated by the Cronbach alpha coefficient.

Table 3.10 Reliability Coefficients of the Beliefs about Global Climate Change Measure (BGCCM) Factors and Related Items

	Reliability	*Alpha If Item Deleted*
Belief about occurrence	.84	
Item 5		.81
Item 6		.79
Item 7		.83
Item 8		.82
Item 9		.78
Item 10		.83
Belief about causes	.78	
Item 11		.72
Item 13		.77
Item 17		.69
Item 19		.70
Belief about consequences	.73	
Item 15		.73
Item 20		.61
Item 22		.65
Item 24		.68
Intention to act	.86	
Item 12		.84
Item 16		.81
Item 21		.81
Item 26		.81
Self-efficacy of cooperation	.73	
Item 14		.66
Item 18		.63
Item 23		.71
Item 25		.61

3.5.3 Environmental Attitudes Scale (EAS)

In this study, the environmental attitudinal orientations were measured through the Turkish adaptation of the Environmental Attitudes Scale (EAS) (Thompson & Barton, 1994). Therefore, EAS contributes the third dimension of the *Future Perspective Related Beliefs and Behavioral Intention about Global Climate Change Scale.*

EAS assesses two major opposite types of individuals: Ecocentric individuals value nature for its own sake and believe that nature deserves protection for its intrinsic value. Anthropocentric individuals believe that nature should be protected because of its value in enhancing the quality of life for humans.

Environmental Attitudes Scale was originally developed as a five Likert-type scale to assess participants' eco-centric and anthropocentric attitudes and general apathy toward environmental issues. However, for this study only ecocentric and anthropocentric items were utilized. The internal reliabilities of the three dimensions of the scale assessed with Cronbach's alpha were reported as .78 for eco-centrism and .67 for anthropocentrism (Thompson & Barton, 1994) (Table 3.3).

Ecocentric attitudes are measured with 12 items reflecting the intrinsic value of nature, feelings of relaxation pertaining to being out in nature, and being aware of a connectedness between humans and nature. Anthropocentric attitudes are measured with 10 items emphasizing a concern associated with the decreased quality of human life as a result of environmental degradation.

The scale items are rated on a 5-point Likert scale (1, strongly disagree; 2, disagree; 3, undecided; 4, agree; 5, strongly agree). The mean score for each of the dimensions was generated out of 5. The scale was adapted into Turkish by Eryigit (2010). For the Turkish adapted scales Cronbach's alpha values were reported as .85 for eco-centric attitudes; and .69 for anthropocentric attitudes (Eryigit, 2010) (Table 3.3). Sample items for each dimension of the scale are given in Table 3.11.

Table 3.11 Sample Items for Environmental Attitude Scale (EAS) (Turkish adaptation)

Environmental Attitude	Sample Item
Anthropocentrism	
	Yağmur ormanlarının zarar görmesinin en kötü yanı yeni ilaçların bulunmasını sınırlayacak olmasıdır. (The worst thing about the loss of the rain forest is that it will restrict the development of new medicines.)
	Nehirleri ve gölleri temiz tutmanın en önemli nedenlerinden biri insanlara su sporları yapacakları yerler sağlamaktır. (One of the most important reasons to keep rivers and lakes clean is so that people can have a place to enjoy water sports.)

Table 3.11 (continued)

Ecocentrism	
	Sırf doğada olmak adına, doğal ortamda vakit geçirmekten zevk alırım. (I can enjoy spending time in natural settings just for the sake of being out in nature.)
	İnsanların olduğu kadar bitkilerin ve hayvanların da yaşama hakkı vardır. (Plants, animals have as much right as humans to exist.)

3.5.3.1 Exploratory Factor Analysis of Environmental Attitude Scale (EAS) in the Pilot Study

For the construct validity of EAS, the second scale of the data collection instrument, exploratory factor analysis was performed in two stages: 1. Factor extraction and 2.Factor rotation (Green and Salkind, 2005). In the first stage, principal axis factoring technique (PAF) was used in order to decide about the number of factors. In the second sage, factors were rotated with an oblique rotation to make meaningful interpretations for the dimensions. Oblique rotation (direct oblimin) was preferred since this method allows for factor correlation (Preacher & MacCallum, 2003).

Prior to performing the above-mentioned analysis, the data were checked in order to identify the erroneous entries; minimum, maximum values and frequencies of variables were skimmed, and erroneous entries were not found.

Assumptions of EFA

Assumptions of exploratory factor analysis were checked. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was found as .89, which was met the criteria of being greater than .60 (Hair et al., 2006). In addition, Barlett's Test of Sphericity resulted in a significant value (χ^2 (231) =1572.084, *p=.00*) and this indicated that correlation matrix was significantly different from an identity matrix, i.e., none of the correlations between the items were zero (Tabachnick & Fidell, 2007).

EFA

Principal axis factoring technique was used for the extraction of the factors, referring to Fabrigar, Wegener, MacCallum, and Strahan's (1999) suggestion that it is a more robust factor extraction technique against the violation of the assumption of multivariate normality. Oblique rotation was used as a rotational method to make the interpretation of the analysis easier. Oblique rotation (direct oblimin) was preferred since this method allows for factor correlation (Preacher & MacCallum, 2003).

Resulted Factor Structure

In the first analysis, the extraction was made on eigenvalue> 1, scree plot, and percentage of variance (Tabachnick & Fidel, 2007). The initial factor analysis suggested five dimensions which account for 58.81 % of the total variance. However, this structure was not compatible with Thompson and Barton's analysis of EAS. Therefore, the extraction was forced for two factors. The results suggested that two dimensions account for 40.69% of the total variance. When the number of factors was fixed at two, the first factor included 12 items, explaining 26.23% of the variance. The second factor included 10 items, and explained 14.46% of the variance as presented in the structure matrix in Table 3.12. The eigenvalues, percentages of variance and cumulative percentages for factors are given in Table 3.13.

Therefore, it was decided to carry out CFA with the data from a much larger population in the main study to further examine the factor structure of Environmental Attitudes Scale (EAS).

Table 3.12 Factor Loadings for Environmental Attitudes Scale (EAS)

	Factors	
Item No	1	2
42	**.790**	
36	**.758**	
34	**.698**	
29	**.650**	
47	**.581**	
33	**.574**	
53	**.565**	
44	**.532**	
31	**.500**	
38	**.447**	
52	**.442**	
28	**.409**	
37		**.666**
35		**.630**
45		**.599**
49		**.585**
40		**.483**
48		**.447**
30		**.447**
50		**.427**
43		**.392**
32		**.365**

Note. n=197, items are listed according to their loadings.

Table 3.13 Eigenvalues, Percentages of Variance and Cumulative Percentages for Factors of the Environmental Attitudes Scale (EAS)

Factor	Eigenvalue	% of variance	Cumulative %
1	5.77	26.24	26.24
2	3.18	14.47	40.69

3.5.3.2 Reliability Analysis of EAS in the Pilot Study

In order to test the internal consistency of the Turkish-adapted EAS, the second scale of the data collection instrument, reliability analysis was conducted. The reliability analysis yielded sufficient Cronbach alpha coefficients for the two factor model of environmental attitudes. Information regarding reliability coefficients of EAS factors and related items are presented in Table 3.14. For the pilot study, the reliability

coefficient values were found as .85 for ecocentric attitudes; and .78 for anthropocentric attitudes.

Table 3.14 Reliability Coefficients of the Environmental Attitudes Scale (EAS) with respect to Factors and Related Items

	Reliability	*Alpha If Item Deleted*
Ecocentric Attitudes	**.85**	
Item 28		.85
Item 29		.84
Item 31		.84
Item 33		.84
Item 34		.83
Item 36		.83
Item 38		.85
Item 42		.83
Item 44		.84
Item 47		.84
Item 52		.84
Item 53		.84
Anthropocentric Attitudes	**.78**	
Item 30		.77
Item 32		.77
Item 35		.75
Item 37		.74
Item 40		.76
Item 43		.77
Item 45		.74
Item 48		.76
Item 49		.76
Item 50		.76

3.5.3.3 Confirmatory Factor Analysis of EAS in the Main Study

Further to EFA with the data in the pilot study, CFA was conducted with the data in the main study in order to test two-factor structure of environmental attitudes and to ensure the construct validity of the scale. The percentage of missing values was less than 5%; therefore, they were replaced with mean scores.

Brown's (2006) recommendations were referred to assess the model fit. The model chi-square, Root Mean Square Error of Approximation (RMSEA), Comparative Fit

Index (CFI) and Non-Normed Fit Index (NNFI) values were taken into consideration while evaluating the fit for two factors CFA model of Environmental Attitudes.

However, the chi-square test is sensitive to sample size in that as sample size increases (generally above 200), the χ^2 statistics has a tendency to indicate a significant probability level (Schumacker & Lomax, 2004; Tabachnick & Fidell, 2007). Since the sample size of this study was large, chi-square was not an appropriate goodness-of-fit criterion, hence it was not considered in the current study and other fit indices of RMSEA, NNFI and CFI were used to compensate the limitations caused by the chi-square test (Byrne, 2001).

As presented in Table 3.15, the results of CFA showed that chi-square value was significant (χ^2= 1878.586, *df*=199, *p*= .00) with the comparative fit index (CFI) value of .85, non-normed fit index (NNFI) value of .82, and root mean square error of approximation (RMSEA) value of .07. As the criterion values of CFI, NNFI and RMSEA were taken into consideration, the CFA indicated an acceptable model fit (Browne & Cudeck, 1993). Therefore, CFA results added further evidence on the construct validity of EAS.

Table 3.15 CFA Results for the Environmental Attitudes Scale (EAS)

Scale	χ^2	*df*	χ^2/df	RMSEA	CFI	NNFI
EAS	1878.586	199	.82	.07	.85	.82

3.5.3.4 Reliability Analysis of EAS in the Main Study

In order to test the internal consistency of the Turkish-adapted EAS, the second scale of the data collection instrument, reliability analysis was conducted. The reliability analysis yielded sufficient Cronbach alpha coefficients for the two factor model of environmental attitudes. Information regarding reliability coefficients of EAS factors and related items are presented in Table 3.16. For the main study, the reliability coefficient values were found as .86; ecocentric attitudes; and .76 for anthropocentric attitudes.

Table 3.16 Reliability Coefficients of the Environmental Attitudes Scale (EAS) Factors and Related Items

	Reliability	*Alpha If Item Deleted*
Ecocentric Attitudes	**.86**	
Item 28		.86
Item 29		.84
Item 31		.85
Item 33		.85
Item 34		.84
Item 36		.84
Item 38		.85
Item 42		.84
Item 44		.85
Item 47		.85
Item 52		.85
Item 53		.85
Anthropocentric Attitudes	**.78**	
Item 30		.74
Item 32		.75
Item 35		.73
Item 37		.72
Item 40		.73
Item 43		.73
Item 45		.72
Item 48		.75
Item 49		.74
Item 50		.74

3.5.4 Consideration of Future Consequences Scale (CFCS)

The Consideration of Future Consequences Scale (CFCS) was designed to measure the degree to which people prefer to construct the future by considering distant versus immediate consequences of potential behaviors and the extent to which behavior is influenced by such perceived outcomes (Strathman et al., 1994).

The scale was developed by Strathman and his colleagues (Strathman et al., 1994) originally as a unidimensional measure with 12 items measured on a five-point scale. The original scale was adapted into Turkish by Cinan and Dogan (2013). Later, the scale was revised (Joireman, Shaffer, Balliet & Strathman, 2012) as a two-factor measure with 14 items (7 items for each dimension) measured on a seven-point scale. In this study, the revised version of the CFCS was used.

The CFCS was used as the fourth dimension of the *Future Perspective Related Beliefs and Behavioral Intention about Global Climate Change Scale*, and it consists of two dimensions as one assessing the concern with future consequences (CFC-Future) and another one assessing the concern with immediate consequences (CFC-Immediate). CFCS comprises 14 items related to future (7 items) and immediate (7 items) consequences of present actions. Responses are on a 7-point scale (1 = very uncharacteristic of me; 7 = very characteristic of me) with reverse scoring of 7 immediate-focused items. The mean sores were obtained out of 7 by taking mean of 14 items. The high score indicated future time perspective and low score indicated present time perspective.

Cronbach's alpha values were reported for CFC-Future dimension as .80; and for CFC-Immediate dimension as .84 (Joireman, Shaffer, Balliet & Strathman, 2012). The Turkish version of the scale's reliability indicated by the Cronbach alpha coefficient was reported as .82 (Cinan & Dogan, 2013) (Table 3.3). Sample items for each dimension are given in Table 3.17.

Table 3.17 Sample Items for Consideration of Future Consequences Scale (CFCS) (Turkish adaptation)

Consideration of Future Consequences	*Sample Item*
CFC-Immediate	
	Geleceğin ne getireceğini düşünmeden, yalnızca anlık ihtiyaçlarım doğrultusunda davranırım. (I consider how things might be in the future, and try to influence those things with my day to day behavior.)
	Gündelik hedeflerim, uzun vadeli hedeflerimden daha önemlidir. (Since my day to day work has specific outcomes, it is more important to me than behavior that has distant outcomes.)
CFC-Future	
	Gelecekte neler olabileceğini düşünürüm ve gündelik davranışlarıma ona göre yön vermeye çalışırım. (I consider how things might be in the future, and try to influence those things with my day to day behavior.)
	Bir karar verirken gelecekte beni ne şekilde etkileyebileceğini düşünürüm. (When I make a decision, I think about how it might affect me in the future.)

3.5.4.1 Exploratory Factor Analysis of CFCS in the Pilot Study

For the construct validity of the Turkish-adapted CFCS, the third scale of the data collection instrument, exploratory factor analysis (EFA) was performed in two stages: 1. Factor extraction and 2. Factor rotation (Green and Salkind, 2005). In the first stage, principal axis factoring technique (PAF) was used in order to decide about the number of factors. In the second phase, factors were rotated with an oblique rotation method to make meaningful interpretations for the dimensions.

Prior to performing the above-mentioned analysis, the data were checked in order to identify the erroneous entries; minimum, maximum values and frequencies of variables were skimmed; and erroneous entries were not found.

Assumptions of EFA

Assumptions of exploratory factor analysis were checked. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was found as .89, which was met the criteria of being greater than .60 (Hair et al., 2006). In addition, Barlett's Test of Sphericity resulted in a significant value (χ^2 (91) =8048.850, *p=.00*) and this indicated that correlation matrix was significantly different from an identity matrix, i.e., none of the correlations between the items were zero (Tabachnick & Fidell, 2007).

EFA

Principal axis factoring technique was used for the extraction of the factors, referring to Fabrigar, Wegener, MacCallum, and Strahan's (1999) suggestion that it is a more robust factor extraction technique against the violation of the assumption of multivariate normality. Oblique rotation was used as a rotational method to make the interpretation of the analysis easier. Oblique rotation (direct oblimin) was preferred since this method allows for factor correlation (Preacher & MacCallum, 2003). The extraction was made on eigenvalue> 1, scree plot, and percentage of variance (Tabachnick & Fidel, 2007).

Resulted Factor Structure

In the first analysis, the extraction was made on eigenvalue> 1, scree plot, and percentage of variance (Tabachnick & Fidel, 2007). The initial factor analysis

suggested three dimensions which account for 57.89% of the total variance. However, this structure was not compatible with Joireman, Shaffer, Balliet, and Strathman's (2012) analysis of CFCS. Therefore, the extraction was forced for two factors. The results suggested that two dimensions account for 50.26% of the total variance. When the number of factors was fixed at two, the first factor included 7 items, explaining 38.87% of the variance. The second factor included 7 items, and explained 11.4% of the variance as presented in the structure matrix in Table 3.18. The eigen values, percentages of variance and cumulative percentages for factors are given in Table 3.19.

Table 3.18 Factor Loadings for Consideration of Future Consequences Scale (CFCS)

	Factors	
Item No	1	2
66	**.763**	
67	**.755**	
55	**.631**	
54	**.612**	
59	**.518**	
61	**.491**	
60	**.487**	
64		**-.790**
63		**-.675**
62		**-.628**
65		**-.588**
57		**-.517**
56		**-.496**
58		**-.349**

Note. n=197, items are listed according to their loadings.

Table 3.19 Eigenvalues, Percentages of Variance and Cumulative Percentages for Factors of the Consideration of Future Consequences Scale (CFCS)

Factor	Eigenvalue	% of variance	Cumulative %
1	5.44	38.86	38.86
2	1.59	11.399	50.26

3.5.4.2 Reliability Analysis of CFCS in the Pilot Study

In order to test the internal consistency of the Turkish-adapted CFCS, the third scale of the data collection instrument, reliability analysis was conducted. The reliability

analysis yielded sufficient Cronbach alpha coefficients for the two factor model of CFCS. Information regarding reliability coefficients of CFCS factors and related items are presented in Table 3.20. The overall reliability of CFCS with 14 items was .83 as indicated by the Cronbach alpha coefficient.

Table 3.20 Reliability Coefficients of the Consideration of Future Consequences Scale (CFCS) with respect to Factors and Related Items

	Reliability	*Alpha If Item Deleted*
CFC- Future	**.80**	
Item 54		.75
Item 55		.77
Item 59		.78
Item 60		.76
Item 61		.78
Item 66		.75
Item 67		.74
CFC-Immediate	**.80**	
Item 56		.76
Item 57		.75
Item 58		.80
Item 62		.79
Item 63		.77
Item 64		.75
Item 65		.76

3.5.4.3 Confirmatory Factor Analysis of CFCS in the Main Study

Further to EFA with the data in the pilot study, CFA was conducted with the data in the main study in order to test two-factor structure of CFCS and to ensure the construct validity of the scale. The percentage of missing values was less than 5%; therefore, they were replaced with mean scores.

Brown's (2006) recommendations were referred to assess the model fit. The model chi-square, Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI) and Non-Normed Fit Index (NNFI) values were taken into consideration while evaluating the fit for two factors CFA model of CFCS.

However, the chi-square test is sensitive to sample size in that as sample size increases (generally above 200), the χ^2 statistics has a tendency to indicate a

significant probability level (Schumacker & Lomax, 2004; Tabachnick & Fidell, 2007). Since the sample size of this study was large, chi-square was not an appropriate goodness-of-fit criterion, hence it was not considered in the current study and other fit indices of RMSEA, NNFI and CFI were used to compensate the limitations caused by the chi-square test (Byrne, 2001).

As presented in Table 3.21, the results of CFA showed that chi-square value was significant (χ^2= 323.146, *df*=60, *p*= .00) with the comparative fit index (CFI) value of .97, non-normed fit index (NNFI) value of .96, and root mean square error of approximation (RMSEA) value of .05. As the criterion values of CFI, NNFI and RMSEA were taken into consideration, the CFA indicated a good model fit (Browne & Cudeck, 1993). Therefore, CFA results added further evidence on the construct validity of CFCS.

Table 3.21 CFA Results for the Consideration of Future Consequences Scale (CFCS)

Scale	χ^2	*df*	χ^2/df	RMSEA	CFI	NNFI
CFCS	323.146	60	5.38	.05	.97	.96

3.5.4.4 Reliability Analysis of CFCS in the Main Study

In order to test the internal consistency of the Turkish-adapted CFCS, the third scale of the data collection instrument, reliability analysis was conducted. The reliability analysis yielded sufficient Cronbach alpha coefficients for the two factor model of CFCS. Information regarding reliability coefficients of CFCS factors and related items are presented in Table 3.22. For the main study, the overall reliability of CFCS with 14 items was .87 as indicated by the Cronbach alpha coefficient.

Table 3.22 Reliability Coefficients of the Consideration of Future Consequences Scale (CFCS) Factors and Related Items

	Reliability	*Alpha If Item Deleted*
CFC- Future	**.82**	
Item 54		.79
Item 55		.79
Item 59		.80
Item 60		.79
Item 61		.80
Item 66		.78
Item 67		.78
CFC-Immediate	**.82**	
Item 56		.79
Item 57		.80
Item 58		**.84**
Item 62		.81
Item 63		.79
Item 64		.78
Item 65		.79

In conclusion, the above-stated results of the reliability and confirmatory factor analyses conducted in the main study suggested further evidence that the scales of data collection instrument are valid and reliable.

3.6 Data Analysis Procedure

In this study, mainly two types of statistical techniques were used to analyze the data collected from undergraduate students at METU: descriptive statistics and inferential statistics. The statistical analyses of the study were performed by IBM Statistics Package for the Social Sciences, SPSS 22 and IBM Analysis of Moment Structures, AMOS 22 software programs.

3.6.2 Descriptive Statistics

Descriptive statistics was used in order to check the accuracy of the data entry and existence of any missing data. No incorrect entry or no missing value exceeding 5% was detected in the data.

In addition, in order to present the overall picture of the demographic characteristics of undergraduate students at METU, the frequency, percentage, mean, standard deviation calculations were conducted through descriptive statistics.

Thirdly, in order to explore the beliefs and behavioral intentions about global climate change, individual differences in terms of environmental attitudes and future time perspective of the Turkish undergraduate students, the means, standard deviations, and minimum and maximum values of the variables were calculated by means of descriptive statistics.

Finally, descriptive statistics were used in order to check the assumptions of hierarchical multiple regression analysis.

3.6.3 Inferential Statistics

Inferential statistics were utilized in order to answer the research questions of the current study. As the purpose of the study was to investigate whether the future time perspective would have unique role over and above the several other variables in predicting the beliefs and behavioral intention about global climate change, multiple regression analyses were conducted. By means of multiple regression analysis, researchers are able to explore correlation between a criterion variable and the best combination of two or more predictor variables (Fraenkel & Wallen, 2009). Among the three methods of multiple regression, hierarchical multiple regression procedure was preferred as the researcher can choose in which order to enter the predictor variables into the model.

Therefore, three separate hierarchical multiple regression analyses were carried out for three beliefs about global climate change (i.e., belief about occurrence, causes and effects of global climate change). The variables, as stated in the Table 3.23, were entered in three blocks for each of three beliefs.

In addition, a fourth hierarchical multiple regression analysis was employed for the behavioral intention to act against global climate change (Table 3.24). The control variable, gender was the first block variable in each of the regression analyses.

Table 3.23 Predictors for Beliefs about Global Climate Change

Predictors for belief about occurrence of global climate change
Block 1
Gender
Block 2
Perceived knowledge
Ecocentric attitude
Anthropocentric attitude
Block 3
Future time perspective
Predictors for belief about causes of global climate change
Block 1
Gender
Block 2
Perceived knowledge
Ecocentric attitude
Anthropocentric attitude
Block 3
Future time perspective
Predictors for belief about consequences of global climate change
Block 1
Gender
Block 2
Perceived knowledge
Ecocentric attitude
Anthropocentric attitude
Block 3
Future time perspective

Table 3.24 Predictors for Behavioral Intention to Mitigate Global Climate Change

Block 1
Gender
Block 2
Perceived knowledge
Ecocentric attitude
Anthropocentric attitude
Belief about occurrence of GCC
Belief about causes of GCC
Belief about consequences of GCC
Self-efficacy of cooperation
Block 3
Consideration of future consequences
Consideration of immediate consequences

3.7 Reliability and Validity Analyses

To test the construct validity of survey instruments, for the scale that was newly adapted in Turkish for this study, exploratory and confirmatory factor analyses were conducted in the pilot study, and then, confirmatory factor analysis (CFA) was carried out in the main study. For the scales which were formerly adapted into Turkish and implemented to the Turkish population by other researchers, CFA analyses were also employed for further validation purposes in the main study. Exploratory and Confirmatory Factor Analyses of the scales ensured construct evidence.

To ensure the face validity and content validity of BGCCM, three experts in the field and one English language expert were consulted during the Turkish translation process of the BGCCM.

Additionally, correlation between the dimensions of the adapted BGCCM was checked, based on which it was concluded that the dimensions within BGCCM scale are related constructs while measuring different dimensions (Table 4.7). Also, correlations between BGCCM and the other scales in the instrument were checked, and discriminant validity yielded that pre-developed scales used in the instrumentation and the newly-adapted BGCCM were different but related while measuring different constructs.

Finally, cronbach's alpha values (Table 3.3) were checked to provide reliability related evidence.

3.8 Assumptions and Limitations of the Study

The assumptions and limitations which were taken into consideration within the scope of this study are explained at the following sections.

3.8.1 Assumptions of the Study

1. The administration of the measuring instruments was carried out under standard conditions.

2. Participants of the study reported their ideas in an honest and accurate manner, and answered the questions of the scales sincerely.

3. The study participants did not interact with each other during the administration of instrument.

4. The characteristics of sample of the study were assumed to be representative of the population.

3.8.2 Limitations of the Study

The current research study has some limitations to take into account in any attempt to generalize the results.

1. The results of the study are limited to the sample inclusion. Since the data were collected from the undergraduate students of a large state university in a metropolitan of Turkey, the results can only reflect information about that group of students, in other words, data from a private university or a university in a small town of Turkey might provide different results. Thus, it is not possible to generalize the findings to the other undergraduate students at other universities.

2. The number of items in the questionnaire may not be sufficient to understand the undergraduate students' beliefs and behavioral intentions about global climate change and related attributes.

3. Since cross-sectional survey data collection method was employed in this study, the findings of study may only present a picture of the target population at the time when the survey was administered.

4. The present study was relied on self-reported data. Resources such as observation reports, interview reports, or peer evaluation were not used, because of the quantitative nature of the study.

5. Correlational research was used in this study, therefore, no causal relationship can be made between research variables.

6. This study is limited with the relationship between the variables of the study. Any significant relationship may have resulted from another variable not measured herein, for there may be a multiple source of other variables affecting the undergraduate students' beliefs and behavioral intention about global climate change, such as the personal characteristics of the undergraduate students, physical environment where they were born or brought up, or attitudes of their parents.

3.9 Internal Validity of the Study

Internal validity means that "observed differences on dependent variable are due to independent variable rather than being due to some other unintended variable" (Fraenkel and Wallen, 2009, p.179). The possible threats to internal validity and the strategies applied to cope with them are presented below.

In the present study, data collector characteristics and data collector bias cannot be regarded as the threats for internal validity, because the data collection carried out by the researcher in classroom environment under the standard condition.

Instrument decay is revealed in observational studies when the instrument is administered to same participants many times. In current study, the data collection instrument was used just one time and at the same time.

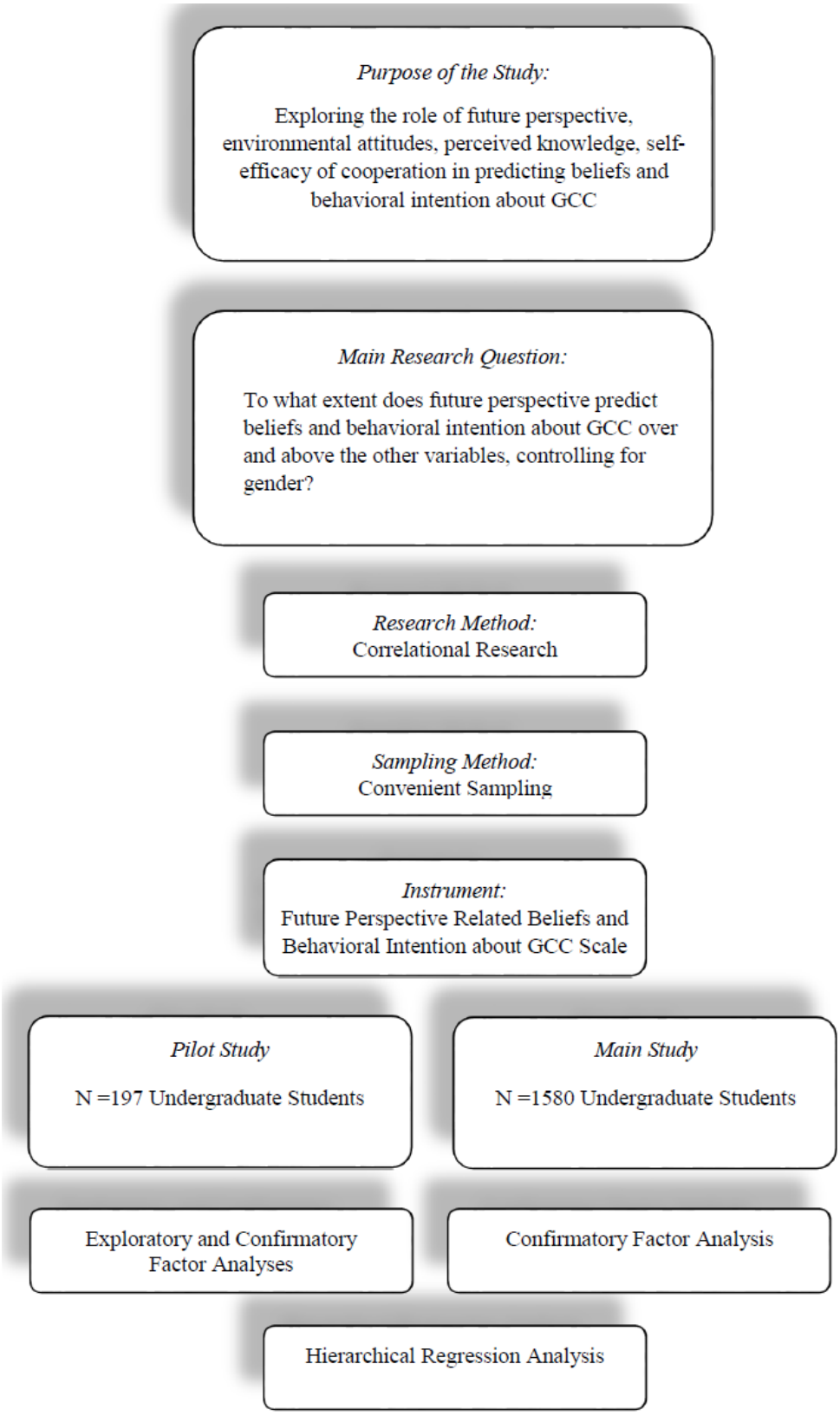
Another threat to internal validity for the present study is testing because in correlational studies participants' responses to an instrument can be influenced by previous and other related instruments which participants administered previously. In this study, the data collection instrument was used only once and at the same time, so the maturation, attitude of subjects, regression, history, maturation and testing threat

cannot be taken into account. Confidentiality was not a possible threat since the participants' names were not collected and used anywhere.

3.10 External Validity of the Study

External validity refers to generalizability of the research results to other people, times and situations (Fraenkel & Wallen, 2006). In this study, selection of the sample based on convenient sampling rather than simple random sampling is likely to increase the chance that it does not represent the target population (Fraenkel & Wallen, 2006). Nonetheless, the inclusion of a large number of students in the study permitted to make generalization of the findings. In addition, a detailed description of the characteristics of the sample was presented to contribute to a better evaluation of the generalizability of the results to the intended population.

A brief summary of the information presented in this chapter is given at Figure 3.3.



**GCC: Global Climate Change*

Figure 3.3 Overview of Organization of Research

CHAPTER IV

RESULTS

This chapter presents the answers for the research questions of this thesis in the context of the primary aim as was reported to explore the role of future time perspective, environmental attitudes, perceived knowledge, and self-efficacy of cooperation in predicting university students' beliefs and behavioral intention about global climate change.

As explained in the previous chapter, a quantitative study was designed and conducted with the participation of 1580 undergraduate students at METU in order to explore the research questions, and the data was gathered through the data collection instrument titled as the Future Perspective Related Beliefs and Behavioral Intention Scale.

Accordingly, the results of the statistical analyses of the gathered data are reported in this chapter under two main headings as the results of pilot study and the results of main study.

In the first section presenting results of pilot study, demographic characteristics of the undergraduate students participated in the pilot study is reported.

The second section of this chapter presenting the results of main study is organized under five main parts to present demographic characteristics of the sample, results of descriptive statistics, correlations between the variables of the study, the results of hierarchical multiple regression analyses and summary of the findings of the study.

4.1 Results of Pilot Study

4.1.1 Demographic Characteristics of the Participants

A total of 197 volunteer undergraduate students of METU participated in the pilot study. The frequency and percentages of the undergraduate students' gender, age,

faculty, and grade level are reported in Table 4.1. As seen in the table, 52.8% of the undergraduate students were female and 47.2% of them were male. The undergraduate students' ages ranged from 18 to 27. The majority of the undergraduate students (80.2%) were between the ages of 21 to 24, followed by 18 - 20 age group (16.8%). Only 3% of the undergraduate participants were of the ages 25 to 27. The mean age average of the undergraduate students was 21.71 (*SD*= 1.39) years.

As for the distribution of undergraduate students by their faculty, 54.1% were from Faculty of Engineering, 19.9% were from Faculty of Arts and Science, 15.3% were from Faculty of Economics and Administrative Sciences, 9.6% were from Faculty of Education, and finally only 2% were from the Faculty of Architecture. In terms of the grade level, 42.1% of the undergraduate students were junior, 28.9% of them were sophomore, 23.9% of them were senior, and 5.1% of them freshman students (Table 4.1).

Table 4.1 Demographic Information of the Undergraduate Students Participated in Pilot Study (n=197)

	Frequency (f)	*Percentage (%)*
Gender		
Female	104	52.8
Male	93	47.2
Age		
18-20	33	16.8
21-24	158	80.2
25-27	6	3.0
Faculty		
Engineering	106	54.1
Arts & Science	39	19.9
Economics & Administrative Sciences	30	15.3
Education	19	9.6
Architecture	2	1.0
Grade		
Freshman	10	5.1
Sophomore	57	28.9
Junior	83	42.1
Senior	47	23.9

4.2 Results of Main Study

This section presents the results of main study under six main parts. In the first part, demographic characteristics of the Turkish undergraduate students participated in the main study are presented. In the second part, validity and reliability analyses of the scales of the data collection instrument are reported. In the third part, descriptive statistics concerning the responses of undergraduate students on outcome six predictor variables of the study are discussed. The fourth part presents correlations between the scales in the instrument. The fifth part reports hierarchical multiple regression analysis results with required assumptions in detail. The final part summarizes the findings of the study.

Prior to the analyses, missing value analysis was conducted. Because missing values may reduce the precision of statistics, all of the items were checked to identify the missing data percentages. As missing values that range from 0 percent to 4 percent were less than 5%, mean imputation method was used and all missing values were replaced by the series mean of the items.

4.2.1 Demographic Characteristics of the Participants in the Main Study

Accessible Population and the Sample of the Study

The target population of the study was all undergraduate students in Turkey and the accessible population was the all undergraduate students at Middle East Technical University (METU) in Ankara, therefore, it is the population which the results of the study were generalized.

The population of Middle East Technical University undergraduate students was 14080 in 2014-2015 academic year. Total number of male students was 2417 (56.8%), while the number of female students was 1757 (43.1%). According to the distribution of these students by faculties at METU, Faculty of Engineering had the highest number of undergraduate students (N=7059 (50.1%)) as compared to other faculties of METU. On the other hand, Faculty of Architecture had the lowest number of undergraduate students (N=846 (%6)) in 2014-2015 academic year. The

distribution of the accessible population (undergraduate students of METU) by faculty and gender in 2014-2015 academic year were presented in Table 4.2.

Table 4.2 Distribution of METU Undergraduate Students by Faculty and Gender in 2014-2015 Academic Year

	Number of Students	*Percentage*
Faculty		
Engineering	7059	50.2
Arts and Science	2651	18.8
Economics and Administrative Science	2085	14.8
Education	1439	10.2
Architecture	846	6.0
Gender		
Female	6073	43.1
Male	8007	56.9
Total	**14080**	

Sample of the Study

A total of 1580 undergraduate students (44.2% male and 55.8% female) participated in the present study during the fall semester of 2014-2015 academic year. The frequency and percentages of the undergraduate students' gender, age, faculty, and grade level are reported in Table 4.3.

As seen in the table, 55.8% (N=881) of the undergraduate participants were female and 44.2% (N=699) of them were male. Mean age of the undergraduates was 20.81 (SD= 1.52). Approximately 16.4% (N=269) of the undergraduate students were of the ages 17 to 19; 71.7% (N=1134) were of the ages 20 to 22; 11.1% (N=177) were of the ages 23 to 25; 0.6% (N=8) were of the ages 26 to 29; and 0.2% (N=2) were of the ages 30 to 33.

As for the distribution of undergraduate students by their faculty, 44.9% (N=709) were from Faculty of Engineering; 18.2% (N==288) were from Faculty of Arts and Science; 14.8% (N=234) were from Faculty of Economics and Administrative Sciences; 14.8% (N=234) were from Faculty of Education; and finally 7.3% (N=115) were from the Faculty of Architecture. In terms of the grade level, 42.4% (N=670) of

the undergraduate students were sophomore; 23% (N=364) of them were junior, 20.1% (N=318) of them were freshman; and 14.4% (N=228) of them senior students.

Table 4.3 Demographic Information of the Undergraduate Students Participated in the Main Study (n=1580)

	Frequency (f)	*Percentage (%)*
Gender		
Female	881	55.8
Male	699	44.2
Age		
17-19	269	16.4
20-22	1134	71.7
23-25	177	11.1
26-29	8	0.6
30-33	2	0.2
Faculty		
Engineering	709	44.9
Arts and Science	288	18.2
Economics and Administrative Sciences	234	14.8
Education	234	14.8
Architecture	115	7.3
Grade		
Freshman	318	20.1
Sophomore	670	42.4
Junior	364	23.0
Senior	228	14.4

The distribution of undergraduate students by faculties and departments given in Table 4.4 indicated that there was a consistency between the frequency distributions by faculties of the accessible population and those of the sample of the study. As it was seen in the table, the rate of participation was highest for Faculty of Engineering students (N=709 (44.9%)), while minimum rate of participation belonged to the students from Faculty of Architecture (N=115 (7.3)).

Table 4.4 Sampling Distribution by Faculties and Departments

Faculties and Departments	*Frequency (f)*	*Percentage (%)*
Faculty of Engineering	**709**	**44,9**
Chemistry Engineering	131	8.3
Aerospace Engineering	44	2.8
Civil Engineering	112	7.1
Computer Engineering	25	1.6
Electrical and Electronics Engineering	134	8.5
Environmental Engineering	21	1.3
Food Engineering	40	2.5
Geological Engineering	28	1.8
Industrial Engineering	62	3.9
Mechanical Engineering	49	3.1
Metallurgical and Material Engineering	22	1.4
Mine Engineering	23	1.5
Petroleum and Natural Gas Engineering	18	1.1
Faculty of Arts and Sciences	**288**	**18.2**
Mathematics	61	3.9
Psychology	42	2.7
Physics	32	2.0
Sociology	32	2.0
Molecular Biology	31	2.0
Statistics	27	1.7
History	25	1.6
Chemistry	24	1.5
Philosophy	8	0.5
Biology	6	0.4
Faculty of Economics and Administrative Sciences	**234**	**14.8**
Political Science and Public Administration	77	4.9
International Relations	65	4.1
Management	55	3.5
Economics	37	2.3
Faculty of Education	**234**	**14.8**
Elementary Mathematics Education	63	4.0
Foreign Language Education	60	3.8
Elementary Science Education	44	2.8
Early Childhood Education	32	2.0
Computer Education and Instructional Technology	18	1.1
Physics Education	10	0.6
Chemistry Education	7	0.4
Faculty of Architecture	**115**	**7.3**
Architecture	86	5.4
City and Regional Planning	16	1.0
Industrial Design	13	0.8
TOTAL	**1580**	**100**

4.3 Descriptive Statistics for Responses of Undergraduate Students

The purpose of this study is to investigate the role of future time perspective, environmental attitudes, perceived knowledge and self-efficacy of cooperation in predicting beliefs and behavioral intention of undergraduate students about global climate change. The data collection instrument consisting of one self-developed and two pre-developed scales was used for this purpose, and the data were collected from 1580 undergraduate students at a state university in Turkey (METU).

In all three scales, the undergraduate students were asked to respond the items on a likert type scale, but at various levels ranging between 5 and 7. In order to explore the research questions of this study, four separate hierarchical multiple regression analyses were conducted with four outcome and five predictor variables. Before conducting regression analyses, in order to understand the participants' positions and characteristics concerning the variables of the study, descriptive analyses of the undergraduate students' responses to the items of scales were carried out by means of calculating the frequencies in percentage. The results of descriptive analyses for each item of the scales of the data collection instrument are given in the following sections.

In addition, as a part of hierarchical multiple regression analysis, the results pertaining to the descriptive analyses are also presented with respect to the means, standard deviations, minimum and maximum values for the variables of the study. Moreover, differences in mean scores of the variables in terms of gender are presented in section 4.3.7.

4.3.1 Undergraduate Students' Beliefs about Global Climate Change

The beliefs about global climate change is the first outcome variable, and consists of three different beliefs about occurrence, causes and consequences of global climate change. For this research, Turkish undergraduate students' beliefs about global climate change were assessed with a total of 14 items (6 items for the belief about occurrence of global climate change; and 4 items for each of the beliefs about causes and consequences of global climate change), and of 4 items are negative statements

(items 11, 17, 20, and 24). Undergraduate students were asked to state their beliefs with "Strongly disagree", "Disagree", "Unsure", "Agree", and "Strongly agree" choices. Frequencies for strongly disagree and disagree and strongly agree and agree items were merged for an easy interpretation (Figures 4.1, 4.2, and 4.3).

Relatively higher mean values in each of three scales related to three beliefs (i.e., occurrence, causes and consequences) about global climate change represent the beliefs that global climate change exists and is a real phenomenon, main causes for global climate change are human activities, and the outcomes of climate change will be negative, respectively.

In order to examine the Turkish undergraduate students' beliefs about global climate change, the percentages, means and standard deviations of the undergraduate students' responses were calculated through descriptive statistics. As displayed in Table 4.5, the average level of beliefs of undergraduate students was relatively high, all on five-point scales. Accordingly, undergraduate students believed that global climate change really occurs in the present time (M=4.11, SD=.60); human activities are the main causes (M=4.04, SD=.63), and the outcomes of global climate change will be harmful (M =4.30, SD=.58).

Beliefs about Occurrence of Global Climate Change

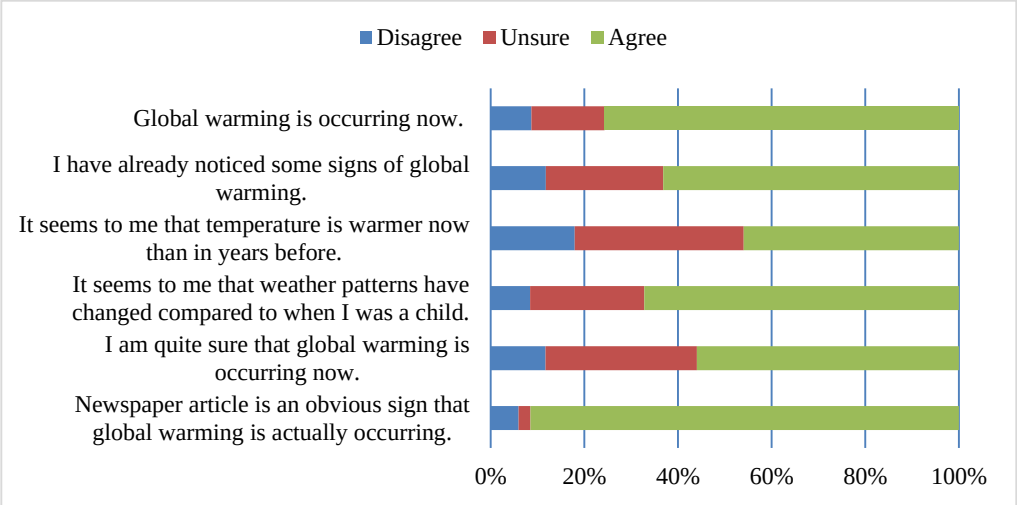


Figure 4.1 Undergraduate Students' Belief about Occurrence of Global Climate Change

According to the results presented in Figure 4.1; the majority of the respondents (85.3%) have already noticed some signs of global warming as such that weather patterns changed as compared to times when they were child (81.7%), that temperature was warmer now than in years before (70.5%), and that newspaper article reporting melting glaciers in the North Pole was obvious sign for actual occurrence of global warming (95.2%). Majority of respondents (87.7%) hold a belief that global warming was occurring now and two-third of the respondents (77.8%) was quite sure about occurrence of global climate change.

Nevertheless, not all respondents believed in global climate change. 10% of the respondent was not sure about or 4.7% did not notice some signs of global warming. 13.5% of the respondents was unsure about or 4.7% did not believe changing weather patterns, and 19.7% was unsure about or of 9.8% did not believe that temperature was warmer than years before. 16.3% of the respondents was not sure about or of 5.9% did not believe that global warming was occurring.

Beliefs about Causes of Global Climate Change

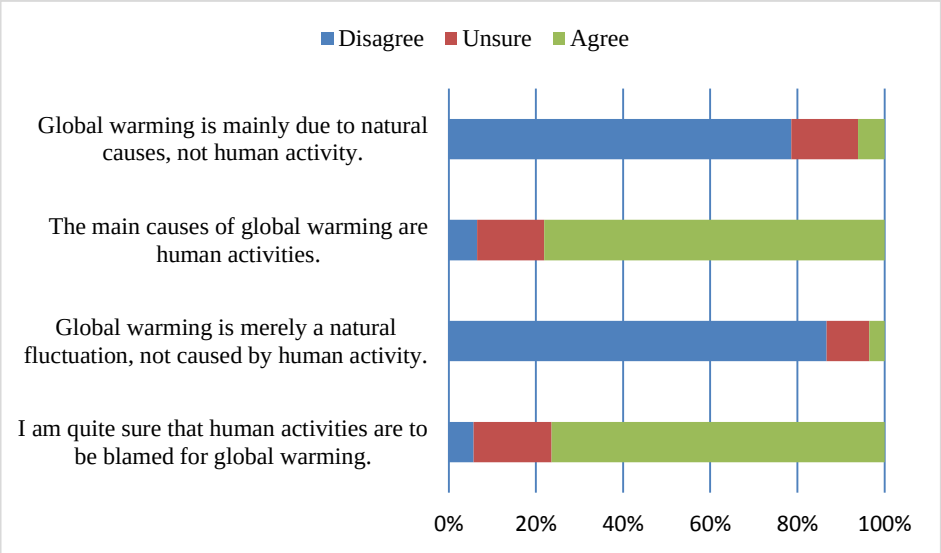


Figure 4.2 Undergraduate Students' Belief about Causes of Global Climate Change

As for the undergraduate students' beliefs about causes of global climate change, results presented in Figure 4.2 indicate that majority of the respondents believed that the main causes of global warming were human activities (78.1%), however 15.4% was unsure about or 6.5% of them did not believe that human activities caused global

warming. In addition, 3.5% believed that global warming was merely a natural fluctuation, or due to natural causes (6.1%) not caused by human activity, while 86.7% reported that they did not believe that global warming was merely a natural fluctuation or mainly due to natural causes (78.5%). Furthermore, nearly 18% of the respondents was not sure about human activities were to be blamed for global warming.

Beliefs about Consequences of Global Climate Change

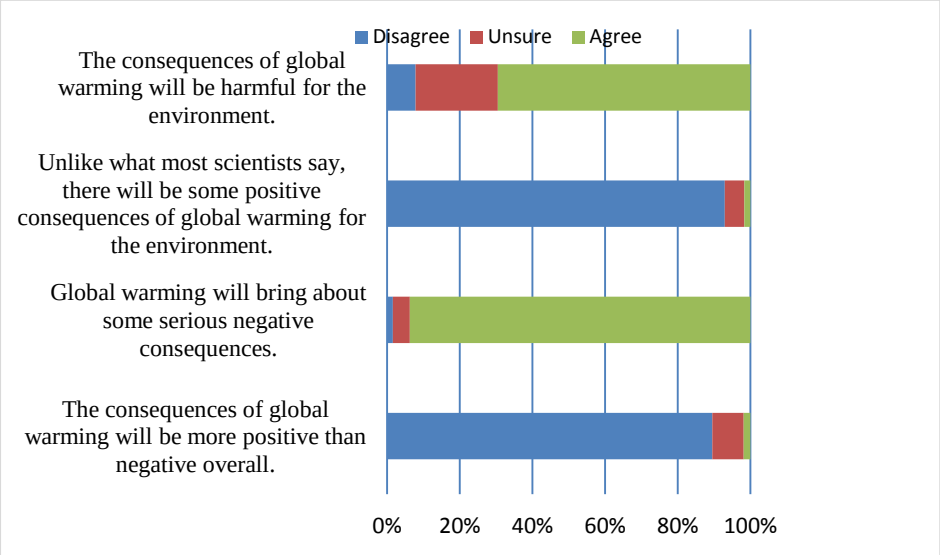


Figure 4.3 Undergraduate Students' Belief about Consequences of Global Climate Change

Concerning the undergraduate students' belief about consequences of global climate change, according to the results presented in Figure 4.3, almost all undergraduate students were agree on the fact that global warming will bring about some serious negative consequences (93.8%). Likewise, majority of the respondents did not believe that there would be some positive consequences of global warming for the environment (93%). Interestingly enough, nearly one third of the respondents (25%) was not sure whether the consequences of global warming would be harmful for the environment, and nearly 10% of the respondents did not believe the harmful effects global warming would bring about for the environment.

To sum up, the results of descriptive analyses indicated that majority of Turkish undergraduate students of this study hold the beliefs that global climate change

occurs, main causes are human activities and will have harmful effects for the environment.

4.3.2 Undergraduate Students' Self-Efficacy of Cooperation about Global Climate Change

The self-efficacy of cooperation is one of the predictor variables of the study and measured by the Beliefs about Global Climate Change Measure. For this research, the undergraduate students' self-efficacy of cooperation belief about global climate change were assessed with 4 items two of which are negative statements (items 14, and 18). Undergraduate students were asked to state their self-efficacy of cooperation belief about global climate change with "Strongly disagree", "Disagree", "Unsure", "Agree", and "Strongly agree" choices. Frequencies for strongly disagree and disagree and strongly agree and agree items were summed for an easy interpretation (Figure 4.4). The higher scores in self-efficacy of cooperation indicates stronger belief that individual efforts will significantly ameliorate the negative consequences of global climate change.

As displayed in Table 4.5, the average level of self-efficacy of cooperation beliefs of undergraduate students was not very high on five-point scale (M=3.37, SD=.70). Figure 4.4 indicates that one-third of the respondents was not sure about (30.6%) or did not believed that little and simple things they could make a difference or meaningful effect to alleviate the negative effects of global warming (30.4%). On the other hand, slightly more than one-third (39.1%) reported that they believed their simple actions against global warming would make difference.

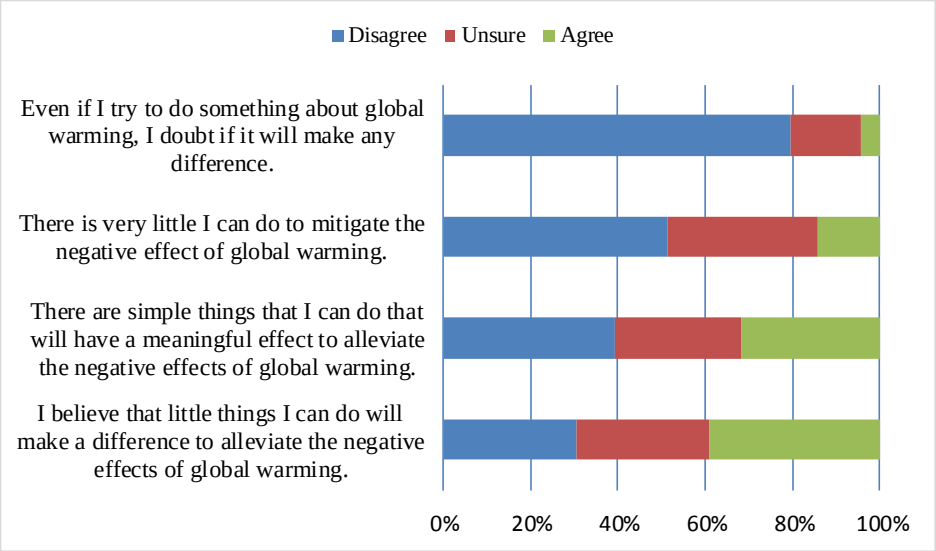


Figure 4.4 Undergraduate Students' Level of Self-Efficacy of Cooperation about Global Climate Change

Therefore, it can be concluded, as the results indicated that undergraduate students of this study had a moderate level of self-efficacy of cooperation about global climate change.

4.3.3 Undergraduate Students' Behavioral Intention about Global Climate Change

The behavioral intention about global climate change is the second outcome variable of the study and measured by the Beliefs about Global Climate Change Measure. For this research, the undergraduate students' behavioral intention about global climate change assessed with 4 items, one of which is reverse coded (item12). Undergraduate students were asked to state their behavioral intention by "Strongly disagree", "Disagree", "Unsure", "Agree", and "Strongly agree" options. The frequencies for the responses were presented by summing up "Strongly disagree - disagree and "strongly agree - agree" results.

As displayed in Table 4.5, the average level of undergraduate students' behavioral intention about global climate change was relatively high on five-point scale (M=3.72, SD=.70).

As the results presented in Figure 4.5 indicate nearly 80% of the respondents reported that they had intent to make some efforts or take some actions to mitigate the negative effects of global warming. In addition, slightly more than half of the respondents (55.3%) had intent to take concrete steps and to do much to stop global warming.

Despite of the relatively high average for behavioral intention about global climate change, however, the percentage of undecided undergraduate students, concerning particularly two statements were not very low: "I intend to take concrete steps to do something to mitigate the negative effects of global warming" (36.4%), and "I personally do not intend to do much to stop global warming" (33.2%). In addition, around 11% percent of the undergraduate students reported that they had no intention to act to mitigate the negative effects of global warming.

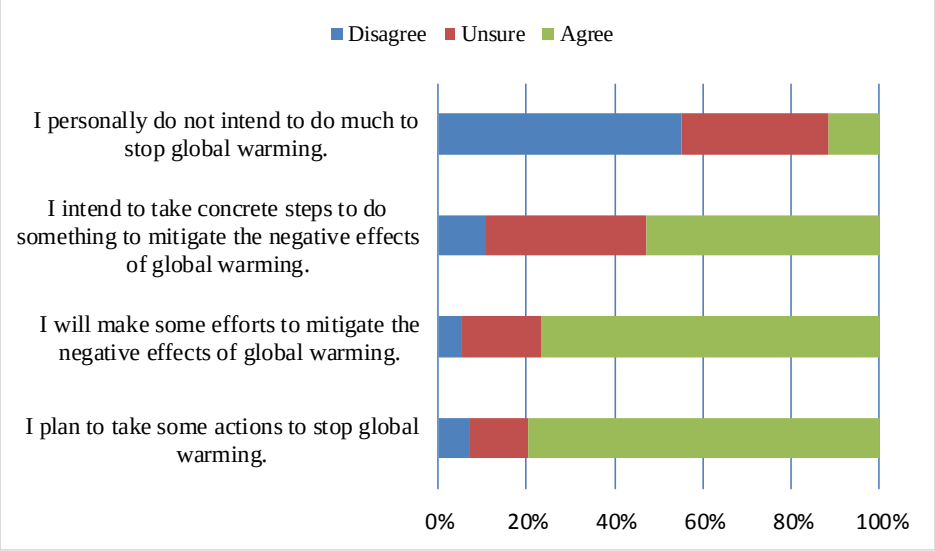


Figure 4.5 Undergraduate Students' Levels of Behavioral Intention about Global Climate Change

Therefore, it can be concluded that, the undergraduate students of this study had relative high level of behavioral intention about global climate change.

4.3.4 Undergraduate Students' Perceived Knowledge about Global Climate Change

Perceived knowledge about global climate change is one of the predictor variables of the study and measured by the Beliefs about Global Climate Change Measure. The Turkish undergraduate students were asked to respond the following item: "I would say my knowledge about causes and consequences of global climate change is" on five choices as minimal, limited, moderate, extensive, and professional, coded from 1 to 5. The higher scores in perceived knowledge show individual belief in being more knowledgeable about causes and consequences of global climate change.

In order to examine the Turkish undergraduate students' perceived knowledge about global climate change, the percentages, means and standard deviations of the undergraduate students' responses were calculated through descriptive statistics.

As displayed in Table 4.5, the average level of undergraduate students' perceived knowledge about global climate change was very low on five-point scale (*M*=2.97, *SD*=.82). Descriptive results showed that about half of the undergraduate students believed that they had moderate level of knowledge about global climate change (49%), approximately 25% of the undergraduate students perceived that they had a limited knowledge, while of 22% reported their knowledge level as extensive (Figure 4.6).

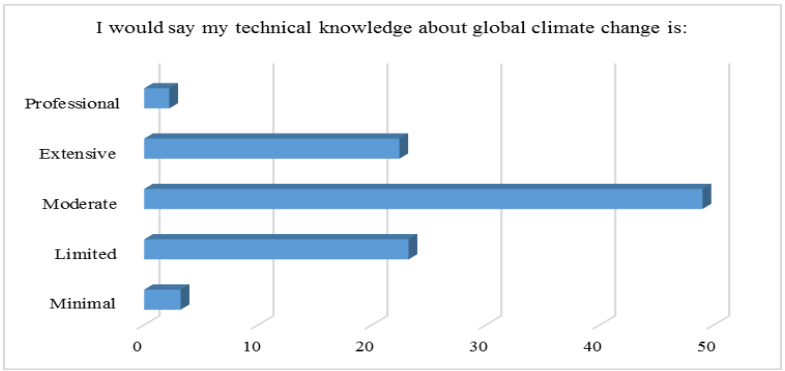


Figure 4.6 Undergraduate Students' Perceived Knowledge Levels (%)

To sum up, the descriptive results indicated that undergraduate students believed that they had moderate level knowledge about causes and consequences of global climate change.

4.3.5 Undergraduate Students' Environmental Attitudes

Environmental attitudes consisting of ecocentrism and anthropocentrism were two predictor variables of the study and measured by Environmental Attitude Scale (EAS). For this research, environmental attitudes of the respondents assessed with 22 items, 12 of which measures ecocentrism and 10 of which measures anthropocentrism. Undergraduate students of this study were asked to state their attitudes by "Strongly disagree", "Disagree", "Unsure", "Agree", and "Strongly agree" options. In the 4.7 Figure below, frequencies for the responses were presented by summing up "Strongly disagree - disagree and "strongly agree - agree" results.

According to the frequencies given in Figure 4.7, undergraduate students' ecocentric environmental attitudes were evaluated as follows: Almost all of the undergraduate students (96.7 %) agreed on the idea that seeing environment destroyed makes sad; 95.1% of them claimed that plants, animals have as much right as humans to exist; 93.9% of them believed that special areas should be set aside for endangered species; 93.3% of the university students agreed on the idea that we all should care about the deforestation of the rainforest even though they are not within our geographical region; 91.8% of undergraduate students thought that conserving the environment in place where they live is their individual responsibility; 92.6% of them thought that preserving wild areas is one of the most important reason for conservation.

In addition, majority of undergraduate students supported the statements such as "sometimes when I am unhappy I find comfort in nature." (88%); "being out in nature is a great stress reducer for me" (87.7%); "sometimes it makes me sad to see forests cleared for agriculture" (87.7%); "one of the worst things about overpopulation is that natural areas are getting destroyed for development" (86.7%); "I can enjoy spending time in natural settings just for the sake of being out in nature" (84.3%); and "I need time in nature to be happy" (83.3%).

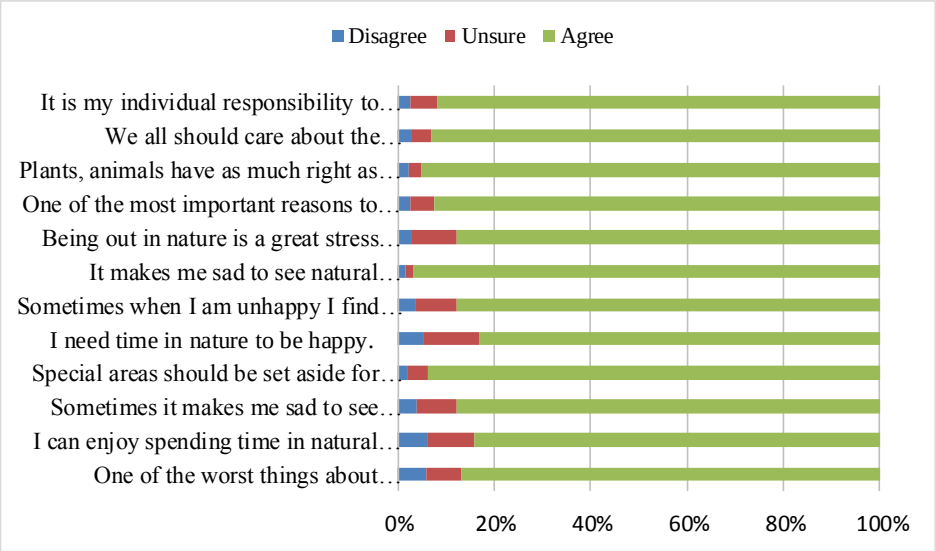


Figure 4.7 Undergraduate Students' Ecocentric Attitudes Levels

When the responses given to the statements for anthropocentric attitude were investigated (Figure 4.8), on the other hand, it was observed that the great majority of undergraduate students disagreed with the statements such as "only the plants and animals having economical value should be conserved" (93.4%); "the thing that concerns me about deforestation is that there will not be enough lumber for future generations" (81.2%); and "one of the most important reasons to keep rivers and lakes clean is so that people can have a place to enjoy water sports" (77%).

On the other hand, no distinct difference can be found between the percentages of the agreement and disagreement about statements such as "one of the most important reasons to conserve is to ensure a continued high standard of living" (39.8% agree; 39.8% disagree); and "animals could be used in scientific experiments to save human life" (31.5% agree; 31.8% disagree).

Although the descriptive results revealed that the respondents had a lower level of anthropocentric attitude, the percentage of the respondents supporting the statement that "nature is important because of what it can contribute to the pleasure and welfare of humans" was higher than that of not supporting (47.3% agree; 38.7% disagree).

The mean scores calculated for the ecocentric attitude items is 4.31 with standard deviation .47, and for the anthropocentric attitude items is 2.42 with standard

deviation .62 (Table 4.5). Therefore, it can be concluded that, undergraduate students of this study displayed an ecocentric, rather than anthropocentric attitude towards natural environment as described by the items of EAS, that, they believe conserving nature and respecting environment for the sake of nature, and not because of its perceived importance to human beings.

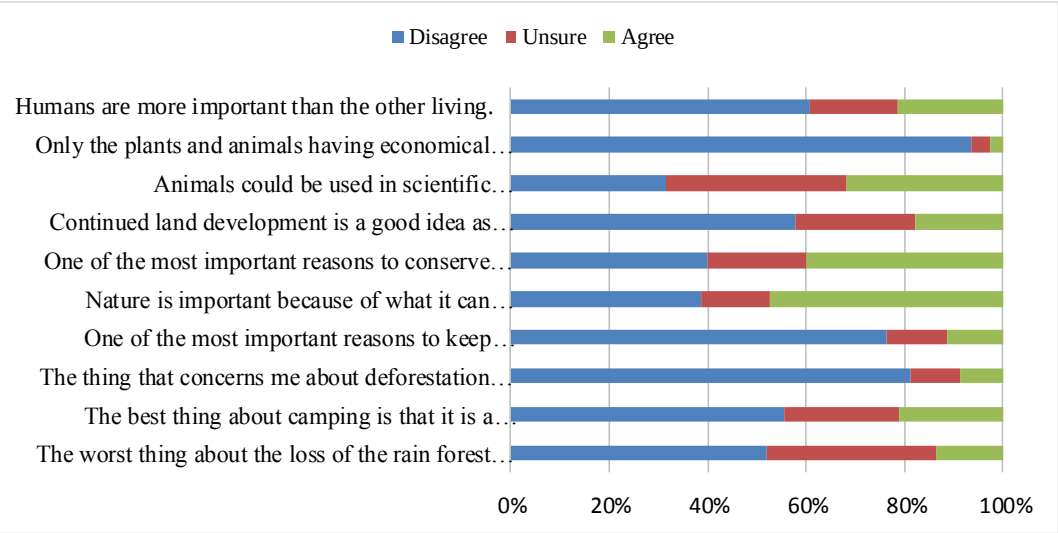


Figure 4.8 Undergraduate Students' Anthropocentric Attitudes Levels

4.3.6 Undergraduate Students' Future Time Perspective

Future time perspective is one of the predictor variables of the study. This variable was measured by the Consideration of Future Consequences Scale with two dimensions as consideration of future consequences and consideration of immediate consequences. For this research, future time perspective of the respondents assessed with 14 items, seven of which are reverse items (item numbers 56, 57, 58, 62, 63, 64, and 65). Undergraduate students were asked to state their thoughts by "Extremely uncharacteristic", "Very uncharacteristic", "Somewhat uncharacteristic", "Uncertain", "Somewhat characteristic", "Very characteristic", and "Extremely characteristic" options. Frequencies for the responses were presented in Figure 4.9 and Figure 4.10, for future and immediate consequences levels respectively, by summing up "extremely uncharacteristic-very uncharacteristic-somewhat uncharacteristic" and "somewhat characteristic-very characteristic-extremely characteristic" results.

According to the frequencies (Figure 4.9) undergraduate students' characteristics of considering future consequences of current behaviors were evaluated as follows: Almost all of undergraduate students (92.6%) declared that their behavior was generally influenced by future consequences; and when making a decision they thought of how it might have affected them in the future (95.5%); believed the importance of taking warnings about negative outcomes seriously even if the negative outcomes would not occur for many years (94.7%); and of conducting a behavior with important distant consequences than a behavior with less important immediate consequences (93%). 86.5% of the respondents stated their willingness to sacrifice their own immediate happiness or wellbeing in order to achieve future outcomes; and that they often engaged in a particular behavior in order to achieve outcomes that may not result for many years. In addition, 81% of undergraduate students of this study claimed that they considered how things might have been in the future, and tried to influence those things with their daily behaviors.

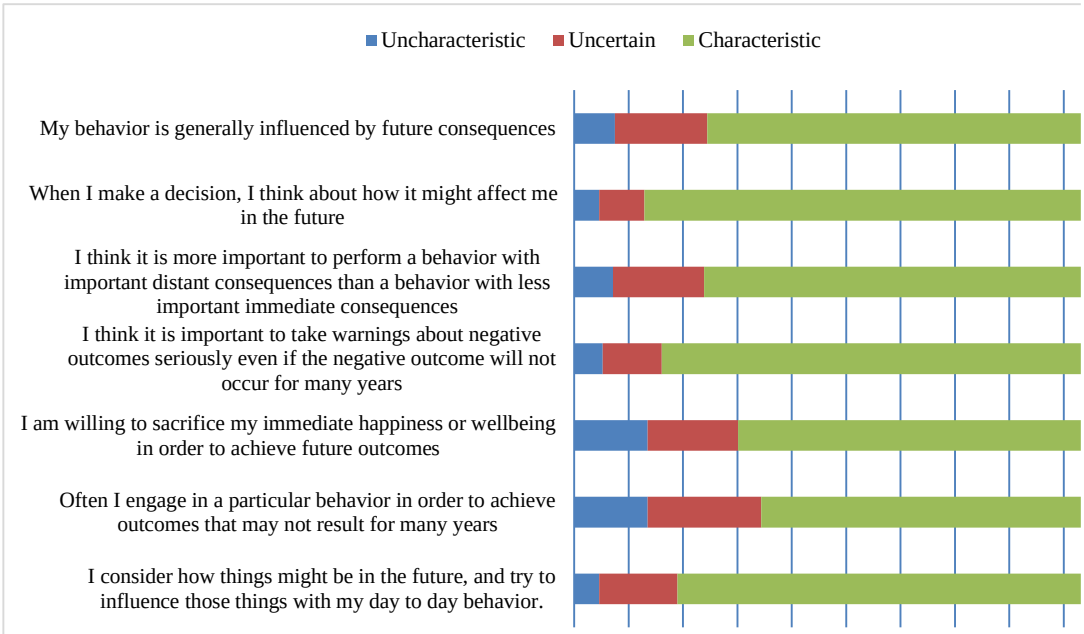


Figure 4.9 Undergraduate Students' Consideration of Future Consequences Levels

When the responses given to the negative statements –which measure undergraduate students' characteristics for considering immediate consequences of current behaviors– were investigated on the other hand, it was observed that most of the undergraduate students responded negative statements as uncharacteristic (Figure

4.10). Accordingly, undergraduate students of this study were disagree with the following statements: sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time (78.7%); acting only to satisfy immediate concerns, because one will take care of future problems that may occur at a later date (77.2%) and because the future will take care of itself (76.8%); and one's daily work with specific outcomes is more important than behavior with distant outcomes (72.7%).

On the other hand, while 63.7% of the undergraduate students declared that the statement of ignoring warnings about possible future problems because the problems will be resolved before they reach crisis level uncharacteristic of themselves does not convey his/her characteristics, almost one-third of them found that statement as his/her characteristic (20.9%).

In addition, 67.2% of the undergraduate students of this study indicated that their behavior was only influenced by the immediate (i.e., a matter of days or weeks) outcomes of their actions while only 16.5% of them opposed this statement.

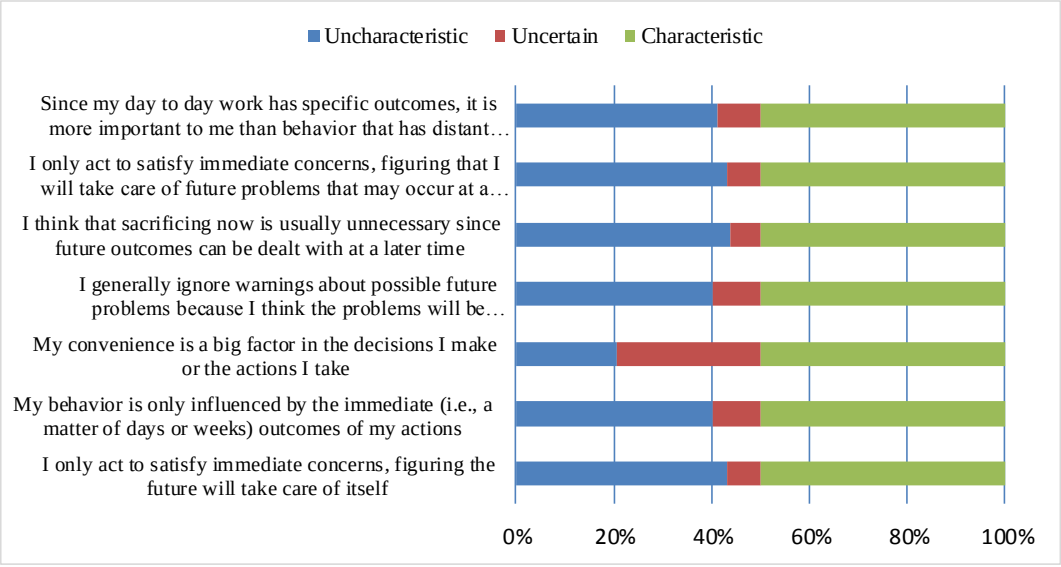


Figure 4.10 Undergraduate Students' Consideration of Immediate Consequences Levels

The mean value calculated for consideration of future consequences is 5.36 out of 7 with a standard deviation of .86, and that for consideration of immediate consequences is 4.93 with a standard deviation of 1.01 (Table 4.5). Therefore, it can

be inferred as a result that, the undergraduate students of this study consider the future outcomes of their present behaviors, rather than concentrating only present time, they think of and care about their future. In brief, it can be concluded that the undergraduate students of this study have future time perspective rather than present time perspective.

Table 4.5 Descriptive Statistics for the Outcome and Predictor Variables of the Study

Variables	***M***	***SD***	***Min.***	***Max.***
Outcome Variables				
Beliefs about GCC				
Belief about occurrence of GCC	4.11*	.60	2	5
Belief about causes of GCC	4.04*	.63	2	5
Belief about consequences of GCC	4.30*	.58	2	5
Behavioral intention about GCC	3.72	.70	1	5
Predictor Variables				
Perceived knowledge about GCC	2.97	.82	1	5
Self-efficacy of cooperation	3.37	.70	1	5
Environmental Attitudes				
Ecocentric attitudes	4.31*	.47	2	5
Anthropocentric attitudes	2.42	.62	1	5
Future Time Perspective	5.15	.81	1	7
Consideration of future consequences	5.36*	.86	1	7
Consideration of immediate consequences	4.93	1.01	1	7

Note. * = High scores, **GCC=Global Climate Change

Table 4.5 summarizes the overall findings of descriptive analyses with respect to the means, standard deviations, minimum and maximum values for the variables of the study. According to the Table, the highest mean score calculated as 4.31 out of 5 with standard deviation .47 was for the ecocentric attitude variable. Furthermore, the mean scores calculated for the belief about consequences (M=4.30, SD=.58), belief about occurrence (M=4.11, SD=.60), and belief about causes (M=4.04, SD=.63) about global climate change were also high. As the Table shows that another high

mean score calculated as 5.36 out of 7 with a standard deviation of .86 was for consideration of future consequences variable.

4.3.7 Variables of the Study in terms of Gender

The distribution of the descriptive analysis results by gender of the undergraduate students are reported in Table 6.

Gender

Looking at the mean scores of the variables of the study in terms of gender difference, generally speaking, female undergraduate students had higher mean scores on all variables than male undergraduates.

Female undergraduate students' beliefs in that global climate change is existing and a real phenomenon (*M*=4.20, *SD*=.51); a human induced problem (*M*=4.03, *SD*=.60); and brings about harmful effects for humans and natural environment (*M*=3.86, *SD*=.59) were stronger than those of male students (*M*=3.99, *SD*=.66 for occurrence; *M*=4.03, *SD*=.66 for causes; and *M*=3.55, *SD*=.77 for consequences of global climate change).

As for the variable of the behavioral intention to act against harmful effects of global climate change, as Table 4.6 indicates, although both females and males students had high mean score, female undergraduate students (*M*=4.36, *SD*=.54) expressed slightly stronger behavioral intention than male undergraduate students (*M*=4.23, *SD*=.62).

In addition, both female and male undergraduates reported that they had ecocentric attitudes towards natural environment. But still, female undergraduate students display higher level mean scores for ecocentric attitudes as compared to male undergraduate students (*M*=4.40, *SD*=.45 for females; *M*=4.21, *SD*=.48 for males). In spite of the fact that both female and male undergraduate students had low mean scores on anthropocentric attitude variable, female students (*M*=2.35, *SD*=.59) had lower level of anthropocentricism than male students (*M*=2.50, *SD*=.65).

Finally, as Table 4.6 indicates, female students were more future time oriented (M=5.40, SD=.83) as compared with male students (M=5.32, SD=.90). In other words, although both female and male undergraduate students consider future consequences for their present behaviors, female students were slightly more future-oriented.

In conclusion, the results of the descriptive analyses revealed that female students had stronger beliefs in that global climate change is existing and a real phenomenon; a human induced problem; and brings about harmful effects for humans and natural environment; had more ecocentric attitudinal motivation; and future time perspective or concern for future consequences of their present behaviors (Table 4.6).

Table 4.6 Descriptive Statistics of Variables for Gender

		Outcome Variables					***Predictor Variables***				
		BO	**BC**	**BCO**	**BI**	**PK**	**SEC**	**EA**	**AA**	**FTP**	**CFC**	**CIC**
Gender												
Female	*M*	4.20*	4.06*	3.86	4.36*	2.96	3.46	4.40*	2.35	5.21	5.40*	5.02
	SD	.51	.60	.59	.54	.79	.64	.45	.59	.76	.83	.95
	Min.	2	2	2	2	1	1	2	1	2	2	1
	Max.	5	5	5	5	5	5	5	5	7	7	7
Male	*M*	3.99	4.03*	3.55	4.23*	2.99	3.25	4.21*	2.50	5.07	5.32*	4,81
	SD	.66	.66	.77	.62	.86	.74	.48	.65	.87	.90	1,06
	Min.	2	2	1	2	1	1	2	1	1	1	1
	Max.	5	5	5	5	5	5	5	5	7	7	7
	SD	.63	.68	.573	.68	.75	.63	.37	.62	.78	.83	.99
	Min.	2	3	3	2	1	1	3	1	3	2	2
	Max.	5	5	5	5	5	5	5	4	7	7	7

Note. * = High mean scores
BO: Belief about occurrence of global climate change, **BC:** Belief about cause of global climate change, **BCO:** Belief about consequences of global climate change, **BI:** Behavioral intention about global climate change, **PK:** Perceived knowledge, **SEC:** Self-efficacy of belief about global climate change, **EA:** Ecocentric attitude, **AA:** Anthropocentric attitude, **FTP:** Future time perspective, **CFC:** Consideration of future consequences, **CIC:** Consideration of immediate consequences.

4.4 Bivariate Correlations among Variables

In accordance with the purpose of this study, four separate hierarchical multiple regression analyses were conducted. However, prior to regression analyses, in order to determine whether linear relationships exist among the variables of this study correlation analysis was conducted. Therefore, for this purpose, Pearson correlation coefficients were calculated among gender, perceived knowledge about global climate change, three beliefs about global climate change, self-efficacy of cooperation, behavioral intention about global climate change, environmental attitudes, and future time perspective variables.

In the present study, the criterion suggested by Field (2005), and Coolidge (2006) was used as a reference to decide the strength of correlations. According to this criterion, the correlation coefficients of .10 represent low correlation, .30 represent medium correlation, and .50 represent strong correlation.

According to the results of the bivariate correlations presented in Table 4.7, among 100 correlations, 98 of them were significant. To be more precise, the correlation coefficients among all variables of the study were statistically significant, except for gender which was not significantly correlated with perceived knowledge (r= -.02, p>.01), and belief about causes (r= -.02, p>.01). However, gender was significantly correlated with all other variables.

The highest positive correlation coefficient is between self-efficacy of cooperation and behavioral intention (r=.61, p<.01). In other words, believing that one's cooperative behavior makes difference associates with behavioral intention to act to mitigate the harmful effects of global climate change.

Furthermore, there is a negative correlation between behavioral intention and anthropocentric attitude (r=-.18, p<.01); and positive correlation with all other variables. As expected ecocentric attitude negatively correlated with anthropocentric attitude (r=-.25, p<.01), and positively correlates with gender (r=.20, p<.01); perceived knowledge (r=.17, p<.01); belief about occurrence (r=.33, p<.01), causes (r=.31, p<.01), and consequences of global climate change (r=.39, p<.01); self-

efficacy of cooperation (r=.28, p<.01); and behavioral intention (r=.41, p<.01). Anthropocentric attitude is negatively associated with all variables.

Looking at the correlations among beliefs about global climate change, three beliefs (i.e., beliefs about occurrence, causes, and consequences) are positively and significantly correlated with each other. Accordingly, there are strong correlations between the belief about consequences of global climate change and belief about causes (r=.57, p<.01); between belief about consequences and belief about occurrence (r=.51, p<.01); and between belief about occurrence and belief about causes (r=.44, p<.01), respectively. This means that, however, believing that climate change is a human induced phenomenon and that it brings about harmful effects for human and natural environment depend on and/or relate with the belief that it really occurs.

Finally, future time perspective has moderate positive correlations with behavioral intention (r=.30, p<.01); ecocentric attitude (r=.26, p<.01); self-efficacy of cooperation (r=.24, p<.01); moderate negative correlation with anthropocentric attitude (r= -.21, p<.01); low positive correlations with belief about consequences (r= .18, p<.01), belief about causes (r= .15, p<.01), and belief about occurrence (r= .14, p<.01) of global climate change. This means that consideration of future consequences of current behaviors relates with behavioral intention to mitigate global climate change, self-efficacy of cooperation, three beliefs about global climate change and environmental attitudes (Table 4.7).

The results of bivariate correlation analysis of the study variables justified that linear relationships appear among all variables of the present study. Therefore, in order to quantify these relationships hierarchical multiple regression analyses were conducted.

Table 4.7 The Pearson Correlation Coefficients of the Study Variables

Variables	1	2	3	4	5	6	7	8	9	10
1. Gender										
2. Perceived knowledge about GCC	-.02									
3. Belief about occurrence of GCC	.18**	.29**								
4. Belief about causes of GCC	-.02	.21**	.44**							
5. Belief about consequences of GCC	.11**	.23**	.51**	.57**						
6. Self-efficacy of cooperation	.15**	.17**	.27**	.24**	.27**					
7. Behavioral intention about GCC	.22**	.26**	.38**	.31**	.37**	.61**				
8. Ecocentric attitude	.20**	.17**	.33**	.31**	.39**	.28**	.41**			
9. Anthropocentric attitude	-.12**	-.10**	-.17**	-.22**	-.21**	-.16**	-.18**	-.25**		
10. Future time perspective	.09**	.14**	.19**	.15**	.18**	.24**	.30**	.26**	-.21**	

*** p<.01 (2-tailed)*

4.5 Hierarchical Multiple Regression Analysis

The main purpose of the present study is to explore the relationships between beliefs with behavioral intentions of undergraduate students about global climate change, and future time perspective along with other several other variables (i.e, perceived knowledge, environmental attitudes, and self-efficacy of cooperation).

Hierarchical multiple regression analysis is used to evaluate relationships between a group of predictor variables and the outcome variable, while the impact of a different group of the independent variables on the dependent variable is controlled (Tabachnick & Fidell, 2007). Therefore, in accordance with the main purpose of the study, four separate hierarchical multiple regression analyses were performed for four outcome variables, namely, belief about occurrence of global climate change, belief about causes of global climate change, belief about consequence of global climate change, and behavioral intention about global climate change. Predictor variables were perceived knowledge, self-efficacy of cooperation, ecocentric attitude, anthropocentric attitude and future time perspective (Table 3.22 and Table 3.23).

As the relevant literature indicates, gender is one of important factors in understanding risk perception (i.e., beliefs that a risk really exists, is caused by humans and has harmful effects), willingness to act in pro-environmental manner, environmental attitudes, and future time orientation. Therefore, in order to control the gender effect in the relationship between the outcome variables and other predictor variables of primary interest, gender was treated as a control variable in this study.

Prior to analyses, the assumptions of multiple linear regression for each outcome variable, to name the belief of occurrence about global climate change, the belief of causes about global climate change, the belief of consequences about global climate change, and the behavioral intention about global climate change were evaluated on the basis of (1) sample size, (2) normality, linearity, homoscedasticity, and independence of residuals, (3) outliers, and (4) multicollinearity and singularity (Tabachnick & Fidell, 2007).

The sample size was evaluated for the research questions before performing the hierarchical multiple regression analyses. According to Tabachnick and Fidell (2007) the minimum and/or adequate sample size can be calculated by the formula N>50+8k, where k refers to the number of criterion variables. The minimum sample size for this study was calculated as 98 with 6 predictors. Thus, sample size in this study (N=1580) was appropriate.

The description of models in hierarchical multiple regression analysis and related research questions addressed are presented in Table 4.8. As indicated, in order to test the research questions, four separate hierarchical multiple regression analyses were conducted in two phases. In the first phase, three separate hierarchical multiple regression analyses were conducted in order to test the research questions 1 to 6. The three outcome variables, i.e., three beliefs about global climate change (global climate change exists, causes are anthropogenic, and effects are harmful) were intended to be predicted from four predictors: perceived knowledge, ecocentric attitude, anthropocentric attitude and future time perspective, controlling for gender.

In the second phase, a fourth hierarchical multiple regression analysis was conducted in order to test the research questions 7 and 8. The outcome variable, behavioral intention to mitigate adverse effects of global climate change were intended to be predicted from eight predictors: perceived knowledge, ecocentric attitude, anthropocentric attitude, the belief about occurrence of global climate change, the belief about causes of global climate change, the belief about consequences of global climate change, self-efficacy of cooperation and future time perspective, controlling for gender.

In the next sections the assumptions and the results of regression analyses conducted in order to test the relevant research questions are reported in detail.

Table 4.8 Description of models in hierarchical multiple regression analysis and related research questions addressed

Model	*Outcome variables*	*Stages*	*Number of variables*	*Predictor variables*	*Related Research Questions*
1	Belief about occurrence of GCC	1	1	Gender	RQ1. How well do the belief about occurrence of global climate change be predicted from perceived knowledge and environmental attitudes, controlling for gender? RQ2. To what extent does the future time perspective predict the belief about occurrence over and above the other variables, controlling for gender?
2		2	3	Perceived knowledge, ecocentric attitude, anthropocentric attitude	
3		3	1	Future time perspective	
1	Belief about causes of GCC	1	1	Gender	RQ3. How well do the belief about causes of global climate change be predicted from perceived knowledge, environmental attitudes, controlling for gender? RQ4. To what extent does the future time perspective predict the belief about causes of global climate change over and above the other variables, controlling for gender?
2		2	3	Perceived knowledge, ecocentric attitude, anthropocentric attitude	
3		3	1	Future time perspective	

Note. GCC=Global Climate Change

Table 4.8 (continued)

Model	*Outcome Variables*	*Stages*	*Number of Variables*	*Predictor Variables*	*Related Research Questions*
1	Belief about consequences of GCC	1	1	Gender	
2		2	3	Perceived knowledge, ecocentric attitude, anthropocentric attitude	RQ5. How well do the belief about consequences of global climate change be predicted from perceived knowledge, environmental attitudes, controlling for gender?
3		3	1	Future time perspective	RQ6. To what extent does the future time perspective predict the belief about consequences of global climate change over and above the other variables, controlling for gender?
1	Behavioral intention about GCC	1	1	Gender	
2		2	7	Perceived knowledge, ecocentric attitude, anthropocentric attitude, belief about occurrence of GCC, belief about causes of GCC, belief about consequences of GCC, self-efficacy of cooperation	RQ7. How well do the behavioral intention against global climate change be predicted from perceived knowledge, environmental attitudes, three beliefs about global climate change and self-efficacy of cooperation, controlling for the gender?
3		3	1	Future time perspective	RQ8. To what extent does the future time perspective predict the behavioral intention against global climate change over and above the other variables, controlling for gender?

4.5.1 Predicting the Belief about Occurrence of Global Climate Change

The hierarchical multiple regression analysis was conducted to explore whether perceived knowledge about global climate change, ecocentric and anthropocentric attitudes predict undergraduate students' belief about occurrence of global climate change; and whether the future time perspective can have unique role in predicting the undergraduate students' belief about occurrence of global climate change. For this purpose of the study, the following two research questions were asked:

RQ1: How well do perceived knowledge and environmental attitudes predict the belief about occurrence of global climate change, controlling for gender?

RQ2: To what extent does the future time perspective predict the undergraduate students' belief about occurrence over and above the other variables, controlling for gender?

The outcome variable was the belief about occurrence of global climate change. The predictor variables were entered at three stages as presented in Table 4.8. The predictor variable at the first stage was gender which was dichotomous variable. Because it was a dichotomous variable, it was dummy coded by taking male students as reference point (0). The predictor variables at the second stage were perceived knowledge, ecocentric attitude, and anthropocentric attitude; and at the third stage predictor variable was future time perspective.

4.5.1.1 Assumptions of Hierarchical Multiple Regression Analysis

Hierarchical multiple regression analysis has a number of assumptions that need to be checked before conducting the analysis. The assumptions for the first outcome variable, i.e., the belief about occurrence of global climate change were evaluated on the basis of normality, linearity, homoscedasticity, and independence of residuals, outliers, and multicollinearity and singularity (Tabachnick & Fidell, 2007).

Normally distributed errors. Histogram and P-P Plot of the residual were checked in order to test for normality of residuals. A bell-shaped figure was observed when the histogram was inspected visually (Figure 4.11). Moreover, despite slight deviations from the normal distribution, P-P plot also represented normal distribution for the residuals (Figure 4.12). Thus, the assumption of normality of residuals was validated.

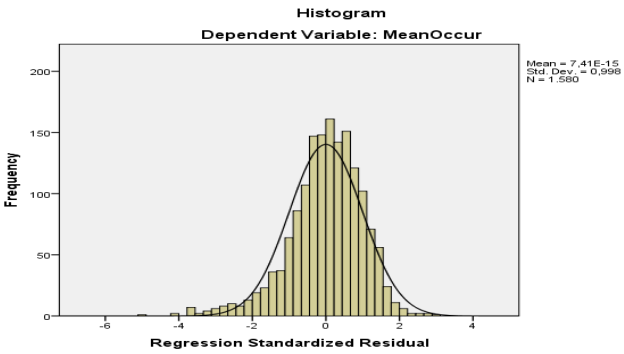


Figure 4.11 Histogram of Residuals

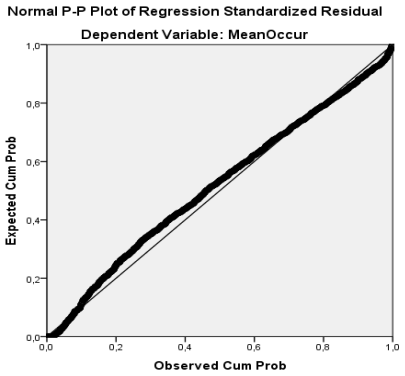


Figure **4.12** P-P Plot of Residuals

Homoscedasticity and Linearity. The residual scatterplot was checked for linearity and homoscedasticity. The overall shape of the scatterplot is in the form of a rectangle if there is linearity (Tabachnick & Fidell, 2007). It was observed in Figure 4.13 that the shape of the scatterplot could be considered to represent a rectangle despite some misfits. Thus, linearity assumption was accepted as validated for this analysis. Considering the validation of the homoscedasticity assumption, the points need to be randomly and uniformly dispersed throughout the plot (Field, 2009). Although the variance of residuals decreases towards the right side of the plot, the points in the residual scatterplot are randomly dispersed; thus, it was concluded that the assumption of homoscedasticity is validated.

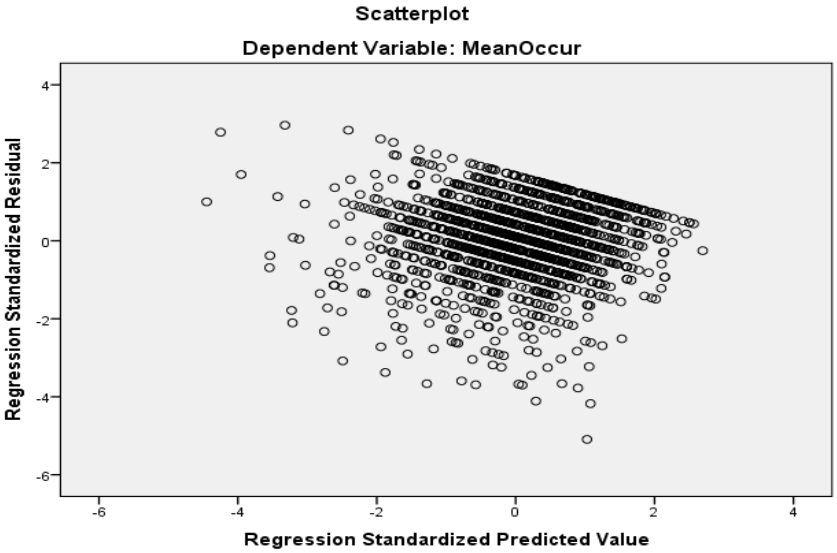


Figure 4.13 Residual Scatterplot

Independent errors. It is suggested by Field (2009) that Durbin-Watson value be not greater than 3 or less than 1 so as to validate the assumption of independence of errors. Durbin-Watson value being within the ideal range (1.947), the assumption of independent errors was validated.

No perfect multicollinearity. Three different ways were suggested by Field (2009) for multicollinearity check. One is scanning the correlation matrix to check whether a high correlation, i.e. correlations above .90, exits between the predictor variables. No substantial correlations (r> .90) were observed between predictors in the correlation matrix; thus, multicollinearity assumption was validated. Checking VIF and tolerance values are the other two ways to validate multicollinearity assumption. The findings showed that VIF values are dispersed between 1.046 and 1.171 and that tolerance values range from .854 to .956. Since the criteria values less than 5 for VIF, greater than .20 for tolerance (1/VIF) are regarded acceptable (Menard, 1995), the assumption of multicollinearity was concluded to be validated.

Influential observations. Partial regression plots of each predictor were checked for multivariate outlier test, the visual inspection of which suggested that there are some multivariate outliers in the data set. Assessment of the Leverage value, Cook's distance, DFBeta values and Mahalanobis distance are the assumptions to be

validated in the next step (Field, 2009). The leverage statistics exceeding the value of .50 suggests the presence of multivariate outliers. As the leverage values are within the range of .001 and .026, this assumption is validated.

Cook's distance is another way of checking the assumption of influential observations. Values exceeding the value of 1 can be problematic in terms of multivariate outliers (Cook & Weisberg, 1982). The maximum Cook's distance value was observed as .037; thus, Cook's distance also validated the assumption of influential observations. When the DFBeta values were checked for predictors, this assumption was also validated as none of the criterion values exceeded the criterion value of 2 as suggested by Stevens (2002). Finally, the assumption of influential observations was validated by checking Mahalanobis distance. At α=.001, for 5 independent variables, the critical χ^2 value is 20.52. Since 10 of the Mahalanobis distance values in the data set exceed this critical value, this assumption of influential observations was not validated. However, on the whole, the assumption of influential observations was considered as validated since the assessments of Leverage value, Cook's distance, DFBeta values gave satisfactory results.

4.5.1.2 Findings of Regression Analysis

After the assumptions were checked and validated, hierarchical multiple regression was performed at three stages to explore how well perceived knowledge, anthropocentric attitude, ecocentric attitude and future time perspective predicted the undergraduate students' belief about occurrence of global change. As indicated in Table 4.8, gender was entered at the first stage of the regression as the control variable; perceived knowledge about global climate change, ecocentric and anthropocentric attitude were added at the second stage; and finally, future time perspective was entered at the third stage. Table 4.9 presents the summary of hierarchical multiple regression analysis for variables predicting belief about occurrence of global climate change; and displays the unstandardized regression coefficients (*B*) and intercept, the standardized regression coefficients (β), *F* changes, R^2 , *t* values, and squared semi partial correlations (sr^2).

Table 4.9 Summary of Hierarchical Multiple Regression Analysis for Variables Predicting Belief about Occurrence of Global Climate Change (N = 1580)

Variable	*B*	*SE B*	*β*	*T*	sr^2	R^2	ΔR^2	ΔF
Model 1						.031	.031	49.72
Gender	.141	.028	.120	5.112	.013			
Model 2						.184	.154	99.02
Perceived knowledge	.166	.017	.231	9.967	.051			
Ecocentric attitude	.295	.031	.240	9.598	.047			
Anthropocentric attitude	-.056	.023	-.060	-2.468	-.003			
Model 3						.190	.006	9.95
Future time perspective	.055	.017	.075	3.155	.005			

$p<.05$.

According to the results indicated in Table 4.9, the first model was found to be statistically significant F (1,1578)=49.725; $p<.05$; with $R^2=.031$. The $R^2=.031$ indicated that 3.1% of the variance in the mean scores of undergraduate students' belief about occurrence of global climate change was explained by gender.

After adding perceived knowledge, ecocentric and anthropocentric attitude to the regression model, when controlling for gender, the second model was also statistically significant F (3,1575)=89.027, $p<.05$; with $R^2=.184$. The $R^2=.184$ indicated that 18.4% of the variance in the mean scores of undergraduate students' belief about occurrence of global climate change was explained by perceived knowledge about global climate change, anthropocentric and ecocentric attitudes.

After adding future time perspective to the regression model, when controlling for gender, the third model was found to be statistically significant, F (1,1574)=9.955, $p<.05$; with R^2 =.190. The R^2 =.190 indicated that 19% of the variance in the mean scores of undergraduate students' belief about occurrence of global climate change

was explained by perceived knowledge about global climate change, anthropocentric attitudes, ecocentric attitudes and future time perspective.

In addition, the results of standardized coefficients indicated that ecocentric attitude positively predicted the undergraduate students' belief about occurrence of global climate change with a highest beta value (β =.24, p<.05), followed by perceived knowledge about global climate change (β =.23, p<.05), gender (β =.12, p<.05), and future time perspective (β =.08, p<.05). Moreover, it was found that anthropocentric attitude (β = -.06, p<.05) negatively predicted the undergraduate students' belief about occurrence of global climate change. To be more precise, having more ecocentric attitude and perception of being more knowledgeable about global climate change, with less anthropocentric attitude contributed to the undergraduate students' belief that global climate change is a real phenomenon and occurring.

Finally, the results of squared semi-partial correlations revealed that the contribution of perceived knowledge was the largest among the 5 predictors, to be more precise, perceived knowledge variable uniquely accounted for 5% (sr^2=.051) of the variation having significant contribution to prediction equation t (1575) = 9.967, p<.05. While ecocentric attitude variable accounted for 4.7% (sr^2=.047) of the variation having significant contribution to prediction equation t (1575) = 9.598, p<.05; gender variable accounted for 1.3% (sr^2=.013) of the variation having significant contribution to prediction equation t (1578) = 5.112, p<.05; and anthropocentric variable accounted for 0.3% (sr^2=-.003) of the variation having significant contribution to prediction equation t (1575) = -2.468, p<.05.

On the other hand, however, the future time perspective variable uniquely accounted for only 0.5% (sr^2=.005) of the variation although it had a significant contribution to prediction in undergraduate students' belief about occurrence of global climate change t (1574) = 3.155, p<.05.

In conclusion, the results of hierarchical regression analysis revealed that all predictor variables made a statistically significant contribution to prediction of

undergraduate students' belief about occurrence of global climate change, but, collectively, the five predictor variables explained 19% of the variance in the undergraduate students' belief that global climate change is a real phenomenon and occurring. The variables of ecocentric attitude and perceived knowledge were shown to have the strongest relationships to belief about occurrence of global climate change. The contribution of future time perspective, although statistically significant, was very low in predicting belief about occurrence of global climate change (Figure 4.14).

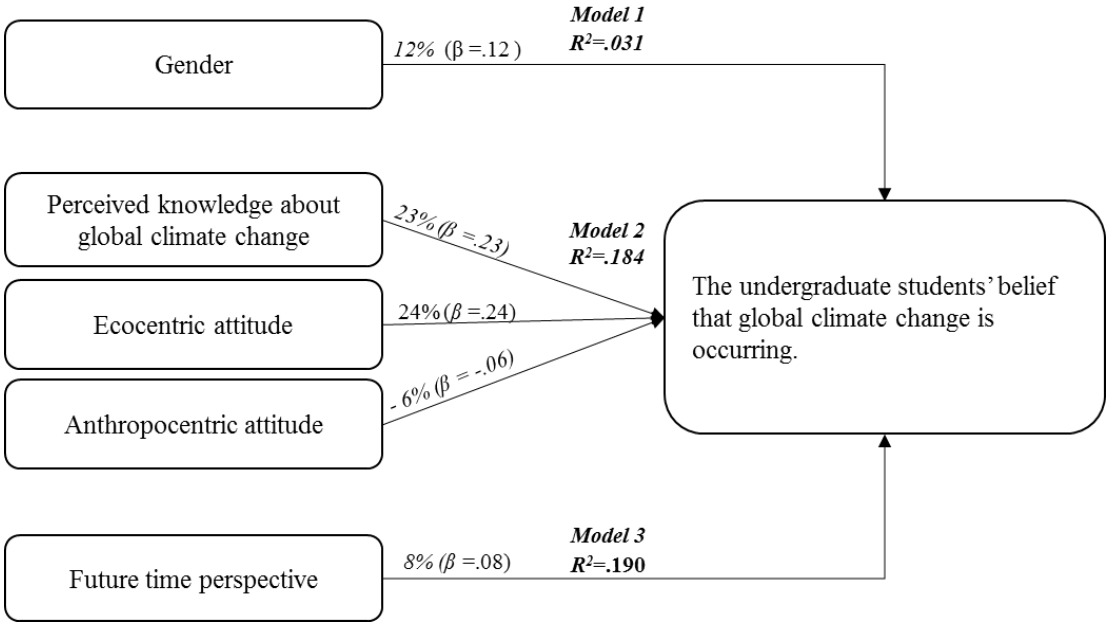


Figure 4.14 Predictors of the Undergraduate Students' Belief about Occurrence of Global Climate Change with the standardized regression coefficient (β) values

4.5.2 Predicting the Belief about Causes of Global Climate Change

The hierarchical multiple regression analysis was conducted to explore whether perceived knowledge about global climate change, ecocentric and anthropocentric attitudes predict undergraduate students' belief about causes of global climate change.; and whether the future time perspective can have unique role in predicting the undergraduate students' belief about causes of global climate change. For this purpose of the study, the following two research questions were asked:

RQ3: How well do perceived knowledge, ecocentric attitude, and anthropocentric attitude predict the undergraduate students' belief about causes of global climate change, controlling for gender?

RQ4: To what extent does the future time perspective predict the undergraduate students' belief about causes of global climate change over and above the other variables, controlling for gender?

The outcome variable was the belief about causes of global climate change. The predictor variables were entered at three stages as presented in Table 4.8. The predictor variable at the first stage was gender which was dichotomous variable. Because it was a dichotomous variable, it was dummy coded by taking male students as reference point (0). The predictor variables at the second stage were perceived knowledge, ecocentric attitude, and anthropocentric attitude; and at the third stage predictor variable was future time perspective.

4.5.2.1 Assumptions of Hierarchical Multiple Regression Analysis

Hierarchical multiple regression analysis has a number of assumptions that need to be checked before conducting the analysis. The assumptions for the second outcome variable, i.e., the belief about causes of global climate change were evaluated on the basis of normality, linearity, homoscedasticity, and independence of residuals, outliers, and multicollinearity and singularity (Tabachnick & Fidell, 2007).

Normally distributed errors. Histogram and P-P Plot of the residual were checked in order to test for normality of residuals. A bell-shaped figure was observed when the histogram was inspected visually (Figure 4.15). Moreover, despite slight deviations from the normal distribution, P-P plot also represented normal distribution for the residuals (Figure 4.16). Thus, the assumption of normality of residuals was validated.

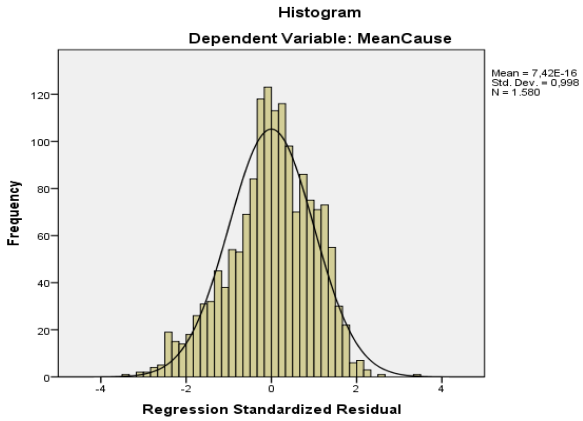


Figure 4.15 Histogram of Residuals

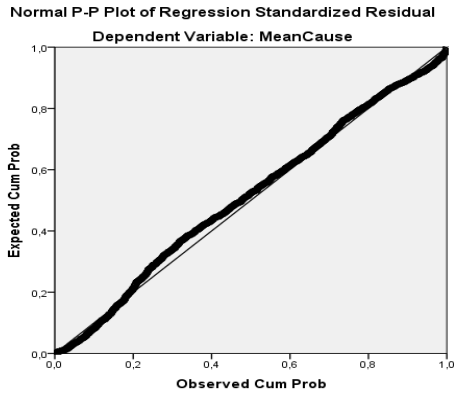


Figure 4.16 P-P Plot of Residuals

Homoscedasticity and Linearity. The residual scatterplot was checked for linearity and homoscedasticity. The overall shape of the scatterplot is in the form of a rectangle if there is linearity (Tabachnick & Fidell, 2007). It was observed in Figure 4.17 that the shape of the scatterplot could be considered to represent a rectangle despite some misfits. Thus, linearity assumption was accepted as validated for this analysis. Considering the validation of the homoscedasticity assumption, the points need to be randomly and uniformly dispersed throughout the plot (Field, 2009). Although the variance of residuals decreases towards the right side of the plot, the points in the residual scatterplot are randomly dispersed; thus, it was concluded that the assumption of homoscedasticity is validated.

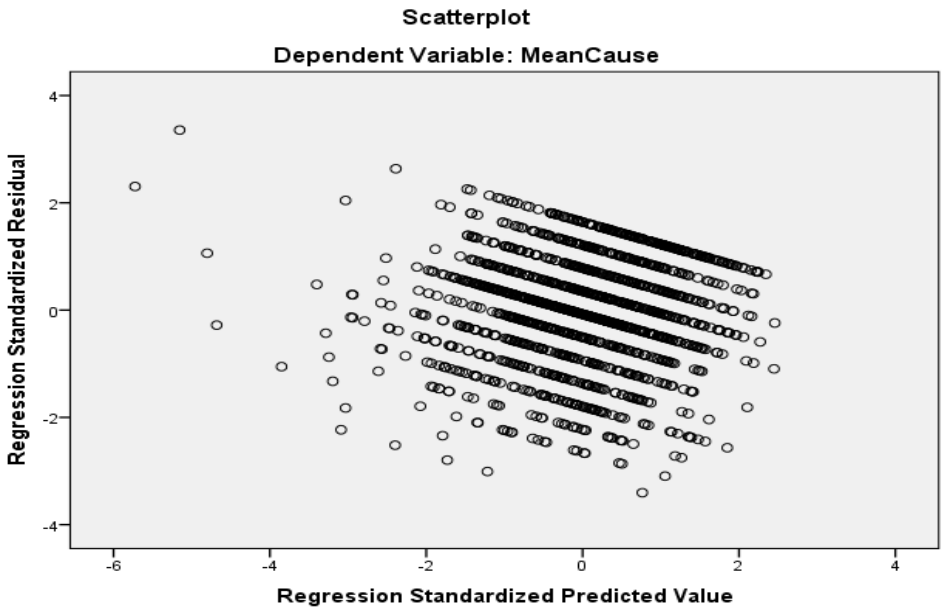


Figure 4.17 Residual Scatterplot

Independent errors. It is suggested by Field (2009) that Durbin-Watson value be not greater than 3 or less than 1 so as to validate the assumption of independence of errors. Durbin-Watson value being within the ideal range (2.031), the assumption of independent errors was validated.

No perfect multicollinearity. Three different ways were suggested by Field (2009) for multicollinearity check. One is scanning the correlation matrix to check whether a high correlation, i.e. correlations above .90, exits between the predictor variables. No substantial correlations (r> .90) were observed between predictors in the correlation matrix; thus, multicollinearity assumption was validated. Checking VIF and tolerance values are the other two ways to validate multicollinearity assumption. The findings showed that VIF values are dispersed between 1.046 and 1.171 and that tolerance values range from .854 to .956. Since the criteria values less than 5 for VIF, greater than .20 for tolerance (1/VIF) are regarded acceptable (Menard, 1995), the assumption of multicollinearity was concluded to be validated.

Influential observations. Partial regression plots of each predictor were checked for multivariate outlier test, the visual inspection of which suggested that there are some multivariate outliers in the data set. Assessment of the Leverage value, Cook's distance, DFBeta values and Mahalanobis distance are the assumptions to be validated in the next step (Field, 2009). The leverage statistics exceeding the value of .50 suggests the presence of multivariate outliers. As the leverage values are within the range of .001 and .026, this assumption is validated.

Cook's distance is another way of checking the assumption of influential observations. Values exceeding the value of 1 can be problematic in terms of multivariate outliers (Cook & Weisberg, 1982). The maximum Cook's distance value was observed as .052; thus, Cook's distance also validated the assumption of influential observations. When the DFBeta values were checked for predictors, this assumption was also validated as none of the criterion values exceeded the criterion value of 2 as suggested by Stevens (2002). Finally, the assumption of influential observations was validated by checking Mahalanobis distance. At α=.001, for 5 independent variables, the critical χ^2 value is 20.52. Since 10 of the Mahalanobis

distance values in the data set exceed this critical value, this assumption of influential observations was not validated. However, on the whole, the assumption of influential observations was considered as validated since the assessments of Leverage value, Cook's distance, DFBeta values gave satisfactory results.

4.5.2.2 Findings of Regression Analysis

After the assumptions were checked and validated, hierarchical multiple regression was performed at three stages to explore how well perceived knowledge, ecocentric attitude, anthropocentric attitude, and future time perspective predicted the undergraduate students' belief about causes of global change. As indicated in Table 4.8, gender was entered at the first stage of the regression as the control variable; perceived knowledge about global climate change, ecocentric and anthropocentric attitude were added at the second stage; and finally, future time perspective was entered at the third stage. Table 4.10 presents the summary of hierarchical multiple regression analysis for variables predicting belief about causes of global climate change; and displays the unstandardized regression coefficients (*B*) and intercept, the standardized regression coefficients (β), *F* changes, R^2 , *t* values, and squared semi partial correlations (sr^2).

According to the results indicated in Table 4.10, the first model to which gender variable was added, was found not to be statistically significant, in other words, gender made no contribution to the undergraduate students' belief that global climate change is caused by human activities F (1,1578)=.565; p>.05.

After adding perceived knowledge, ecocentric and anthropocentric attitude to the regression model, when controlling for gender, the second model was statistically significant F (3,1575)=89.949, p<.05; with R^2=.147. The R^2=.147 indicated that 14.7% of the variance in the mean scores of undergraduate students' belief about causes of global climate change was explained by perceived knowledge about global climate change, ecocentric attitude, and anthropocentric attitude.

Addition of future time perspective variable to the regression model did improve R^2 (R^2=.148, F (1,1574)=2.499, p<.05), but only 0.1% of the variance in the mean

scores of belief about causes of global climate change was explained by future time perspective.

Table 4.10 Summary of Hierarchical Multiple Regression Analysis for Variables Predicting Belief about Causes of Global Climate Change (N = 1580).

Variable	*B*	*SE B*	*β*	*T*	sr^2	R^2	ΔR^2	ΔF
Model 1						.000	.000	.565
Gender	-.111	.030	-.088	-3.672	-.722			
Model 2						.147	.146	89.949
Perceived knowledge	.110	.018	.143	6.017	.019			
Ecocentric attitude	.337	.034	.253	10.050	.054			
Anthropocentric attitude	-.151	.025	-.149	-6.107	-.020			
Model 3						.148	.001	2.499
Future time perspective	.030	.019	.039	1.581	.00			

$p<.05$.

In addition, the results of standardized coefficients indicated that ecocentric attitude made the strongest unique contribution to explaining the undergraduate students' belief about causes of global climate change (β =.253, $p<.05$), followed by anthropocentric attitude (β = -.149, $p<.05$) and perceived knowledge about global climate change (β =.143, $p<.05$). To be more precise, having ecocentric attitude and perception of being more knowledgeable about global climate change, with less anthropocentric attitude contributed to the undergraduate students' belief that global climate change has been caused mostly by human activities.

Finally, the results of squared semi-partial correlations revealed that ecocentric attitude variable uniquely accounted for 5.5% (sr^2=.055) of the variation having significant contribution to prediction equation t (1575)=10.050, $p<.05$. While anthropocentric attitude variable accounted for 2% (sr^2=.020) of the variation having significant contribution to prediction equation t (1575)=-6.107, $p<.05$; and perceived

knowledge about global climate change variable accounted for 1.9% (sr^2=.019) of the variation having significant contribution to prediction equation t (1575)= 6.017, p<.05.

In conclusion, the results of hierarchical regression analysis revealed that only three predictor variables (namely, ecocentric and anthropocentric attitudes, and perceived knowledge about global climate change) made significant contribution to prediction of undergraduate students' belief that global climate change is caused by human activities. Collectively, the predictor variables explained only 14.8% of the variance in the undergraduate students' belief that global climate change is caused by human activities. The variables of ecocentric and anthropocentric attitudes with perceived knowledge were shown to have the strongest relationships to belief about causes of global climate change. The contribution of future time perspective, although low, was statistically significant in predicting belief about cause of global climate change (Figure 4.18).

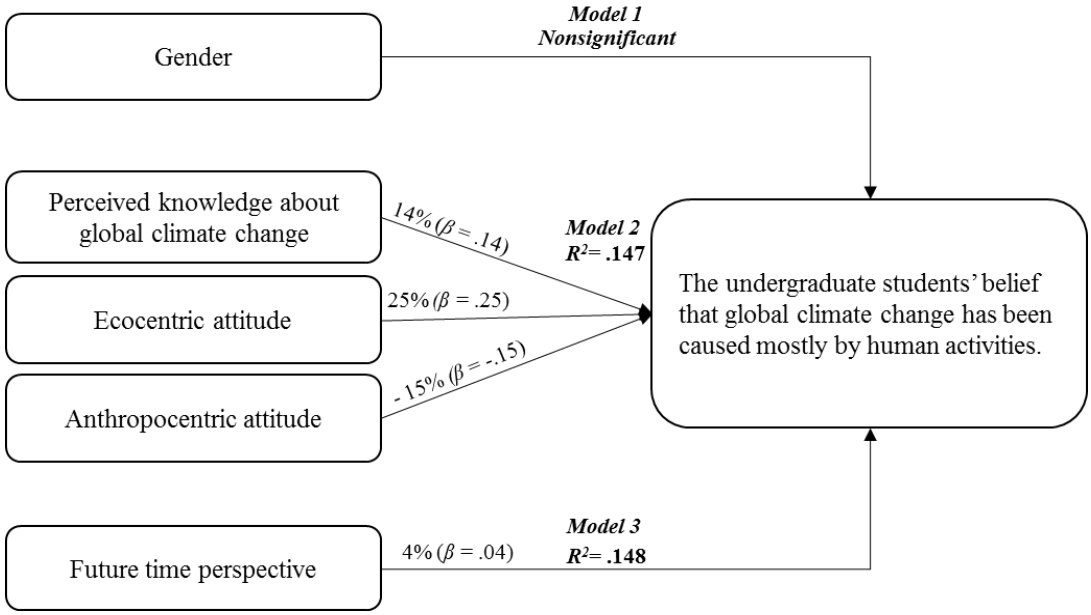


Figure 4.18 Predictors of the Undergraduate Students' Belief about Cause of Global Climate Change with the standardized regression coefficient (β) values

4.5.3 Predicting the Belief about Consequences of Global Climate Change

The hierarchical multiple regression analysis was conducted to explore whether perceived knowledge about global climate change, ecocentric and anthropocentric attitudes predict undergraduate students' belief about consequences of global climate change.; and whether the future time perspective can have unique role in predicting the undergraduate students' belief about consequences of global climate change. For this purpose of the study, the following two research questions were asked:

RQ5: How well do perceived knowledge, ecocentric attitude, and anthropocentric attitude predict the undergraduate students' belief about consequences of global climate change, controlling for gender?

RQ6: To what extent does the future time perspective predict the undergraduate students' belief about consequences of global climate change over and above the other variables, controlling for gender?

The outcome variable was the belief about consequences of global climate change. The predictor variables were entered at three stages as presented in Table 4.8. The predictor variable at the first stage was gender which was dichotomous variable. Because it was a dichotomous variable, it was dummy coded by taking male students as reference point (0). The predictor variables at the second stage were perceived knowledge, ecocentric attitude, and anthropocentric attitude; and at the third stage predictor variable was future time perspective.

4.5.3.1 Assumptions of Hierarchical Multiple Regression Analysis

Hierarchical Multiple Regression Analysis has a number of assumptions that need to be checked before conducting the analysis. The assumptions for the third outcome variable, i.e., the belief about consequences of global climate change were evaluated on the basis of normality, linearity, homoscedasticity, and independence of residuals, outliers, and multicollinearity and singularity (Tabachnick & Fidell, 2007).

Normally distributed errors. Histogram and P-P Plot of the residual were checked in order to test for normality of residuals. A bell-shaped figure was observed when the

histogram was inspected visually (Figure 4.19). Moreover, despite slight deviations from the normal distribution, P-P plot also represented normal distribution for the residuals (Figure 4.20). Thus, the assumption of normality of residuals was validated.

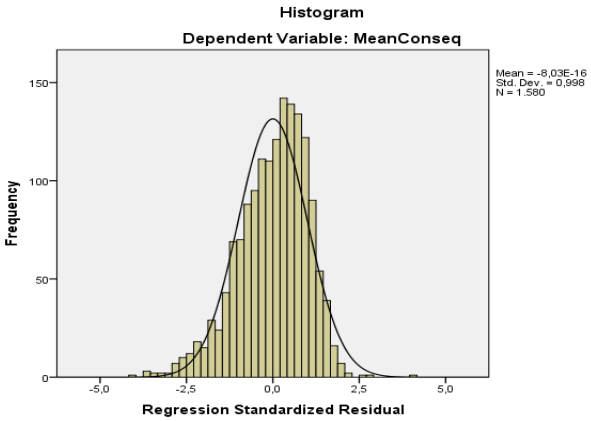


Figure 4.19 Histogram of Residuals

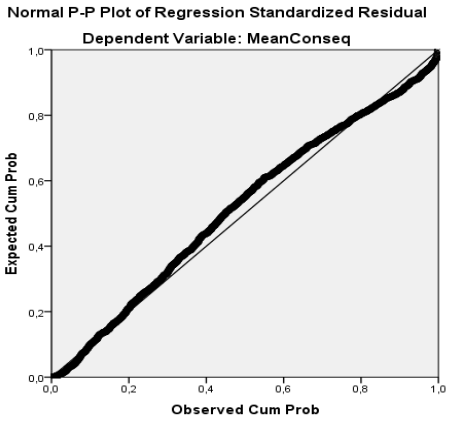


Figure 4.20 P-P Plot of Residuals

Homoscedasticity and Linearity. The residual scatterplot was checked for linearity and homoscedasticity. The overall shape of the scatterplot is in the form of a rectangle if there is linearity (Tabachnick & Fidell, 2007). It was observed in Figure 4.21 that the shape of the scatterplot could be considered to represent a rectangle despite some misfits. Thus, linearity assumption was accepted as validated for this analysis. Considering the validation of the homoscedasticity assumption, the points need to be randomly and uniformly dispersed throughout the plot (Field, 2009). Although the variance of residuals decreases towards the right side of the plot, the points in the residual scatterplot are randomly dispersed; thus, it was concluded that the assumption of homoscedasticity is validated.

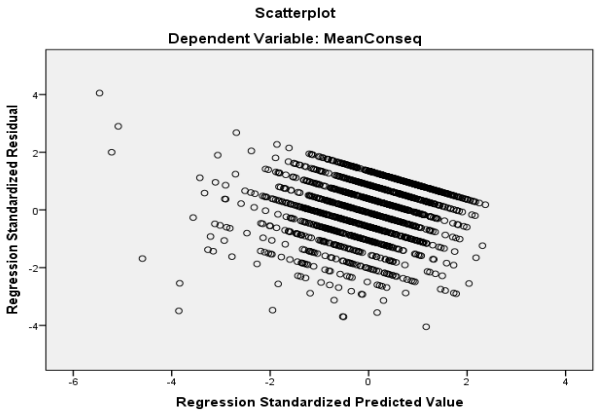


Figure 4.21 Residual Scatterplot

Independent errors. It is suggested by Field (2009) that Durbin-Watson value be not greater than 3 or less than 1 so as to validate the assumption of independence of errors. Durbin-Watson value being within the ideal range (2.031), the assumption of independent errors was validated.

No perfect multicollinearity. Three different ways were suggested by Field (2009) for multicollinearity check. One is scanning the correlation matrix to check whether a high correlation, i.e. correlations above .90, exits between the predictor variables. No substantial correlations (r> .90) were observed between predictors in the correlation matrix; thus, multicollinearity assumption was validated. Checking VIF and tolerance values are the other two ways to validate multicollinearity assumption. The findings showed that VIF values are dispersed between 1.046 and 1.171 and that tolerance values range from .854 to .956. Since the criteria values less than 5 for VIF, greater than .20 for tolerance (1/VIF) are regarded acceptable (Menard, 1995), the assumption of multicollinearity was concluded to be validated.

Influential observations. Partial regression plots of each predictor were checked for multivariate outlier test, the visual inspection of which suggested that there are some multivariate outliers in the data set. Assessment of the Leverage value, Cook's distance, DFBeta values and Mahalanobis distance are the assumptions to be validated in the next step (Field, 2009). The leverage statistics exceeding the value of .50 suggests the presence of multivariate outliers. As the leverage values are within the range of .001 and .026, this assumption is validated.

Cook's distance is another way of checking the assumption of influential observations. Values exceeding the value of 1 can be problematic in terms of multivariate outliers (Cook & Weisberg, 1982). The maximum Cook's distance value was observed as .052; thus, Cook's distance also validated the assumption of influential observations. When the DFBeta values were checked for predictors, this assumption was also validated as none of the criterion values exceeded the criterion value of 2 as suggested by Stevens (2002). Finally, the assumption of influential observations was validated by checking Mahalanobis distance. At α=.001, for 5 independent variables, the critical χ^2 value is 20.52. Since 10 of the Mahalanobis

distance values in the data set exceed this critical value, this assumption of influential observations was not validated. However, on the whole, the assumption of influential observations was considered as validated since the assessments of Leverage value, Cook's distance, DFBeta values gave satisfactory results.

4.5.3.2 Findings of Regression Analysis

After the assumptions were checked and validated, hierarchical multiple regression was performed at three stages to explore how well perceived knowledge, ecocentric attitude, anthropocentric attitude and future time perspective predicted the undergraduate students' belief about consequences of global change. As indicated in Table 4.8, gender was entered at the first stage of the regression as the control variable; perceived knowledge about global climate change, ecocentric and anthropocentric attitude were added at the second stage; and finally, future time perspective was entered at the third stage. Table 4.11 presents the summary of hierarchical multiple regression analysis for variables predicting belief about consequences of global climate change; and displays the unstandardized regression coefficients (*B*) and intercept, the standardized regression coefficients (β), *F* changes, R^2 , *t* values, and squared semi partial correlations (sr^2).

According to the results indicated in Table 4.11, the first model was found to be statistically significant F (1,1578)=18.734, p<.05; with R^2=.012. The R^2=.012 indicated that only 1.2 % of the variance in the mean scores of undergraduate students' belief about consequences of global climate change was explained by gender.

After adding perceived knowledge, ecocentric and anthropocentric attitude to the regression model, when controlling for gender, the second model was also statistically significant F (3,1575)=119.085, p<.05; with R^2=.194. The R^2=.194 indicated that 19.4% of the variance in the mean scores of undergraduate students' belief about consequences of global climate change was explained by perceived knowledge about global climate change, ecocentric and anthropocentric attitudes.

After adding future time perspective to the regression model, when controlling for gender, the third model was found to be statistically significant, F (1,1574)=4.170, p<.05; with R^2 =.197. The R^2 =.197 indicated that 19.7% of the variance in the mean scores of undergraduate students' belief about consequences of global climate change was explained by perceived knowledge about global climate change, ecocentric attitudes, anthropocentric attitudes, and future time perspective.

Addition of future time perspective variable to the regression model did improve R^2, but only 0.2% of the variance in the mean scores of belief about consequences of global climate change was explained by future time perspective.

Table 4.11 Summary of Hierarchical Multiple Regression Analysis for Variables Predicting Belief about Consequences of Global Climate Change (N = 1580).

Variable	*B*	*SE B*	*β*	*T*	*sr²*	R^2	ΔR^2	ΔF
Model 1						.012	.012	18.734
Gender	.036	.027	.031	1.221	.000			
Model 2						.194	.183	119.085
Perceived knowledge	.112	.016	.159	6.859	.024			
Ecocentric attitude	.393	.030	.321	13.137	.088			
Anthropocentric attitude	-.097	.022	-.104	-4.404	.009			
Model 3						.197	.002	4.170
Future time perspective	.035	.017	.049	2.042	.002			

p<.05.

In addition, the results of standardized coefficients indicated that ecocentric attitude made the strongest unique contribution to explaining the undergraduate students' belief about consequences of global climate change (β =.321, p<.05), followed by perceived knowledge about global climate change (β =.159, p<.05), and anthropocentric attitude (β = -.104, p<.05). However, future time perspective (β =.049, p<.05) made the weakest contribution to explaining belief about consequences

of global climate change; and the contribution of gender was found not to be significant (β =.031, p>.05). To be more precise, having ecocentric attitude and perception of being more knowledgeable about global climate change, with less anthropocentric attitude contributed to the undergraduate students' belief that global climate change brings about harmful consequences.

Finally, the results of squared semi-partial correlations revealed that ecocentric attitude uniquely accounted for 8.8% (sr^2=.088) of the variation having significant contribution to prediction equation t (1575)=13.137, p<.05. While the variable of perceived knowledge accounted for 2.4% (sr^2=.024) of the variation having significant contribution to prediction equation t (1575)= 6.859, p<.05, and anthropocentric attitude variable accounted for 0.9% (sr^2=.009) of the variation having significant contribution to prediction equation t (1575)= -4.404, p<.05.

In conclusion, the results of hierarchical regression analysis revealed that only three predictor variables (namely, ecocentric and anthropocentric attitudes, and perceived knowledge about global climate change) made a significant contribution to prediction of undergraduate students' belief that global climate change brings about harmful consequences. Collectively, the predictor variables explained only 19.7% of the variance in the undergraduate students' belief that global climate change brings about harmful consequences. Having more ecocentric and less anthropocentric attitudes with more perceived knowledge were shown to have the strongest relationships to belief about consequences of global climate change. The contribution of future time perspective, although low, was statistically significant in predicting belief about consequences of global climate change (Figure 4.22).

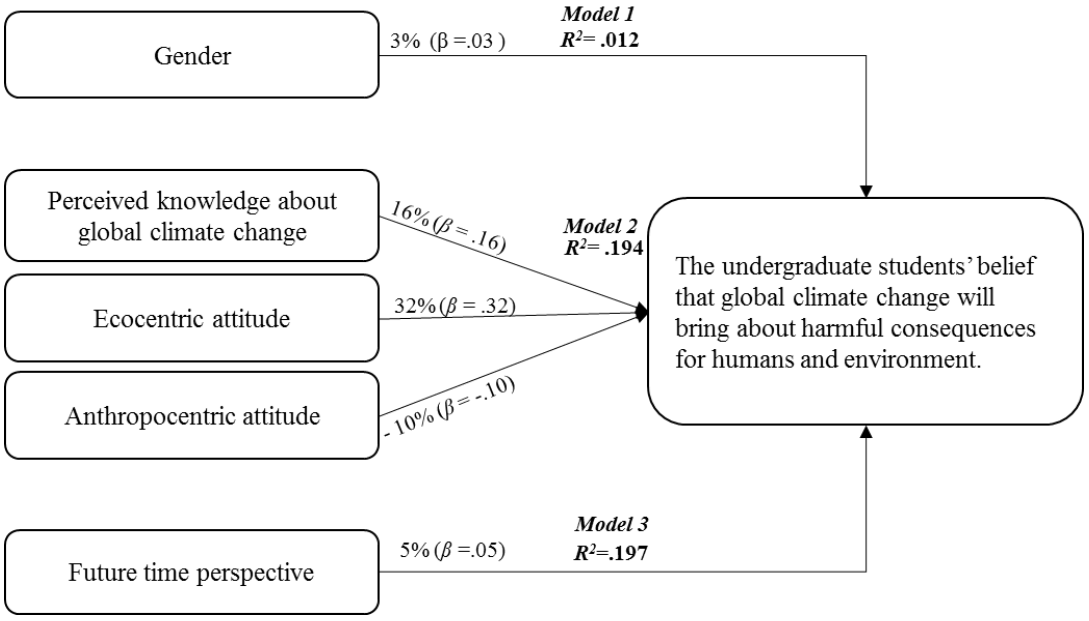


Figure 4.22 Predictors of the Undergraduate Students' Belief about Consequences of Global Climate Change with the standardized regression coefficient (β) values

4.5.4 Predicting Behavioral Intention about Global Climate Change

The hierarchical multiple regression analysis was conducted to explore whether perceived knowledge about global climate change, ecocentric and anthropocentric attitudes, beliefs about occurrence, causes and consequences about global climate change, and self-efficacy of cooperation predict undergraduate students' behavioral intention to mitigate global climate change; and whether the future time perspective can have unique role in predicting the undergraduate students' behavioral intention to mitigate global climate change. For this purpose of the study, the following research questions were asked:

RQ7: How well do perceived knowledge, ecocentric attitude, and anthropocentric attitude, belief about occurrence, belief about causes and belief about consequences of global climate change, and self-efficacy of cooperation predict the undergraduate students' behavioral intention to mitigate global climate change, controlling for the gender?

RQ8: To what extent does the future time perspective predict the undergraduate students' behavioral intention to mitigate global climate change over and above the other variables, controlling for gender?

The outcome variable was the behavioral intention to mitigate global climate change. The predictor variables were entered at three stages as presented in Table 4.8. The predictor variable at the first stage was gender which was dichotomous variable. Because it was a dichotomous variable, it was dummy coded by taking male students as reference point (0). The predictor variables at the second stage were perceived knowledge, ecocentric attitude, anthropocentric attitude, beliefs about occurrence, causes and consequences of global climate change, and self-efficacy of cooperation; and at the third stage predictor variable was future time perspective.

4.5.4.1 Assumptions of Hierarchical Multiple Regression Analysis

Hierarchical Multiple Regression Analysis has a number of assumptions that need to be checked before conducting the analysis. The assumptions for the fourth outcome variable, i.e., the behavioral intention to mitigate global climate change were evaluated on the basis of normality, linearity, homoscedasticity, and independence of residuals, outliers, and multicollinearity and singularity (Tabachnick & Fidell, 2007).

Normally distributed errors. Histogram and P-P Plot of the residual were checked in order to test for normality of residuals. A bell-shaped figure was observed when the histogram was inspected visually (Figure 4.23). Moreover, despite slight deviations from the normal distribution, P-P plot also represented normal distribution for the residuals (Figure 4.24). Thus, the assumption of normality of residuals was validated.

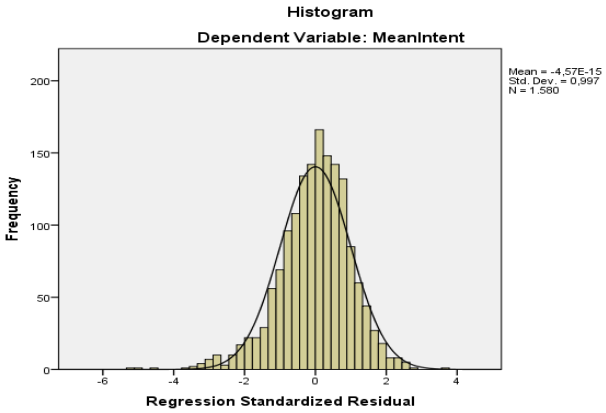


Figure 4.23 Histogram of Residuals

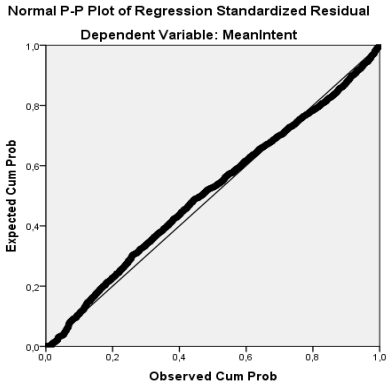


Figure 4.24 P-P Plot of Residuals

Homoscedasticity and Linearity. The residual scatterplot was checked for linearity and homoscedasticity. The overall shape of the scatterplot is in the form of a rectangle if there is linearity (Tabachnick & Fidell, 2007). It was observed in Figure 4.25 that the shape of the scatterplot could be considered to represent a rectangle despite some misfits. Thus, linearity assumption was accepted as validated for this analysis. Considering the validation of the homoscedasticity assumption, the points need to be randomly and uniformly dispersed throughout the plot (Field, 2009). Although the variance of residuals decreases towards the right side of the plot, the points in the residual scatterplot are randomly dispersed; thus, it was concluded that the assumption of homoscedasticity is validated.

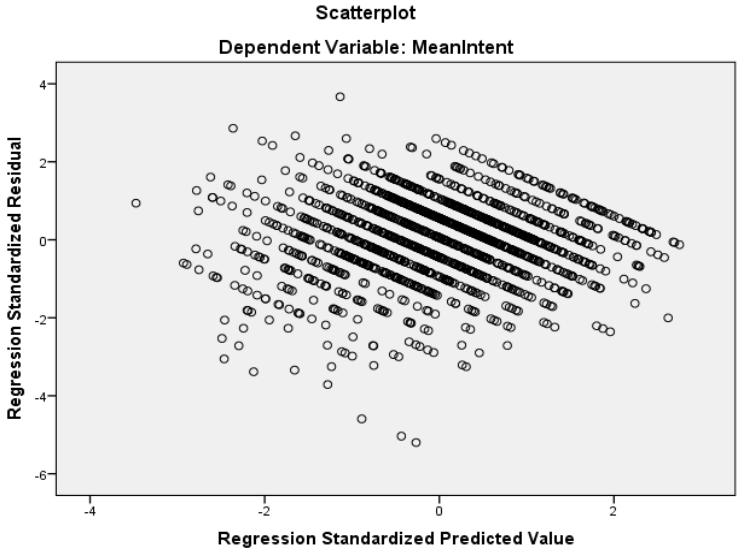


Figure 4.25 Residual Scatterplot

Independent errors. It is suggested by Field (2009) that Durbin-Watson value be not greater than 3 or less than 1 so as to validate the assumption of independence of errors. Durbin-Watson value being within the ideal range (1.974), the assumption of independent errors was validated.

No perfect multicollinearity. Three different ways were suggested by Field (2009) for multicollinearity check. One is scanning the correlation matrix to check whether a high correlation, i.e. correlations above .90, exits between the predictor variables. No substantial correlations (r>.90) were observed between predictors in the correlation matrix; thus, multicollinearity assumption was validated. Checking VIF and tolerance values are the other two ways to validate multicollinearity assumption. The findings showed that VIF values are dispersed between 1.105 and 1.776 and that tolerance values range from .563 to .905. Since the criteria values less than 5 for VIF, greater than .20 for tolerance (1/VIF) are regarded acceptable (Menard, 1995), the assumption of multicollinearity was concluded to be validated.

Influential observations. Partial regression plots of each predictor were checked for multivariate outlier test, the visual inspection of which suggested that there are some multivariate outliers in the data set. Assessment of the Leverage value, Cook's distance, DFBeta values and Mahalanobis distance are the assumptions to be validated in the next step (Field, 2009). The leverage statistics exceeding the value of .50 suggests the presence of multivariate outliers. As the leverage values are within the range of .001 and .044, this assumption is validated.

Cook's distance is another way of checking the assumption of influential observations. Values exceeding the value of 1 can be problematic in terms of multivariate outliers (Cook & Weisberg, 1982). The maximum Cook's distance value was observed as .023; thus, Cook's distance also validated the assumption of influential observations. When the DFBeta values were checked for predictors, this assumption was also validated as none of the criterion values exceeded the criterion value of 2 as suggested by Stevens (2002). Finally, the assumption of influential observations was validated by checking Mahalanobis distance. At α=.001, for 7 independent variables, the critical χ^2 value is 26.12. Since 9 of the Mahalanobis

distance values in the data set exceed this critical value, this assumption of influential observations was not validated. However, on the whole, the assumption of influential observations was considered as validated since the assessments of Leverage value, Cook's distance, DFBeta values gave satisfactory results.

4.5.4.2 Findings of Regression Analysis

After the assumptions were checked and validated, hierarchical multiple regression was performed at three stages to explore how well perceived knowledge, ecocentric attitude, anthropocentric attitude, beliefs about occurrence, causes and consequences of global climate change, self-efficacy of cooperation and future time perspective predicted the undergraduate students' behavioral intention to mitigate global change. As indicated in Table 4.8, gender was entered at the first stage of the regression as the control variable; perceived knowledge about global climate change, ecocentric and anthropocentric attitudes, beliefs about occurrence, causes and consequences of global climate change, and self-efficacy of cooperation were added at the second stage; and finally, future time perspective was entered at the third stage. Table 4.12 presents the summary of hierarchical multiple regression analysis for variables predicting the undergraduate students' behavioral intention to mitigate global climate change; and displays the unstandardized regression coefficients (*B*) and intercept, the standardized regression coefficients (β), *F* changes, R^2 , *t* values, and squared semi partial correlations (sr^2).

Table 4.12 Summary of Hierarchical Multiple Regression Analysis for Variables Predicting Behavioral Intention to Mitigate Global Climate Change (N = 1580)

Variable	*B*	*SE B*	*β*	*T*	sr^2	R^2	ΔR^2	ΔF
Model 1						.049	.049	81.696
Gender	.132	.027	.094	4.973	.008			
Model 2						.482	.433	187.333
Perceived knowledge	.081	.016	.096	4.995	.008			
Ecocentric attitude	.221	.031	.150	7.163	.016			
Anthropocentric attitude	.016	.022	.014	.747	.000			
Belief about occurrence of GCC	.113	.026	.096	4.275	.005			
Belief about cause of GCC	.047	.025	.042	1.837	.001			
Belief about consequences of GCC	.080	.029	.067	2.776	.002			
Self-efficacy of cooperation	.465	.020	.464	23.548	.180			
Model 3						.489	.008	23.271
Future time perspective	.080	.017	.093	4.824	.007			

Note. $p<.05$.

According to the results indicated in Table 4.12, the first model was found to be statistically significant F (1,1578)=81.696, p<.05; with R^2=.049. The R^2=.049 indicated that 4.9 % of the variance in the mean scores of undergraduate students' behavioral intention to mitigate global climate change was explained by gender.

After adding perceived knowledge, ecocentric and anthropocentric attitudes, beliefs about occurrence, causes and consequences of global climate change, and self-efficacy of cooperation to the regression model, when controlling for gender, the second model was also statistically significant F (7,1571)=187.333, p<.05; with R^2=.482. The R^2=.482 indicated that 48.2% of the variance in the mean scores of undergraduate students' behavioral intention to mitigate global climate change was explained by perceived knowledge about global climate change, ecocentric and anthropocentric attitudes, beliefs about occurrence, causes and consequences of global climate change, and self-efficacy of cooperation.

After adding future time perspective to the regression model, when controlling for gender, the third model was found to be statistically significant, F (1,1570)=23.271, p<.05; with R^2 =.489. The R^2 =.489 indicated that 48.9% of the variance in the mean scores of undergraduate students' behavioral intention to mitigate global climate change was explained by perceived knowledge about global climate change, ecocentric and anthropocentric attitudes, beliefs about occurrence, causes and consequences of global climate change, self-efficacy of cooperation, and future time perspective.

Addition of future time perspective variable to the regression model did improve R^2, but only 0.8% of the variance in the mean scores of behavioral intention to mitigate global climate change was explained by future time perspective.

In addition, the results of standardized coefficients indicated that self-efficacy of cooperation made the strongest unique contribution to explaining the undergraduate students' behavioral intention to mitigate global climate change (β =.464, p<.05), followed by ecocentric attitude (β =.150, p<.05), perceived knowledge about global climate change (β =.096, p<.05), belief that global climate change occurs (β =.096,

p<.05), gender (β =.094, p<.05), and future time perspective (β =.093, p<.05). In addition, belief that global climate change brings about harmful consequences (β =.067, p<.05), and belief that human activities cause global climate change (β =.042, p<.05) also made contribution to explaining the undergraduate students' behavioral intention to mitigate global climate change. Whereas, anthropocentric attitude (β = .014, p>.05) made no contribution to explaining the undergraduate students' behavioral intention to mitigate global climate change.

To be more precise, having self-efficacy of cooperation, ecocentric attitude, perception of being more knowledgeable about global climate change, belief that global climate change really occurs, is caused by human activities and brings about harmful effects, future time perspective, and being female or male contributed to the undergraduate students' behavioral intention to mitigate global climate change. On the other hand, having anthropocentric attitude towards the natural environment made no contribution to undergraduates' behavioral intention about global climate change.

Finally, the results of squared semi-partial correlations revealed that self-efficacy of cooperation uniquely accounted for 18% (sr^2=.180) of the variation having significant contribution to prediction equation t (1571)=23.548, p<.05. While the variable of ecocentric attitude accounted for 1.6% (sr^2=.016) of the variation having significant contribution to prediction equation t (1571)=7.163, p<.05, perceived knowledge accounted for 0.8% (sr^2=.008) of the variation having significant contribution to prediction equation t (1571)= 4.995, p<.05; and gender accounted for 0.8% (sr^2=.008) of the variation having significant contribution to prediction equation t (1571)= 4.973, p<.05. Future time perspective accounted for 0.7% (sr^2=.007) of the variation having significant contribution to prediction equation t (1570)= 4.824, p<.05; belief about occurrence of global climate change accounted for 0.5% (sr^2=.005) of the variation having significant contribution to prediction equation t (1571)= 4.995, p<.05; belief about consequences of global climate change accounted for 0.2% (sr^2=.002) of the variation having significant contribution to prediction equation t (1571)= 2.776, p<.05; and belief about causes of global climate

change accounted for 0.1% (sr^2=.001) of the variation having significant contribution to prediction equation t (1571)= 1.837, p<.05.

In conclusion, the results of hierarchical regression analysis revealed that eight predictor variables (namely, perceived knowledge, ecocentric and anthropocentric attitudes, beliefs about occurrence, causes and consequences of global climate change, self-efficacy of cooperation, and gender) made a significant contribution to prediction of undergraduate students' behavioral intention to mitigate global climate change. Collectively, the predictor variables explained 48.9% of the variance in the undergraduate students' behavioral intention to mitigate global climate change. Having self-efficacy of cooperation, higher ecocentric attitude, perception of having knowledge about global climate change, belief that global climate change really occurs, is caused by human activities and brings about harmful effects, future time perspective, and gender were shown to have the strongest relationships to the undergraduate students' behavioral intention to mitigate global climate change.

The contribution of future time perspective, although low, was statistically significant in predicting belief about consequences of global climate change (Figure 4.26).

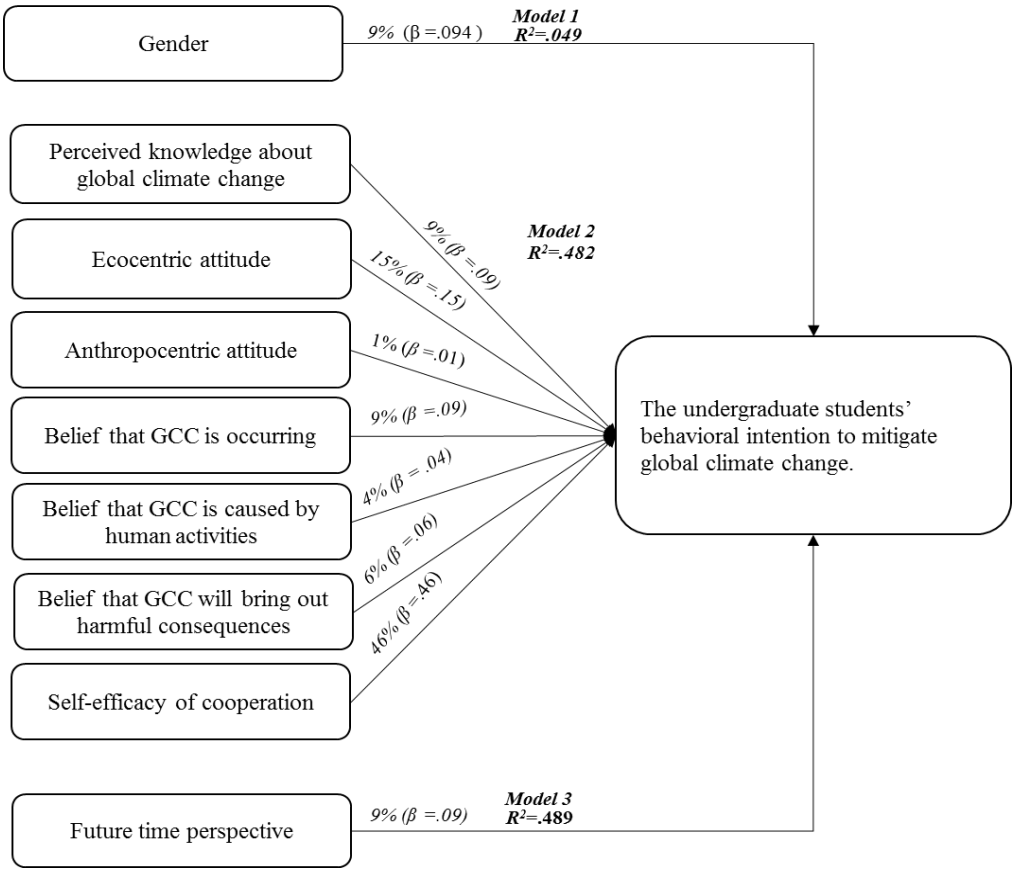


Figure 4.26 Predictors of the Undergraduate Students' Behavioral Intention to Mitigate Global Climate Change with the standardized regression coefficient (β) values

CHAPTER V

DISCUSSION

In this chapter, the results of the present study are discussed with the findings in related literature. Following this discussion, implications for practice and recommendations for future studies are presented.

5.1 Study Results

The main purpose of the present study was to explore how and to what extent future time perspective, perceived knowledge about global climate change, environmental attitudes, and self-efficacy of cooperation explain the university students' beliefs and behavioral intention about global climate change after controlling for gender. For this purpose, this quantitative study was designed and conducted with the participation of 1580 undergraduate students of METU and the data was gathered through the data collection instrument titled *Future Perspective Related Beliefs and Behavioral Intention about Global Climate Change Scale*. The most of the participants were female (55.8%), more than half (71.7%) were of ages between 20 and 22, nearly half (45%) of them were from the Faculty of Engineering, and about half of the participants (42.4%) were sophomore students.

Undergraduate students were asked to indicate their beliefs about global climate change on three dimensions: that global climate change is occurring, is caused mainly by humans, and will have negative consequences. Majority of the undergraduate students believed that global warming was occurring (87.7%); caused mainly by human activities (78.1%); and would bring about negative consequences (93%). On the other hand, 16.3% of them were not sure or 5.9% did not believe the occurrence of climate change; 15.4% were unsure about or 6.5% did not believe that human activities caused global climate change and 9.6% believed that global warming was due to natural causes; and 25% was not sure about or 10% did not believe that consequences of global warming would be harmful for the environment.

As the findings indicated, despite beliefs of the majority, there is still an important minority who believe that global climate change is caused by natural processes, or its consequences would be harmful, or it is not occurring at all. These findings are consisted with the results of other national and international surveys about the Turkish public perceptions about global climate change (Ministry of Environment and Urbanization, 2012; Ipsos MORI, 2014). Moreover, most of the researchers reported the same trend in public beliefs elsewhere in the world (Gallup Poll, 2013; Eurobarometer, 2014; Leiserowitz, Maibach, Roser-Renouf, Smith, & Hmielowski, 2011; Shao, 2012; Reser, Bradley, Glendon, Ellul, & Callaghan, 2012).

Majority of the undergraduate students perceived that they had moderate (49%) or limited (25%) knowledge about causes and consequences of global climate change. These findings confirmed the results of previous studies suggested that the Turkish students did not have adequate knowledge about causes and consequences, and more importantly, they were not aware of the link between individual behaviors and the causes of climate change (Senel, & Gungor, 2008; Kahraman et al., 2008; Bozdogan, 2009; Sever, 2013; Ozdem et al., 2014); and of a national survey stated that people in Turkey have concern and interest but no adequate knowledge about climate change (Ministry of Environment and Urbanization, 2012). Likewise, international research on individuals' knowledge of climate change often revealed that most people, even those considered well-educated, have a minimum understanding of the causes of climate change (Bord, O'Connor, & Fisher, 2000; Hidalgo & Pisano, 2010; O'Connor et al., 1999; O'Connor et al., 2002; Whitmarsh, 2009b). As Grotzer and Lincoln (2007) pointed out, the lack of knowledge about climate change may not be surprising given the complexity of the issue and lack of opportunity to learn about it for, "*the current adult population grew up at a time when the curriculum did not offer the understandings necessary to enable people to understand the language or pattern of nature in general or climate change in particular*" (p. 267).

The findings revealed that the undergraduate students had ecocentric attitude (M=4.31, SD=.47), rather than anthropocentric attitude (M=2.42, SD=.62) towards environment. They believed conserving nature and respecting environment for the

sake of nature, and not because of its perceived importance to human beings. This finding was confirmed by many studies in Turkey which consistently showed that youth in Turkey often had an ecocentric attitudes (e.g., Tuncer, 2008; Tuncer, Ertepinar, Tekkaya, & Sungur, 2005).

The average level of self-efficacy of cooperation beliefs of undergraduate students was not very high on five-point scale (*M*=3.37, *SD*=.70). As the results indicated, one-third (30.6%) of the respondents was not sure about or did not believed (30.4%) that little and simple things they could do, will make a difference in or have meaningful effect to diminish the negative effects of global warming. On the other hand, slightly more than one-third (39.1%) reported that they believed their simple actions against global warming would make difference. This finding reflects the common problem for all countries in the world as Gifford points out, because global climate change is a worldwide problem, it decreases individuals' belief that they can make a difference, and sometimes causes fatalism (sense of destiny), people believe that nothing can be done by individual, or even collectively to fight against global climate change (2011).

The undergraduate students reported to have future time perspective (*M*=5.36, *SD*=.86), rather than present time perspective (*M*=4.93, *SD*=1.01). As the results revealed, the undergraduate students consider the future outcomes of their present behaviors, think of and care about their future. This findings have been confirmed by some other studies emphasizing influence of cultural differences in socialization on future time perspective. For example, Gailly (1982) argued that social and cultural differences determined in motivation and future time perspective. Gailly found out that the Belgian and Turkish youth differed in future time perspective and motivational contents since their parents differed in degree of modernism and in value orientations. On the other hand, Kabasakal and Dastmalchian (2001) proposed that like in other Middle East countries, in the Turkish culture believing fate and destiny was a strongly rooted cultural aspect, and the concept of destiny in Islam was a factor negatively influencing future orientation of societies. However, despite the concept of destiny observed at the societal level, the young generation in Turkey

tended to be more future oriented, as globalization and modernization changed the traditional Turkish society. Likewise, the most recent study conducted to explore the cultural differences in terms of time perspective with a sample (N=7942) from 23 countries, including Turkey also confirmed this findings. The study found that the Turkish participants were rather future oriented than present. In that study, the mean scores of the Turkish sample (N=432) were reported that future perspective as 3.89 out of 5 (SD=.50) (Sircova et al., 2015).

The results revealed that female students had stronger beliefs that global climate change is occurring; a human induced problem; and will have negative consequences; had more ecocentric attitudinal motivation; self-efficacy of cooperation beliefs, behavioral intention to mitigate global climate change, and future time perspective than did male students. The findings of this study confirmed the gender-effect which has been referred extensively by most of environmental or sustainability studies both in Turkey (e.g., Tuncer, Ertepinar, Tekkaya, & Sungur, 2005; Sahin, Ertepinar, & Teksoz, 2012; Yılmaz, Boone, & Anderson, 2004) and in other countries (e.g., Milfont & Duckitt, 2010; Zelezny, Chua, & Aldrich, 2000; Milfont, 2012).

It is important to note that the findings of this present study indicated that male students reported a slightly higher level of perceived knowledge about global climate change (*M*=2.99, *SD*=.86) than did female students (*M*=2.96, *SD*=.79). The gender-effect on environmental and/or sustainability knowledge and literacy, suggested by majority of the previous research in both Turkey and in the world. For example, Teksoz, Sahin and Ertepinar (2010) reported that the effect of gender on environmental knowledge was significant in favor of the Turkish male pre-service teachers. Kollmuss and Agyeman (2002) highlighted gender-effect on environmental knowledge and proposed that "*women usually display less extensive environmental knowledge than men, but they are more emotionally engaged, show more concern about environmental destruction, believe less in technological solutions, and are more willing to change*" (p. 248). However, contrary to these findings, a recent research (McCright, 2010) reached to conclusion that women conveyed greater

assessed scientific knowledge of climate change than did men. In the study exploring the gender effect on the perception of knowledge about global climate change McCright (2010) claimed that women usually perceived themselves as less knowledgable, because women underestimated their climate change knowledge more than do men. McCright (2010) alleged that "*...girls tend to express lesser confidence in their science and math abilities, lower expectations for success in science and math courses, and lesser interest in science and math than do boys. These gender differences first emerge in middle school, they increase in high school, and they persist throughout the college years and beyond*" (p.68). Therefore, the female undergraduate students' low level of perceived knowledge about global climate change might be explained through lack of confidence in their science abilities.

Correlational analyses indicated that self-efficacy of cooperation was strongly and positively associated with behavioral intention. Believing that one's cooperative behavior makes difference associates with behavioral intention to act to mitigate the harmful effects of global climate change. As literature review suggests, self-efficacy of cooperation is an important factor for motivating individuals to conduct behaviors for mitigation of global climate change. Because, when individuals believe that their cooperative behavior will make a difference in achieving collective wellbeing, they are most likely to cooperate (Reser, et al., 2012).

As expected ecocentric attitude positively correlates with gender, perceived knowledge, belief about occurrence, causes, and consequences of global climate change, self-efficacy of cooperation, and behavioral intention. On the other and, anthropocentric attitude is negatively associated with all variables. These findings corroborate the previous studies. For example, Nilsson, von Borgstede, and Biel (2004) found that willingness to support climate change mitigation policy was positively related to ecocentric values; and O'Connor and colleagues (1999) concluded that people with ecocentric attitudes were significantly more willing to support efforts for mitigate greenhouse gas emissions. Bord and his colleagues (1998) found that persons with pro-environmental attitudes were more likely to adopt behaviors and support policies mitigating climate change.

Three beliefs (i.e., beliefs about occurrence, causes, and consequences) are positively and significantly correlated with each other. Accordingly, there are strong correlations between the belief about consequences of global climate change and belief about causes, between belief about consequences and belief about occurrence, and between belief about occurrence and belief about causes, respectively. This means that, believing that climate change is a human induced phenomenon and that it brings about harmful effects for human and natural environment depend on and/or relate with the belief that it really occurs. Future time perspective has moderate positive correlations with behavioral intention, ecocentric attitude, self-efficacy of cooperation, low positive correlations with belief about consequences, belief about causes, and belief about occurrence of global climate change. This means that consideration of future consequences of current behaviors relates with behavioral intention to mitigate global climate change, self-efficacy of cooperation, three beliefs about global climate change and environmental attitudes. These findings support the results of previous studies. For example, Strathman and colleagues (1994) found that college students who scored higher in CFC also expressed more pro-environmental attitudes toward offshore drilling. Joireman, Lasane, Bennett, Richards, and Solaimani (2001) also used CFC in a sample of college students and reported that higher CFC was positively related to stronger intentions to engage and to more frequent actual engagement in pro-environmental activism.

The results of hierarchical regression analysis revealed that perceived knowledge about global climate change, anthropocentric attitudes, ecocentric attitudes, gender and future time perspective made significant contribution to prediction of undergraduate students' beliefs that global climate change is occurring, caused by human activities and will bring about harmful consequences. Collectively, the predictor variables explained 19% of the variance in the undergraduate students' belief about occurrence of global climate change; 14.8% of the variance in the undergraduate students' belief about causes of global climate change; and 19.7% of the variance in the undergraduate students' belief about consequences of global climate change. In explaining of all three beliefs, ecocentric attitude and perceived knowledge about global climate change were found to be made the highest

contribution. Future time perspective's contribution although low, was found to be significant in all three beliefs about global climate change. However, gender made no contribution to the undergraduate students' belief that global climate change is caused by human activities. The present study findings suggested that ecocentric attitude and perceived knowledge, among others, are mainly two influential factors for the undergraduate students' beliefs about global climate change.

The results of hierarchical regression analysis revealed that eight predictor variables (namely, perceived knowledge, ecocentric and anthropocentric attitudes, beliefs about occurrence, causes and consequences of global climate change, self-efficacy of cooperation, and gender) made a significant contribution to prediction of undergraduate students' behavioral intention to mitigate global climate change. Collectively, the predictor variables explained 48.9% of the variance in the undergraduate students' behavioral intention to mitigate global climate change. Having self-efficacy of cooperation, higher ecocentric attitude, perception of knowledge about global climate change, belief that global climate change really occurs, is caused by human activities and brings about harmful effects, future time perspective, and gender were shown to have the strongest relationships to the undergraduate students' behavioral intention to mitigate global climate change. The contribution of future time perspective, although low, was statistically significant in predicting belief about consequences of global climate change. The present study findings suggested that self-efficacy of cooperation, ecocentric attitude and perceived knowledge, among others, are mainly three influential factors for the undergraduate students' beliefs about global climate change. Current survey findings clearly indicate that perceived self-efficacy of cooperation for the Turkish undergraduate students is important to have behavioral intention to mitigate global climate change.

5.2 Implications for Practice

Mitigation and adaptation related to negative effects of global climate change require an informed and engaged public and an education system that provides students with the knowledge they need to make informed choices about responses to climate change. Climate change will impact significantly on the well being of future

generations. Therefore, it is important to enhance future thinking skills of university students. Students should be aware that their current actions and decisions will affect on future environmental problems. Thus, education and training should be relevant for this purpose. Through certain appropriate instruction methods such as scenario construction, role playing and simulations, case studies, and by making use of information technologies, educational programs and university courses should be designed to enable students to imagine how the future could be and how their present actions and decisions will impact the life of their own and the other people living in their country or in other parts of world.

Current and future university students need to understand the causes, consequences, and potential solutions to climate change; develop scientific thinking and problem-solving skills; and improve their ability to make informed decisions. To achieve these goals, Turkey needs to make considerable progress in climate education curriculum development in higher education, and professional development for teachers. Climate change related curricula should focus on the development of knowledge, skills and competencies needed, and contribute to the mitigation of and adaptation to climate change. Hands-on or experiential approaches should be employed as these approaches are particularly effective ways to promote learning among students.

Turkey also needs a national strategy and supporting network to coordinate climate change education, construction of information dissemination and sharing networks, and continuous assessment systems to measure the effectiveness of climate change education. Turkey's current national climate policy documents target mainly industry and general public. Turkey needs to develop and integrate climate change into national education policies and also include the climate change education into climate policies and action plans.

5.3 Limitations and Recommendations for Further Research

There are some limitations associated with the current dissertation. First of all, about 19% of the variance in beliefs about occurrence; 15% of the variance in beliefs about causes; 20% of the variance in beliefs about consequences; and 49% of the variance in behavioral intentions accounted for a linear combination of the selected cognitive and psychological variables. It must be acknowledged that further research is needed to explore other determinants that may play an important role in undergraduate students' beliefs and behavioral intention about global climate change. Further research should examine the effects of other socio-demographic attributes other than gender, such as socio-economic status and situational factors including economic constrains, social pressure, advantages and disadvantages of behaviors concerning global climate change should be carefully explored in the future research.

This study was conducted at a large university in a metropolitan of Turkey. Although university students of this study were from diversed geographical regions of Turkey, however, the cultural differences in terms of geographical regions might not be reflected thoroughly by this study. Therefore, as the culture where students were raised influence their beliefs and behavioral intention about climate change; the role of cultural differences in terms of geographical regions in undergraduate students' beliefs and behavioral intention about global climate change should also be investigated by future studies.

In addition, reliance on self-reported data in this study requires to confirm the research results through qualitative research. A qualitative study should be conducted to make an in-depth analysis for exploring the gender difference in individual perception of knowledge level concerning climate change.

The present study found self-efficacy of cooperation as the most significant predictor of behavioral intention of undergraduate students. Although it was extensively explored and found as influential determinant of behavioral intentions and behaviors by various studies in other countries, literature review revealed that it has not yet addressed and examined by the studies in Turkey. Therefore, future qualitative and

quantitative studies should be conducted for exploring role of self-efficacy of cooperation in determining behaviors related to mitigation and adaptation of global climate change.

The present study found future time perspective (i.e., consideration of future consequences) statistically significant predictor of beliefs and behavioral intentions about global climate change. As literature review indicated future time perspective, although used increasingly in sustainability related studies in other countries, has not yet examined in Turkish studies. Therefore, future study should be conducted to explore the role of future time perspective in various behaviors related to climate change and more generally sustainability.

As in this sudy beliefs and behavioral intention was explores, further study should be conducted to examine the potential role of future time perspective in behaviors pertaining climate change mitigation and adaptation, or more general sustainable behaviors.

A cross-cultural study should be conducted to provide further evidence for culture differences in future time perspective on which very limited research is available in the literature.

A future study should be conducted to propose a model based on health belief model in order to provide more evidence for the reported role of future time perspective in both beliefs and behavioral intentions of Turkish sample.

This study should also be replicated on regional and national data from different universities.

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APPENDICES

APPENDIX A. DATA COLLECTION INSTRUMENT

1. Cinsiyetiniz: ❑ Kadın ❑ Erkek

2. Yaşınız: _____

3. Bölümünüz: _____

4. Kaçıncı sınıftasınız: ❑ 1. Sınıf ❑ 2. Sınıf ❑ 3. Sınıf ❑ 4. sınıf

5. Günümüzde küresel ısınmanın gerçekleşiyor olduğuna inanıyor musunuz?

❑ Kesinlikle inanmıyorum.
❑ İnanmıyorum.
❑ Emin değilim.
❑ İnanıyorum.
❑ Kesinlikle inanıyorum.

Küresel ısınma ile ilgili aşağıda belirtilen genel ifadelere ne derece katıldığınızı belirtiniz.	Kesinlikle katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle katılıyorum
6. Uzun süredir küresel ısınmanın bazı belirtilerinin farkındayım.	1	2	3	4	5
7. Önceki yıllara oranla havanın daha sıcak olduğunu düşünüyorum.	1	2	3	4	5
8. Çocukluk yıllarımla karşılaştırdığımda iklimin değişmiş olduğunu düşünüyorum.	1	2	3	4	5
9. Günümüzde küresel ısınmanın gerçekleşmekte olduğuna kesinlikle eminim.	1	2	3	4	5

10. Aşağıda New York Times'da yayımlanan bir gazete haberi* verilmektedir:

Kuzey Kutbu 50 milyon yıldan beri ilk kez buzsuz.

Kuzey Kutbu eriyor. Geçtiğimiz hafta sonu bölgeyi ziyaret eden uzmanlar, yüzyıllardır Kuzey Buz Denizi'ni kaplayan kalın buz tabakasının suya dönüştüğünü bildiriyorlar. Dünyanın tam tepesinde, en azından şimdilik ortalama 1,5 km genişliğinde buzsuz bir alan oluştuğunu belirtiyorlar. İnsanoğlunun şu ana kadar hiç görmediği bu durumun, küresel ısınmanın gerçek olabileceğinin kanıtı ve iklimi etkiliyor olduğunun göstergesi olduğunu bildiriyorlar.

Aşağıda verilen ifadelerden hangisi bu habere ilişkin görüşünüzü <u>en iyi</u> ifade eder?

❑ Bu haber, küresel ısınmanın gerçekten var olduğunun açık bir işaretidir.

❑ Bu haber, küresel ısınmanın gerçekten var olduğunu gösteriyor olabilir.

❑ Bu haberin ne anlatmak istediği konusunda emin değilim.

❑ Küresel ısınmanın gerçek olduğuna hala ikna olmadım.

❑ Bu haber abartılı; küresel ısınmanın var olduğunu kanıtlamıyor.

*Wilford, J.N.(2000, August 19). North Pole has been ice free for 13 years. *New York Times*

Lütfen arka sayfaya geçiniz ➔

Aşağıda küresel ısınma hakkında belirtilen genel ifadelere ne derece katıldığınızı belirtiniz.	Kesinlikle katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle katılıyorum
11. Küresel ısınma temelde insan faaliyetlerinin değil, doğal sebeplerin sonucudur.	1	2	3	4	5
12. Kişisel olarak küresel ısınmayı durdurmak için herhangi bir şey yapma niyetinde değilim.	1	2	3	4	5
13. Küresel ısınmanın temel nedeni insan faaliyetleridir.	1	2	3	4	5
14. Küresel ısınma için bir şeyler yapmayı denesem de, bunların işe yarayacağından şüpheliyim.	1	2	3	4	5
15. Küresel ısınmanın sonuçları çevre için zararlı olacaktır.	1	2	3	4	5
16. Küresel ısınmanın olumsuz sonuçlarını azaltmaya yönelik bir şeyler yapmak için bazı somut adımlar atma niyetindeyim.	1	2	3	4	5
17. Küresel ısınma yalnızca doğal nedenlerden kaynaklanmaktadır.	1	2	3	4	5
18. Küresel ısınmanın olumsuz etkilerini azaltmak için yapabileceğim çok az şey var.	1	2	3	4	5
19. İnsan faaliyetlerinin küresel ısınmanın sebebi olduğundan kesinlikle eminim.	1	2	3	4	5
20. Bilim insanları ne derlerse desinler, küresel ısınmanın çevre için bazı olumlu sonuçları olacaktır.	1	2	3	4	5
21. Küresel ısınmanın olumsuz sonuçlarını azaltmak için çaba göstereceğim.	1	2	3	4	5
22. Küresel ısınma bazı ciddi sonuçlar doğuracaktır.	1	2	3	4	5
23. Küresel ısınmanın olumsuz sonuçlarının azaltılmasına anlamlı katkı sağlayacak kişisel olarak yapabileceğim basit şeyler vardır.	1	2	3	4	5
24. Küresel ısınmanın sonuçları genel olarak olumsuzdan çok olumlu olacaktır.	1	2	3	4	5
25. Yapabileceğim küçük şeylerin küresel ısınmanın olumsuz etkilerinin azalmasında fark yaratacağına inanıyorum.	1	2	3	4	5
26. Küresel ısınmayı durdurmak için harekete geçmeyi planlıyorum.	1	2	3	4	5

27. Küresel iklim değişikliğinin sebepleri ve etkileri konusunda genel olarak sahip olduğum bilgi:

- ❑ Çok az düzeydedir.
- ❑ Sınırlı düzeydedir.
- ❑ Orta düzeydedir.
- ❑ İyi düzeydedir.
- ❑ Çok iyi düzeydedir.

Lütfen diğer sayfaya geçiniz ➔

Aşağıdaki ifadelere ne derece katıldığınızı lütfen belirtiniz.	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
28. Aşırı nüfus artışının en kötü yanı, doğal alanların yok ediliyor olmasıdır.	1	2	3	4	5
29. Sırf doğada olmak adına, doğal ortamda vakit geçirmekten zevk alırım.	1	2	3	4	5
30. Yağmur ormanlarının zarar görmesinin en kötü yanı, yeni ilaçların geliştirilmesinin sınırlanacak olmasıdır	1	2	3	4	5
31. Tarım alanları yaratmak için ormanların tahrip edilmesi beni üzer.	1	2	3	4	5
32. Kamp yapmanın en iyi tarafı ucuz tatil imkanı sağlamasıdır.	1	2	3	4	5
33. Soyu tükenmekte olan canlı türleri için özel alanlar ayrılmalıdır.	1	2	3	4	5
34. Mutlu olmak için doğada zaman geçirmeye ihtiyaç duyarım.	1	2	3	4	5
35. Ormanların yok olması hakkında beni en çok endişelendiren şey, gelecek nesiller için yeterince kereste bulunmayacak olmasıdır.	1	2	3	4	5
36. Mutsuz olduğum bazı zamanlarda doğada huzur bulurum.	1	2	3	4	5
37. Nehirleri ve gölleri temiz tutmanın en önemli nedenlerinden biri, insanlara su sporları yapacakları yerler sağlamaktır.	1	2	3	4	5
38. Çevreye zarar verildiğini görmek beni üzer.	1	2	3	4	5
39. İnsanların et ihtiyaçlarının karşılandığı vahşi hayvanlar, korunması gereken en önemli türlerdir.	1	2	3	4	5
40. Doğa, insanların refah ve keyfine sağlayabileceği katkılardan dolayı önemlidir.	1	2	3	4	5
41. Doğal kaynakları, yüksek bir yaşam kalitesi sürdürmek için korumalıyız.	1	2	3	4	5
42. Doğada zaman geçirmek stresimi büyük ölçüde azaltır.	1	2	3	4	5
43. Doğal kaynakları korumanın en önemli nedenlerinden birisi, insanların yüksek yaşam standardının devamını sağlamaktır.	1	2	3	4	5
44. Doğal kaynakları korumanın en önemli nedenlerinden biri, doğal yaşam alanlarını korumaktır.	1	2	3	4	5
45. Doğal alanların insan kullanımına açılması insanlara yüksek yaşam kalitesi sunduğu sürece iyi bir fikirdir	1	2	3	4	5
46. Bazen hayvanlar bana, neredeyse insanmış gibi görünüyor.	1	2	3	4	5
47. İnsanların olduğu kadar bitkilerin ve hayvanların da yaşama hakkı vardır.	1	2	3	4	5
48. Eğer insan hayatını kurtarabilecekse, hayvanlar bilimsel deneylerde kullanılmalıdır.	1	2	3	4	5
49. Sadece ekonomik değeri olan bitki ve hayvanlar korunmalıdır.	1	2	3	4	5
50. İnsanlar diğer bütün canlılardan önemlidir.	1	2	3	4	5
51. Zehirli yılanlar ve böcekler insanlar için tehdit oluşturdukları için öldürülmelidirler.	1	2	3	4	5
52. Coğrafi bölgemizde olmasa da, hepimiz yağmur ormanlarının tahrip edilmesini önemsemeliyiz.	1	2	3	4	5
53. Yaşadığımız yerdeki çevreyi korumak benim kişisel sorumluluğumdadır.	1	2	3	4	5

Lütfen arka sayfaya geçiniz➔

Aşağıda belirtilen ifadelerin her birini okuyunuz ve lütfen bu ifadelerin sizi bir kişi olarak ne kadar tanımladığını ya da tanımlamadığını aşağıda verilen ölçeğe göre belirtiniz. Lütfen cevaplarınızı sizi en iyi açıklayan seçeneği işaretleyerek veriniz.

1----------2----------3----------4----------5----------6----------7

Karakterime tamamıyla aykırı — Karakterime tamamıyla uygun

54. Gelecekte neler olabileceğini düşünürüm ve gündelik davranışlarıma ona göre yön vermeye çalışırım.	1	2	3	4	5	6	7
55. Sonuçlanması yıllar alabilecek hedeflere ulaşmak için sıklıkla belirli davranışlar sergilerim.	1	2	3	4	5	6	7
56. Geleceğin ne getireceğini düşünmeden, yalnızca anlık ihtiyaçlarım doğrultusunda davranırım.	1	2	3	4	5	6	7
57. Davranışlarım yalnızca kısa vadeli (örneğin: günlük veya haftalık sorunlara yönelik) eylemlerimin sonuçlarından etkilenir.	1	2	3	4	5	6	7
58. Verdiğim kararlarda ve davranışlarımda, o andaki durumumun uygunluğu önemli bir faktördür.	1	2	3	4	5	6	7
59. Gelecekte ulaşmak istediğim hedefler için anlık mutluluğumu ya da rahatımı feda etmeye hazırım.	1	2	3	4	5	6	7
60. Olumsuz bir sonucun ortaya çıkması yıllar alacak olsa bile, olumsuz sonuçların doğacağına işaret eden uyarıları ciddiye almanın önemli olduğunu düşünürüm.	1	2	3	4	5	6	7
61. Uzun vadede önemli sonuçlar doğuracak bir faaliyeti yürütmenin, daha az önemli anlık sonuçları olan bir faaliyeti yürütmekten daha önemli olduğunu düşünürüm.	1	2	3	4	5	6	7
62. Genelde olası gelecek problemlerle ilgili uyarıları görmezden gelirim çünkü problemlerin kriz seviyesine gelmeden bir şekilde çözüleceğini düşünürüm.	1	2	3	4	5	6	7
63. Gelecekte olacaklara daha sonraki bir zamanda müdahale edilebileceğinden şimdiden fedakârlık etmenin genelde gereksiz olduğunu düşünürüm.	1	2	3	4	5	6	7
64. Gelecekteki problemlerle daha ileri bir tarihte başa çıkabileceğimi düşünerek yalnızca anlık ihtiyaçlarımı karşılayacak şekilde hareket ederim.	1	2	3	4	5	6	7
65. Gündelik hedeflerim uzun vadeli hedeflerimden daha önemlidir.	1	2	3	4	5	6	7
66. Bir karar verirken gelecekte beni ne şekilde etkileyebileceğini düşünürüm.	1	2	3	4	5	6	7
67. Davranışlarımı genellikle gelecekte karşıma çıkarabilecek durumlara göre belirlerim.	1	2	3	4	5	6	7

ANKET BİTTİ KATKILARINIZ İÇİN TEŞEKKÜRLER!

APPENDIX B. CONSENT FORM OF HUMAN SUBJECTS ETHICS COMMITTEE

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
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14.10.2014

Gönderilen : Doç.Dr. Gaye Teksöz
İlköğretim Bölümü

Gönderen : Prof. Dr. Canan Özgen
IAK Başkanı

İlgi : Etik Onayı

Danışmanlığını yapmış olduğunuz İlköğretim Bölümü öğrencisi Deniz Ateş'in "The Role of Future Time Orientation in Predicting University Students' Beliefs and Behavioral Intention About Global Climate Change" isimli araştırması "İnsan Araştırmaları Komitesi" tarafından uygun görülerek gerekli onay verilmiştir.

Bilgilerinize saygılarımla sunarım.

Etik Komite Onayı

Uygundur

14/10/2014

Prof.Dr. Canan Özgen
Uygulamalı Etik Araştırma Merkezi
(UEAM) Başkanı
ODTÜ 06531 ANKARA

APPENDIX C. TURKISH SUMMARY
(Türkçe Özet)

1. Giriş

Yüzyılımızın en büyük tehdidi olarak değerlendirilen küresel iklim değişikliğinin, önemli ölçüde insan faaliyetlerinin neticesinde (fosil yakıtları tüketiminden kaynaklanan sera gazlarından) kaynaklanmakta olduğu, Hükümetler Arası İklim Değişikliği Paneli (Intergovernmental Panel on Climate Change) tarafından hazırlanan, Dördüncü Değerlendirme Raporu (Fourth Assessment Report- FAR) ile doğrulanmaktadır (IPCC, 2007). Küresel iklim değişikliğine yönelik, uluslararası bilim çevrelerinde oluşan fikir birliğine rağmen, genel olarak tüm dünya kamuoyunda farklı bir tablo sergilenmektedir. Son yıllarda gerçekleştirilen uluslararası ve ulusal araştırmalar, dünyada ve ülkemizde insanların, küresel iklim değişikliğine neden olan unsurları ve küresel iklim değişikliğinin etkileri hakkında çeşitli kavram yanılgılarına, yanlış veya yetersiz düzeyde bilgiye sahip oldukları ve iklim değişikliğinin nedenleri ile insan faaliyetleri arasında bağlantı kuramadıkları sonucunu ortaya koymuştur (Çevre ve Şehircilik Bakanlığı, 2012; Ipsos MORI, 2014; Gallup Poll, 2013; Eurobarometer, 2014; Şenel ve Güngör, 2008; Kahraman ve ark., 2008; Bozdoğan, 2009). Küresel ısınmaya ilişkin sınırlı bilgi ve yanlış inançlar, iklim değişikliği ile mücadele etme ve önleme çabalarının başarı ile sonuçlanmasının önündeki önemli bir engel olarak değerlendirilmektedir (Gifford ve ark., 2011; van der Linden, 2014). Küresel iklim değişikliğini önlemek ve mücadele etmek için, iklim değişikliğine yol açan insan davranışlarında köklü ve kalıcı değişikliğe ihtiyaç duyulmaktadır. Bireylerin uygun davranış, inanç ve tutum geliştirilmesinde eğitimin rolü sıklıkla vurgulanmaktadır (Buckler ve Creech, 2014). Bireylerin inançları ve davranış niyetlerini şekillendiren ve etkileyen faktörlerin incelenmesi, davranış ve tutumlarının değiştirilmesine yönelik eğitim programlarının tasarlanması için gereklidir (Gifford ve ark., 2011; van der Linden, 2014).

1990'lı yılların başlarından itibaren, iklim değişikliğine ilişkin inançlar ve davranış niyetlerini belirleyen unsurları ortaya çıkarmaya yönelik pek çok araştırma gerçekleştirilmiştir (örneğin, Bord, Fisher, ve O'Connor, 1998; Bord, O'Connor ve Fisher, 2000; Heath ve Gifford, 2006; Maibach, Roser-Renouf ve Leiserowitz, 2009; Whitmarsh, 2009; Swim ve ark., 2011; Stern, 2011; Swim, Clayton ve Howard, 2011; Maibach, Leiserowitz, Roser-Renouf ve Mertz, 2011). Bu çalışmalar, temel olarak, küresel iklim değişikliğine yönelik üç tür inanca işaret etmektedir: Günümüzde küresel iklim değişikliğinin gerçekleşiyor olması inancı; iklim değişikliğinin insan faaliyetlerinden kaynakladığı inancı ve iklim değişikliğinin olumsuz sonuçlar doğuracağı inancı. Bunun yanı sıra, küresel iklim değişikliği ile ilgili inançlar ile iklim değişikliğini önlemeye yönelik davranış niyeti arasındaki ilişkiyi inceleyen pek çok çalışma bulunmaktadır. Söz gelimi, Krosnick ve arkadaşları (2006) iklim değişikliğinin varlığına ve ciddi sonuçlar doğuracağına ilişkin inançlar taşıyan bireylerin, iklim değişikliğinin azaltılmasına yönelik politikaları destekleme eğiliminde oldukları sonucuna varmıştır.

Diğer taraftan, daha önce gerçekleştirilen çok sayıda çalışma, iklim değişikliği hakkındaki bilginin, küresel iklim değişikliğini önleyici davranış niyetlerinin önemli bir yordayıcısı olduğuna işaret etmektedir (O'Connor ve ark., 1999; Bord, O'Connor ve Fisher, 2000; O'Connor ve ark., 2002; Heath ve Gifford, 2006; Whitmarsh, 2009; Hidalgo ve Pisano, 2010). Benzer şekilde, çevresel tutumlar (ekosantrik ve antroposantrik çevresel tutumlar) ile küresel iklim değişikliğine ilişkin riskleri fark etme ve endişe etme ile bu riskleri önlemeye yönelik destekleyici davranışlar sergileme arasında güçlü bir ilişki bulunduğu tespit edilmiştir (Nilsson, von Borgstede ve Biel, 2004; Heath ve Gifford, 2006; Brody, Zahran, Vedlitz ve Grover, 2008; Corner ve ark., 2011; Poortinga ve ark., 2011; Whitmarsh, 2011).

Diğer taraftan, Kerr (1992) tarafından sosyal çelişki (social dilemma) alanyazınına kazandırılan; bireyin sergilediği işbirlikçi davranışın kalabalık bir toplulukta önemli bir etki yaratacağına ilişkin özyeterlik inancını yansıtan *işbirliği özyeterliği*nin (self-efficacy of cooperation), küresel iklim değişikliğinin olumsuz etkilerini azaltmaya yönelik davranış niyetleri ile ilişkili olduğu sonucuna ulaşılmıştır (Heath ve Gifford,

2006). Çevre dostu davranışlar, tutum ve değerleri inceleyen pek çok çalışma, cinsiyetin bu unsurlarda etkili rol oynadığını ortaya koymuştur. Benzer şekilde, küresel iklim değişikliğine ilişkin davranış niyetleri ve inançlarda cinsiyet unsurunun önemli bir rol oynadığı tespit edilmiştir (Örneğin, Liu ve Sibley, 2010; Maibach, Leiserowitz, Roser-Renouf ve Mertz, 2011; McCright, Dunlap ve Xiao, 2013).

Gelecek zaman perspektifi, bireyin kendi geleceğini öngörebilme, bu öngörüyü gerçeğe dönüştürme yolları yaratabilme, geleceğin açık uçlu hedefleri ile şu andaki eylemler arasında duygusal bağlar kurabilme (Zimbardo ve Boyd, 1999) ve eylemlerin gelecekteki sonuçlarını dikkate alabilme (Strathman ve ark., 1994) becerisi olarak tanımlanmaktadır. İlgili alanyazında, gelecek öngörüsünün, çevre dostu davranışları yordamada önemli rol oynadığı belirtilmektedir (Joireman, 1999; Rappange, Brouwer ve Van Exel, 2009; Ebreo ve Vining, 2001; Lindsay ve Strathman,1997; Joireman, Lasane, Bennett, Richards ve Solaimani, 2001; Khachatryan ve ark., 2013; Joireman, Van Lange ve Van Vugt, 2004; Collins ve Chambers, 2005).

2. Çalışmanın Önemi

Bu çalışmanın amacı, Lisans öğrencilerinin küresel iklim değişikliğinin varlığı, nedenleri ve etkilerine ilişkin inançları ve küresel iklim değişikliğini önlemeye yönelik davranış niyetleri ile alanyazın incelenmesiyle belirlenen değişkenler (gelecek zaman perspektifi, iklim değişikliği hakkındaki bilgi algısı, çevresel tutumlar, işbirliği özyeterliği ve cinsiyet) arasındaki ilişkiyi incelemektir. Bu çalışmadan elde edilen bulguların, Türkiye'deki iklim değişikliğine yönelik eğitim programlarını desteklemek ve eğitim materyalleri geliştirmesine rehberlik etmek için bilgi sağlamak suretiyle katkı sunabileceği düşünülmektedir.

Beck ve Cable'e göre etkin bir sürdürülebilirlik eğitimi, öğrencilerin tutumları, değerleri ve inançlarının iyi anlaşılmasına bağlıdır (2011). Çevre ve sürdürülebilirlik alanındaki eğitim ve öğretim faaliyetlerinin pek çoğu, müfredat geliştirmeye temel teşkil edecek şekilde, öğrencilerin sahip oldukları inançlar, değerler ve tutumlardan faydalanmaktadır (Pike, Doppelt ve Herr, 2010). Çevre politikaları ile ilgili

kararlarda, vatandaşların davranışlarını şekillendiren ve etkileyen değer yönelimleri ve tutumlarının iyi anlaşılması gerekir; bu gereklilik özellikle küresel iklim değişikliğine yönelik eğitim programları ve müfredat geliştirme konularını inceleyen eğitim araştırmacılarının da üzerinde önemle durmaları gereken bir konudur (Brownlee, Powell ve Hallo, 2013).

Küresel iklim değişikliği eğitiminin amacı, insan davranışlarını değiştirmektir; araştırmacıların büyük çoğunluğu, insan davranışlarının ve davranış niyetlerinin belirleyici unsurları olarak değerler, tutumlar ve inançlara işaret etmektedirler (Hines, Hungerford ve Tomera, 1987). Eğitim psikolojisi alanındaki teorilerin pek çoğu, değerler, tutumlar ve inançların, sosyal sorumluluk ve normları şekillendirdiğini ve/veya belirlediğini, bunun sonucunda da davranışları etkilediğini doğrulamaktadır (Stern ve ark., 1995). Planlanmış davranış teorisi, örneğin, benzer bir sebep-sonuç silsilesi öne sürmektedir, inancın, bir davranışın gerçekleştirilmesi için sosyal açıdan kabul görme ile ilgili tutumlara, bu davranışın arzulanan sonuçlarına ve çoğunlukla davranış niyetlerini de etkileyen o davranışı gerçekleştirmeye yönelik beceri algısına sebep olduğunu savunmaktadır (Ajzen, 1991).

Bu nedenle, sosyal teorilerin pek çoğuna göre, öğrencilerin davranışlarını değiştirmek ve pekiştirmek isteyen eğitimcilerin, öğrencilerinin tutumlarını iyi anlaması gerekmektedir (Powell ve Ham, 2008). Bu nokta, özellikle küresel iklim değişikliğinin önlenmesi için çok önemlidir, çünkü küresel iklim değişikliğine yönelik çözümler, ister önlemeye yönelik; isterse etkilerini azaltmaya yönelik olsun, genellikle, insan davranışlarında değişiklik yaratmak zorunluluğuna dayanır (Hulma, 2009). Son tahlilde, öğrencilerin küresel iklim değişikliğine ilişkin inançlarını ve davranış niyetlerini anlamak, eğitimcilere iklim dostu davranışların geliştirilmesinde yardımcı olacaktır. Bu bakımdan, bu çalışmanın, Lisans öğrencilerinin küresel iklim değişikliği ile ilgili inançları ve davranış niyetlerini etkileyen faktörlerin incelenmesi suretiyle Türkiye'de bu alandaki eğitim programcıları ile eğitimcilerin araştırma ve çabalarına katkı sunacağına inanılmaktadır.

Çevreyi koruma, genellikle geleceğe yönelik endişeleri içerir; çünkü doğal kaynaklar gelecek nesiller için korunmaktadır. Sürdürülebilir Kalkınma kavramının en yaygın kullanılan tanımı da gelecek düşüncesi ya da kaygısına işaret eder ve/veya vurgu yapar: Günümüz insanın ihtiyaçları karşılanırken gelecek nesillerin ihtiyaçlarından ödün verilmemelidir. Bu bakımdan, sürdürülebilirlik kavramı, hem kısa süreli ve hem de uzun vadeli zaman perspektifine sıkı sıkıya bağlıdır. Sürdürülebilirlik, bireylerin davranışlarının kısa ve uzun vadeli getirileri ile yaptıkları seçimlerin sonuçlarına dikkat etmelerini; aldıkları kararların ve davranışlarının gelecek nesiller üzerindeki etkileri açısından sorumluluk almalarını gerektirir (Gibson, 2006). Bu nedenle, gelecek zaman yönelimi ya da gelecek zaman perspektifi, bazı eğitim araştırmacıları tarafından Sürdürülebilir Kalkınma için Eğitim'in önemli unsurlarından biri olarak kabul edilir (Frisk, & Larson, 2011; Wiek, Withycombe, & Redman, 2011).

Bunun yanı sıra, gelecek zaman perspektifinin küresel iklim değişikliği eğitiminde de özel bir önemi vardır. Küresel iklim değişikliğinin pek çok olumsuz ve ciddi etkisi veya sonuçları gelecek bin yıllık süreçte ortaya çıkacağı için (Collins ve ark., 2007), küresel iklim değişikliğinin olumsuz sonuçlarının azaltılması ve önlenmesi için bireylerin şu anda gerçekleştirdikleri davranışlarının uzun süreli sonuçlarını dikkate almaları gerekmektedir (Milfont, & Demarque, 2015).

Küresel iklim değişikliğinin insanlar için yarattığı problemler ve riskler karşısında yükseköğretim kurumlarının önemli sorumlulukları bulunmaktadır; çünkü ülkemizde ve dünyada üniversiteler, gençleri, toplumun karar alıcıları, sürdürülebilir kalkınma politikalarına yön verecek liderler, demokratik toplumların etkin ve bilinçli vatandaşları ve pek çok meslek sahibi olarak geleceğe hazırlar. Bu nedenle, üniversite mezunlarının küresel iklim değişikliğinin doğurduğu; doğurmakta olduğu ve doğuracağı olumsuz ve tehlikeli sonuçlarla baş edebilecekleri düzeyde, bilgi, beceri ve donanıma sahip olmalarını sağlamak ve eğitmek sorumluluğunu üstlenmesi gerekmektedir. Böylesine önemli bir sorumluluk ve görevi yerine getirmek için, her şeyden önce, üniversite öğrencilerinin küresel iklim değişikliği hakkında neye inandıklarını ve ne düşündüklerini bilmek oldukça önemlidir. Bu nedenle, üniversite

öğrencilerinin iklim değişikliği ile ilgili inançları, çevresel değer yönelimleri, özyeterlik inançları ve gelecek zaman perspektifinin araştırılması, yükseköğretim programları ve müfredatın değerlendirilmesi ve geliştirilmesine ışık tutabileceği düşünülmektedir. Ayrıca, bu çalışmanın bulguları, ülkemizdeki alanyazın küresel iklim değişikliği ile ilişkili gelecek zaman perspektifine yönelik çalışmalar sunmadığından, ilgili alanyazına katkı sağlayacağına inanılmaktadır.

Son olarak, küresel iklim değişikliği ile ilgili alanyazın incelemesi sonuçları, şimdiye değin yapılan araştırmaların, büyük ölçüde, gelişmiş ülkelerde gerçekleştirildiğine işaret etmektedir. Küresel iklim değişikliğinin olumsuz sonuçlarına en çok maruz kalan ve iklim değişikliğiyle mücadele ya da önleme girişimleri için gerekli alt yapı ve finansmana sahip olmayan gelişmekte olan ya da gelişmemiş ülkelerde de bu çalışmaların yapılması gerekmektedir. Bu bakımdan, bu çalışmanın, gelişmekte olan ülkelerde yapılan çalışmalara katkı sağlayabileceği düşünülmektedir.

3. Yöntem

Bu çalışma, Türkçe uyarlaması yapılan Küresel İklim Değişikliği İnançları ölçeğinin geçerlik çalışmasının yapıldığı pilot çalışma ve küresel iklim değişikliği inançları ve davranış niyetlerini yordayan belirli değişkenlerin incelendiği ana çalışmadan oluşmaktadır. Bu çalışmanın amacı, iklim değişikliği inançları ve davranış niyetleri ile diğer pek çok kavram arasındaki ilişkiyi incelemek olduğu için bir korelasyon çalışma olarak tasarlanmıştır. Bu çalışmada pek çok değişken arasındaki ilişki, herhangi bir şekilde bu değişkenlere müdahale edilmeden incelendiği için nitel ilişkisel bir çalışmadır. Bu çalışmada, gelecek zaman perspektifi, iklim değişikliği hakkındaki bilgi algısı, çevresel tutumlar, işbirliği özyeterliği ve cinsiyet ile küresel iklim değişikliği inançları ve davranış niyetleri arasındaki ilişki incelenmektedir. Bu çalışmada, amaçlı örnekleme çeşitlerinden biri olan kolay ulaşılabilir durum örneklemesi yöntemi kullanılmıştır.

3.1 Katılımcılar

Bu çalışmada veri toplamak üzere kullanılacak ölçeklerin tutarlılık ve geçerlilik testlerini yapmak üzere 2013-2014 eğitim-öğretim yılı yaz döneminde bir pilot çalışma gerçekleştirilmiştir. Pilot çalışmaya, Orta Doğu Teknik Üniversitesi'nde öğrenim görmekte olan 197 gönüllü Lisans öğrencisi katılmıştır. Yapılan analizler sonucunda, çalışmada kullanılacak veri toplama aracının geçerli ve tutarlı olduğu tespit edilmiştir. Daha sonra, 2014-2015 eğitim-öğretim yılı güz döneminde esas çalışma gerçekleştirilmiştir. Esas çalışmaya Orta Doğu Teknik Üniversitesi'nde öğrenim görmekte olan 1580 gönüllü Lisans öğrencisi katılmıştır (Tablo 1). Veri toplamak üzere geliştirilen anket, sınıf ortamında araştırmacı tarafından katılımcılara dağıtılmış ve katılım tamamen gönüllülük temelinde gerçekleşmiştir.

Tablo 1. Lisans Öğrencilerine İlişkin Demografik Bilgiler (N= 1580)

	Frekans (f)	*Yüzdelik (%)*
Cinsiyet		
Kadın	881	55.8
Erkek	699	44.2
Yaş		
17-19	269	16.4
20-22	1134	71.7
23-25	177	11.1
26-29	8	0.6
30-33	2	0.2
Fakülte		
Mühendislik	709	44.9
Fen-Edebiyat	288	18.2
İktisadi ve İdari Bilimler	234	14.8
Eğitim	234	14.8
Mimarlık	115	7.3
Sınıf		
Birinci sınıf	318	20.1
İkinci sınıf	670	42.4
Üçüncü sınıf	364	23.0
Dördüncü	228	14.4

3.2 Veri Toplama Aracı

Bu çalışmada kullanılan veri toplama aracı olan *Gelecek Zaman Perspektifi ile İlişkilendirilmiş Küresel İklim Değişikliği İnançları ve Davranış Niyeti Anketi*, demografik form, küresel iklim değişikliği inançları, çevresel tutumlar ve gelecek

zaman perspektifi olmak üzere dört bölümden oluşmaktadır. Çalışmada kullanılan veri toplama aracını oluşturan alt boyutlar ile madde sayıları, Tablo 2'de verilmektedir.

Tablo 2. Gelecek Zaman Perspektifi ile İlişkilendirilmiş Küresel İklim Değişikliği İnançları ve Davranış Niyetleri Anketinin Alt Boyutları

Ölçekler/Boyutlar	*Maddeler*
1. Demografik Bilgi Formu	**4**
2. Küresel İklim Değişikliği Hakkındaki İnançlar	**23**
2.1. Gerçekleşmesine ilişkin inanç	6
2.2. Sebeplere ilişkin inanç	4
2.3. Sonuçlara ilişkin inanç	4
2.4. İşbirliği Özyeterliği	4
2.5. Davranış Niyeti	4
2.6. Bilgi Algısı	1
3. Çevresel Tutumlar	**22**
3.1. Ecosantrik tutum	12
3.2. Anthroposantrik tutum	10
4. Gelecekteki Sonuçları Dikkate Alma	**14**
4.1. Gelecekteki sonuçları dikkate alma	7
4.2. Günümüzdeki sonuçları dikkate alma	7

Demografik Form: Bu bölümde, Lisans öğrencilerinin cinsiyet, yaş, bölüm ve sınıfları hakkında bilgi almak üzere hazırlanan dört soru yer almaktadır.

Küresel İklim Değişikliği İnançları Anketi: Veri toplama aracının ikinci bölümünde, Heath ve Gifford (2006) tarafından geliştirilen ve araştırmacı tarafından bu çalışma kapsamında Türkçe'ye uyarlanan Küresel İklim Değişikliği İnançları Anketi yer almaktadır. Altı alt boyut altında 5li Likert tipte toplam 23 maddeden oluşmaktadır.

Çevresel Tutum Anketi: Veri toplama aracının üçüncü bölümünde, çevreye yönelik değer yönelimlerini ölçmek için Thompson ve Barton (1994) tarafından geliştirilen ve Türkçe adaptasyonu Eryigit (2010) gerçekleştirilen 5li Likert tipindeki 22 maddeden oluşan anket kullanılmıştır. Anket, insan merkezli (antroposantrik) ve çevre merkezli (ekosantrik) tutumlar olmak üzere iki boyuttan oluşmaktadır.

Gelecekteki Sonuçları Dikkate Alma Anketi (Consideration of Future Consequences): Veri toplama aracının dördüncü bölümünde, Lisans öğrencilerinin gelecek zaman perspektiflerini ölçmek üzere kullanılan Gelecekteki Sonuçları Dikkate Alma Anketi yer almaktadır. Anket, Strathman ve arkadaşları (1994) tarafından geliştirilmiş ve Türkçe'ye Cinan ve Doğan (2013) tarafından adapte edilmiştir. Anket iki boyut ve 14 maddeden oluşmaktadır. Anketin birinci boyutu, gelecekteki sonuçları dikkate alma (consideration of future consequences) ile ilgili 7 soru ve ikinci boyutu ise şu anki sonuçları dikkate alma (consideration of immediate consequences) ile ilgili 7 sorudan oluşmaktadır.

4. Bulgular

Bu çalışmada, temel olarak iki tür istatistiksel veri analiz yöntemi kullanılmıştır: Betimsel istatistik ve Çıkarımsal istatistik. Bu nedenle, çalışma bulguları, betimsel ve çıkarımsal istatistik sonuçları olmak üzere iki ana başlık altında incelenmiş ve sunulmuştur. Eksik verilerin ve aykırı değer tespitinde, normallik temininde, açıklayıcı faktör analizlerinin yapılmasında, değişkenlerin betimleyici istatistiklerinde ve hiyerarşik regresyon analizinde SPSS istatistik paket programı kullanılmıştır. Çalışma kapsamında yapılan kullanılan veri toplama aracının alt ölçeklerinin geçerlilikleri test etmek üzere gerçekleştirilen doğrulayıcı faktör analizlerinde AMOS 21 istatistik paket programı kullanılmıştır.

Ön Veri Analizi: Betimsel ve çıkarımsal analizler gerçekleştirilmeden önce, verileri düzenlemek ve bir sonraki analizlere hazırlamak için ön veri analizi yapılmıştır. Bu kapsamda, eksik veri analizi, etkili veri noktaları, tek değişkenli ve çok değişkenli normallik ve doğrusallık analizleri gerçekleştirilmiştir.

4.1 Betimleyici Analiz Bulguları

Lisans öğrencilerinin, küresel iklim değişikliğinin gerçekleşiyor olduğuna; küresel iklim değişikliğinin sebeplerine ve küresel iklim değişikliğinin olumsuz etkilerine ilişkin inançlarının, işbirliği özyeterliğine ilişkin inançlarının, küresel iklim değişikliğini önleyici davranış niyetlerinin, küresel iklim değişikliği hakkındaki bilgi algılarının ve gelecek zaman perspektifine sahip olma düzeylerinin incelenmesinde

betimleyici analiz yöntemi, kullanılmıştır. Öğrencilerin anket maddelerine verdikleri yanıtların yüzdelik, ortalama ve standart sapma değerleri hesaplanmıştır.

Lisans Öğrencilerinin Küresel İklim Değişikliği Hakkındaki İnançları

Küresel İklim Değişikliğinin Gerçekleşmesine İlişkin İnançlar: Lisans öğrencilerinin küresel iklim değişikliğine ilişkin inançlarının ortalama değerleri oldukça yüksektir. Çalışma bulguları, Lisans öğrencilerinin, küresel iklim değişikliğinin günümüzde gerçekleşiyor olduğuna (Ort=4.11, SS=.60); küresel iklim değişikliğinin temelde insan faaliyetlerinin bir sonucu olduğuna (Ort=4.04, SS=.63) ve küresel iklim değişikliğinin sonuçlarının insanlar için zararlı olacağına (Ort=4.30, SS=.58) inanmakta olduklarını ortaya koymuştur. Buna ek olarak, betimsel analiz sonuçlarına göre, öğrencilerin büyük bir çoğunluğu (%85), küresel ısınmanın yarattığı etkilerin pek çoğunu fark ediyor olduklarını; çocukluk zamanlarıyla karşılaştırdıklarında, günümüz hava koşullarının değişmiş (%80) ve hava sıcaklığının artmış (%71) olduğuna inandıklarını bildirmişlerdir. Katılımcıların çoğu (%88) küresel iklim değişikliğinin günümüzde yaşanıyor olduğuna ve katılımcıların üçte ikisi (%78) küresel iklim değişliğinin var olduğuna kesinlikle inandıklarını belirtmişlerdir.

Diğer taraftan, katılımcıların %10'u küresel iklim değişikliğinin yaşanıyor olmasından emin olmadığına ve %5'inin küresel iklim değişikliğinin gerçekleşiyor olduğuna dair hiçbir işaret olmadığına inandıklarını belirtmişlerdir. Daha da önemlisi, katılımcıların %6'sı küresel iklim değişikliğine kesinlikle inanmadıklarını bildirmiştir.

Küresel İklim Değişikliğinin Sebeplerine İlişkin İnançlar: Katılımcıların %78'i küresel iklim değişikliğinin temelde insan faaliyetlerinden kaynaklandığına inandıklarını bildirmiştir. Diğer taraftan, %15'i emin olmadıklarını; %7'si insan faaliyetlerinin küresel iklim değişikliğine yol açtığına inanmadıklarını ve %10'u küresel iklim değişikliğinin doğal sebeplerden kaynakladığına inandıklarını belirtmiştir.

Küresel İklim Değişikliğinin Sebeplerine İlişkin İnançlar: Katılımcıların büyük çoğunluğu (%94) küresel iklim değişikliğinin insanlar ve çevre için olumsuz

sonuçlar doğuracağına inanmaktadır. Aynı şekilde, katılımcıların çoğu (%93), küresel iklim değişikliğinin bazı olumlu etkileri olacağına inanmamaktadır. Diğer taraftan, katılımcıların üçte biri (%25) küresel iklim değişikliğinin sonuçlarının zararlı olabileceğinden emin olmadığını ve %10'u da küresel ısınmanın çevre için zararlı etkileri olacağına inanmadıklarını bildirmiştir.

Lisans Öğrencilerinin Küresel İklim Değişikliğine İlişkin İşbirliği Öz-Yeterliliği Çalışma bulguları, Lisans öğrencilerinin işbirliği özyeterlik düzeylerinin çok yüksek olmadığına işaret etmektedir (Ort=3.37, SS=.70). Katılımcıların %30'u, davranışlarının küresel iklim değişikliğinin olumsuz etkilerini azaltılmasında önemli bir fark yaratacağına ya da anlamlı bir etkisi olacağına inanmamaktadır. Diğer taraftan, katılımcıların %30'u küresel iklim değişikliğini önlemeye yönelik yapacakları eylemlerin anlamlı bir katkısı olacağını düşünmektedir.

Lisans Öğrencilerinin Küresel İklim Değişikliğini Önlemeye Yönelik Davranış Niyetleri: Çalışmaya katılan Lisans öğrencilerinden %80'i, küresel iklim değişikliğinin olumsuz etkilerini azaltmaya yönelik davranışta bulunma ya da çaba gösterme niyetinde olduklarını bildirmiştir. Ancak, %10'u küresel iklim değişikliğini azaltmak için herhangi bir çaba harcama niyetinde olmadıklarını belirtmiştir.

Lisans Öğrencilerinin Küresel İklim Değişikliği Hakkındaki Bilgi Algıları: Çalışmaya katılan Lisans öğrencilerinin küresel iklim değişikliğinin nedenleri ve etkilerine ilişkin sahip oldukları bilgi düzeyi algısı oldukça düşüktür (Ort=2.97, SS=.82). Katılımcıların %50'si küresel iklim değişikliğine ilişkin bilgi düzeylerinin orta seviyede, %25'i ise sınırlı seviyede olduğunu bildirmiştir. Katılımcıların yalnızca %20'si küresel iklim değişikliği hakkında kapsamlı bilgiye sahip olduklarını belirtmişlerdir.

Lisans Öğrencilerinin Çevresel Tutumları: Çalışmaya katılan Lisans öğrencilerinin, insan merkezli (antroposantrik) çevresel tutumdan (Ort=2.42, SS=.62) ziyade, çevre merkezli (ekosantrik) tutuma (Ort=4.31, SS=.47) sahip olduğu anlaşılmıştır. Katılımcılar, çevreyi, insanlar için taşıdığı önem ve sağladığı yarar adına değil, doğaya verdikleri değer için korudukları sonucuna varılmıştır.

Lisans Öğrencilerinin Gelecek Zaman Perspektifi Düzeyi: Çalışmaya katılan Lisans öğrencilerinin büyük bir çoğunluğu (%93), şu anki davranışlarına gelecekteki olası sonuçlarına göre yön verdikleri, bir karar aldıklarında bu kararın gelecekte kendilerini ne şekilde etkileyeceğini düşündüklerini bildirmiştir. Katılımcıların %80'i gelecekte neler olabileceğini düşündüklerini ve şu anki davranışlarını bu düşüncelerine göre şekillendirdiklerini belirtmiştir. Katılımcıların, şimdiki zaman perspektifinden (Ort=4.93, SS=1.01) ziyade daha çok gelecek zaman perspektifine (Ort=5.36, SS=.86) sahip oldukları tespit edilmiştir.

Çalışma Değişkenlerinin Cinsiyet Etkisi Bakımından Değerlendirilmesi: Çalışmada kullanılan değişkenlerin ortalamalarına bakıldığında, bayan katılımcıların, erkek katılımcılara oranla, küresel iklim değişikliğinin gerçekleşmekte olduğuna (*Ort*=4.20, *SS*=.51, *Ort*=3.99, *SS*=.66), büyük ölçüde insan faaliyetlerinden kaynaklandığına (*Ort*=4.03, *SS*=.60, *Ort*=3.03, *SS*=.66) ve insanlar ve doğal çevre için olumsuz ve ciddi sonuçlar doğuracağına ilişkin (*Ort*=3.86, *SS*=.59, *Ort*=3.55, *SS*=.77) daha güçlü inanç taşıdıkları sonucuna ulaşılmıştır.

Kadın katılımcıların erkeklere oranla daha çok ekosantrik (çevre merkezli) bir tutuma sahip oldukları (*Ort*=4.40, *SS*=.45, *Ort*=4.21, *SS*=.48 for males) küresel iklim değişikliğinin etkilerini azaltmaya yönelik daha yüksek seviyede davranış niyeti taşıdıkları (*Ort*=4.36, *SS*=.54, *Ort*=4.23, *SS*=.62) ve daha çok gelecek zaman yönelimine sahip oldukları tespit edilmiştir (*Ort*=5.40, *SS*=.83, *Ort*=5.32, *SS*=.90).

Diğer taraftan, erkek katılımcıların kadın katılımcılara oranla, küresel iklim değişikliğinin sebepleri ve etkileri hakkında daha çok bilgiye sahip oldukları algısını taşıdıkları sonucuna ulaşılmıştır (*Ort*=2.99, *SS*=.86, *Ort*=2.96, *SS*=.79).

4.2 Korelasyon Analizi Sonuçları

Korelasyon analizinin sonuçlarına göre, en yüksek pozitif ilişki, işbirliği özyeterliği ile küresel iklim değişikliğini önlemeye yönelik davranış niyeti arasında bulunmuştur (r=.61, p<.01). Diğer bir ifade ile işbirliğine yönelik davranışın toplum içinde anlamlı bir etki yaratacağına ilişkin inanç ile küresel iklim değişikliğini önlemeye yönelik davranış niyeti ile güçlü bir ilişki bulunmaktadır. İnsan merkezli çevresel

tutum ile tüm değişkenler arasında negatif ilişki tespit edilmiştir. Diğer taraftan, çevre merkezli tutum ile çalışmanın diğer değişkenleri arasında pozitif ilişki bulunmaktadır. Gelecek zaman perspektifi ile insan merkezli çevresel tutum arasında negatif ilişki ve diğer tüm değişkenler arasında pozitif ilişki tespit edilmiştir.

4.3 Hiyerarşik Regresyon Analiz Bulguları

Bu çalışmada, bağımlı ve bağımsız değişkenler arasındaki ilişkiyi incelemek için dört ayrı hiyerarşik regresyon analizi yapılmıştır. Çalışmanın dört bağımlı değişkeni, küresel iklim değişikliğinin gerçekleşmesine ilişkin inanç, küresel iklim değişikliğinin sebeplerine ilişkin inanç, küresel iklim değişikliğinin sonuçlarına ilişkin inanç ve küresel iklim değişikliğini önlemeye yönelik davranış niyetidir. Bağımlı değişkenler ve yordayıcı (bağımsız) değişkenler ile hiyerarşik regresyon modelleri ve aşamaları Tablo 3'te verilmektedir.

Tablo 3. Hiyerarşik Regresyon Analizinde Modellerin Açıklanması

Model	*Bağımlı Değişkenler*	*Kademe*	*Değişken Sayısı*	*Yordayıcı/Bağımsız Değişkenler*
1	Küresel İklim Değişikliğinin Gerçekleşmesine İlişkin İnanç	1	1	Cinsiyet
2		2	3	Bilgi algısı, ekosantrik çevresel tutum, antroposantrik çevresel tutum
3		3	1	Gelecek zaman perspektifi
1	Küresel İklim Değişikliğinin Sebeplerine İlişkin İnanç	1	1	Cinsiyet
2		2	3	Bilgi algısı, ekosantrik çevresel tutum, antroposantrik çevresel tutum
3		3	1	Gelecek zaman perspektifi

Tablo 3 (devamı)

1	Küresel İklim Değişikliğinin Sonuçlarına İlişkin İnanç	1	1	Cinsiyet
2		2	3	Bilgi algısı, ekosantrik çevresel tutum, antroposantrik çevresel tutum
3		3	1	Gelecek zaman perspektifi
1	Küresel İklim Değişikliğini Önlemeye Yönelik Davranış Niyeti	1	1	Cinsiyet
2		2	7	Bilgi algısı, ekosantrik çevresel tutum, antroposantrik çevresel tutum, küresel iklim değişikliğinin gerçekleşmesine ilişkin inanç, küresel iklim değişikliğinin sebeplerine ilişkin inanç, küresel iklim değişikliğinin sonuçlarına ilişkin inanç, işbirliği özyeterliği
3		3	1	Gelecek zaman perspektifi

Hiyerarşik regresyon analizi sonuçlarına göre, bağımlı dört değişkeni yordamak için model uygundur. Küresel iklim değişikliğinin gerçekleşmesine ilişkin inanç ele alındığında, birinci kademe değişkeni olan cinsiyet dikkate alınınca regresyon modeli anlamlıdır:

R^2=.031, F (1,1578) = 49.725. Cinsiyet, küresel iklim değişikliğinin gerçekleşmesine ilişkin inancı önemli ölçüde yordamaktadır. İkinci kademede ise, küresel iklim değişikliği hakkında bilgi algısı, ekosantrik çevresel tutum ve antroposantrik çevresel tutum değişkenleri dikkate alınınca regresyon modeli anlamlıdır: R^2=.184, F (3,1575) = 89.027 ve küresel iklim değişikliği hakkında bilgi ve çevresel tutumlar, küresel iklim değişikliğinin gerçekleşmesine ilişkin inancı önemli ölçüde yordamaktadır. Üçüncü kademede, gelecek zaman perspektifi değişkeni dikkate alınınca, regresyon modeli anlamlıdır: R^2 =.190, F (1,1574)=9.955 ve küresel iklim değişikliğinin gerçekleşmesine ilişkin inancı önemli ölçüde yordamaktadır.

Küresel iklim değişikliğinin sebeplerine ilişkin inanç bağımlı değişken olarak ele alındığında, birinci kademe değişkeni olan cinsiyet dikkate alınınca regresyon modeli anlamlı değildir. Cinsiyet, küresel iklim değişikliğinin ana sebebinin insan faaliyetleri olduğuna ilişkin inancı yordamamaktadır. İkinci kademede ise, küresel

iklim değişikliği hakkında bilgi algısı, ekosantrik çevresel tutum ve antroposantrik çevresel tutum değişkenleri dikkate alınınca regresyon modeli anlamlıdır: R^2=.147, F (3,1575) = 89.949 ve küresel iklim değişikliği hakkında bilgi ve çevresel tutumlar, küresel iklim değişikliğinin sebeplerine ilişkin inancı önemli ölçüde yordamaktadır. Üçüncü kademede, gelecek zaman perspektifi değişkeni dikkate alınınca, regresyon modeli anlamlıdır: R^2=.148, F (1,1574) = 2.499 ve küresel iklim değişikliğinin sebeplerine ilişkin inancı önemli ölçüde yordamaktadır.

Küresel iklim değişikliğinin sonuçlarına ilişkin inanç bağımlı değişken olarak ele alındığında, birinci kademe değişkeni olan cinsiyet dikkate alınınca regresyon modeli anlamlıdır: R^2=.012, F (1,1578) = 18.734. Cinsiyet, küresel iklim değişikliğinin sonuçlarının insanlar ve çevre için zararlı olacağına ilişkin inancı önemli ölçüde yordamaktadır. İkinci kademede ise, küresel iklim değişikliği hakkında bilgi algısı, ekosantrik çevresel tutum ve antroposantrik çevresel tutum değişkenleri dikkate alınınca regresyon modeli anlamlıdır: R^2=.194, F (3,1575) = 119.085 ve küresel iklim değişikliği hakkında bilgi ve çevresel tutumlar, küresel iklim değişikliğinin olumsuz sonuçlar doğuracağına ilişkin inancı önemli ölçüde yordamaktadır. Üçüncü kademede, gelecek zaman perspektifi değişkeni dikkate alınınca, regresyon modeli anlamlıdır: R^2 =.197, F (1,1574) = 4.170 ve küresel iklim değişikliğinin olumsuz sonuçlar doğuracağına ilişkin inancı önemli ölçüde yordamaktadır.

Küresel iklim değişikliğini önlemeye yönelik davranış niyeti bağımlı değişken olarak ele alındığında, birinci kademe değişkeni olan cinsiyet dikkate alınınca regresyon modeli anlamlıdır: R^2 =.049, F (1,1578) = 81.696. Cinsiyet, küresel iklim değişikliğini önlemeye yönelik davranış niyetini önemli ölçüde yordamaktadır. İkinci kademede ise, küresel iklim değişikliği hakkında bilgi algısı, ekosantrik çevresel tutum ve antroposantrik çevresel tutum, küresel iklim değişikliğinin gerçekleşmesine ilişkin inanç, küresel iklim değişikliğinin sebeplerine ilişkin inanç, küresel iklim değişikliğinin sonuçlarına ilişkin inanç, işbirliği özyeterliği değişkenleri dikkate alınınca regresyon modeli anlamlıdır: R^2=.482, F (7,1571) = 187.333 ve küresel iklim değişikliği hakkında bilgi ve çevresel tutumlar, küresel iklim değişikliğine ilişkin inançlar ve işbirliği özyeterliği, küresel iklim değişikliğini önlemeye yönelik

davranış niyetini önemli ölçüde yordamaktadır. Üçüncü kademede, gelecek zaman perspektifi değişkeni dikkate alınınca, regresyon modeli anlamlıdır: R^2 =.489, F (1,1570) = 23.271 ve küresel iklim değişikliğini önlemeye yönelik davranış niyetini önemli ölçüde yordamaktadır. Çalışmanın sonuçları, ekosantrik çevre tutumu ve algılanan bilgi düzeyinin, üniversite öğrencilerinin iklim değişikliği inançlarını yordamada en belirleyici iki faktör olduğunu göstermiştir. Gelecek zaman perspektifinin, küresel iklim değişikliği inançlarını yordamada istatistiksel olarak önemli bir belirleyici olduğu sonucuna varılmıştır. Ayrıca, işbirliği özyeterliği, ekosantrik çevre tutumu ve algılanan bilgi düzeyinin, üniversite öğrencilerinin, küresel iklim değişikliğine ilişkin davranış niyetlerini yordamada en belirleyici üç faktör olduğu sonucuna varılmıştır. Gelecek zaman perspektifi, küresel iklim değişikliğine ilişkin davranış niyetlerini yordamada istatistiksel olarak önemli bir belirleyici olmuştur. Tablo 4'te yordayıcı değişkenlerin, Lisans öğrencilerinin küresel iklim değişikliği hakkındaki inançları ve davranış niyetlerini yordama katkıları ve açıkladıkları varyans yüzdelikleri verilmektedir.

Tablo 4. Yordayıcı Değişkenlerin Katkıları ve Açıkladıkları Varyans Yüzdelikleri

Bağımlı Değişkenler	***Yordayıcı/Bağımsız Değişkenler***	***Yordayıcı Değişkenlerin Katkıları (standardized coefficients)***	***Açıklanan Varyans***
Küresel İklim Değişikliğinin Gerçekleşmesine İlişkin İnanç	Cinsiyet	β = .12 (12%)	3%
	Bilgi algısı, ekosantrik çevresel tutum, antroposantrik çevresel tutum	Ekosantrik tutum β = .24 (24%) Bilgi algısı β = .23 (23%) Anthroposantrik tutum β= -.6 (6%)	18%
	Gelecek zaman perspektifi	Gelecek zaman perspektifi β=.75 (7.5%)	**19%**
Küresel İklim Değişikliğinin Sebeplerine İlişkin İnanç	Cinsiyet	Anlamlı değil	
	Bilgi algısı, ekosantrik çevresel tutum, antroposantrik çevresel tutum	Ekosantrik tutum β = .253 (25%) Bilgi algısı β = .143 (14%) Anthroposantrik tutum β= -.149 (15%)	14.7%
	Gelecek zaman perspektifi	Gelecek zaman perspektifi β=.39 (4%)	**14.8%**

Tablo 4 (devamı)

Küresel İklim Değişikliğinin Sonuçlarına İlişkin İnanç	Cinsiyet	β =.03 (3%)	12%
	Bilgi algısı, ekosantrik çevresel tutum, antroposantrik çevresel tutum	Ekosantrik tutum β =.32 (32%) Bilgi algısı β =.16 (16%) Anthroposantrik tutum β = -.10 (10%)	19.4%
	Gelecek zaman perspektifi	Gelecek zaman perspektifi β =.05 (5%)	19.7% ~20%
Küresel İklim Değişikliğini Önlemeye Yönelik Davranış Niyeti	Gender	β =.094 (1%)	5%
	Bilgi algısı, ekosantrik çevresel tutum, antroposantrik çevresel tutum, küresel iklim değişikliğinin gerçekleşmesine ilişkin inanç, küresel iklim değişikliğinin sebeplerine ilişkin inanç, küresel iklim değişikliğinin sonuçlarına ilişkin inanç, işbirliği özyeterliği	İşbirliği yeterliği β =.464 (46%) Ecosantrik tutum β =.15 (15%) Bilgi algısı β =.096 (9.6%) Gerçekleşme inancı β =.096 (9.6%) Sebep inancı β = .067 (6.7%) Sonuç inancı β=.042 (4.2%) Anthroposantrik tutum β =.014 (1.4%)	48%
	Gelecek zaman perspektifi	Gelecek zaman perspektifi β =.093 (9.3%)	49%

5. Tartışma

Türkiye'de ve diğer ülkelerde yapılan çalışmalar, küresel iklim değişikliğinin insanlar tarafından açık bir tehdit olarak görülmediği, temel olarak insan davranışlarından kaynaklandığının yeterince iyi anlaşılmadığını ortaya koymuştur. Diğer çalışma bulgularına paralel olarak, bu çalışmanın bulguları da, Lisans öğrencilerinin büyük bir çoğunluğunun küresel iklim değişikliğinin varlığına inandığını, ancak, yine de küresel iklim değişikliğinin doğal bir süreç olduğuna inandıkları ve insan davranışlarından kaynaklanan bir olgu olduğuna inanmadıklarını belirten katılımcıların da bulunduğunu göstermiştir. Küresel iklim değişikliği ile mücadele etmek ya da sebep olan unsurları azaltmak, büyük ölçüde insanların karşı karşıya oldukları sorunu ya da riskleri kabul etmesine bağlıdır. Bu bakımdan, geleceğin karar vericileri ve meslek sahipleri olarak, özellikle üniversite

öğrencilerinin, günlük eylemleri ile küresel iklim değişikliği arasındaki bağlantıyı anlamalarını sağlayacak, küresel iklim değişikliğinin yol açtığı olumsuzlarla baş edebilmelerini mümkün kılacak ve çözüm yolu üretebilecekleri bilgi, beceri ve yetkinleri kazanmaları için uygun eğitim programları oluşturulmalıdır.

Daha önce yapılan pek çok araştırma, insan davranışlarının kalabalık bir grup içinde anlamlı bir fark yarattığına inanmanın, diğer bir ifadeyle, işbirliği özyeterliğine sahip olan bireylerin, küresel iklim değişikliğini önleyici davranışlar sergileme niyetini taşıdıkları sonucuna ulaşmıştır (Gifford, 2011; Heath ve Gifford, 2006). Bu çalışma bulguları, bu sonuçları doğrular ve destekler niteliktedir. Lisans öğrencilerinin küresel iklim değişikliğini önlemeye yönelik davranışlarının en önemli belirleyici faktörü olarak işbirliği özyeterliği bulunmuştur.

Ülkemizde ve diğer ülkelerde yapılan çalışmalar, çevre merkezli (ekosantrik) tutuma sahip bireylerin, küresel iklim değişikliğinin varlığına inandıklarını, ortaya çıkmasında insan faktörünün önemli rol oynadığının farkında olduklarını ve insanlık ve doğa için ciddi tehdit oluşturduğuna inandıklarını ortaya koymuştur (Nilsson, von Borgstede ve Biel, 2004; O'Connor ve ark., 1999; Bord ve ark., 1998). Bu çalışma da benzer sonuçlar elde edilmiştir. Lisans öğrencilerinin küresel iklim değişikliğine ilişkin inançlarını belirleyen en önemli unsur, ekosantrik çevresel tutum olarak bulunmuştur.

Çalışmanın bir diğer önemli sonucu da, küresel iklim değişikliğinin sebepleri ve etkileri hakkındaki bilgi algısının, hem küresel iklim değişikliğinin varlığına, sebeplerine ve sonuçlarına ilişkin inançları ve hem de küresel iklim değişikliğini önlemeye yönelik davranış niyetlerini belirleyen önemli bir unsur olduğunun tespit edilmesidir. Bu sonuç, geçmişte yapılan çalışma bulgularını destekler niteliktedir. Örneğin, Ngo, West ve Calkins (2009), küresel iklim değişikliği hakkındaki bilgi algısının, küresel iklim değişikliğini önlemeye yönelik pek çok davranışı önemli ölçüde yordadığı sonucuna varmışlardır. Lazo ve arkadaşları (2000), küresel iklim değişikliği hakkında sahip olunan bilgi düzeyinin, küresel iklim değişikliğinin getirdiği riskleri algılayabilme düzeyini etkilediğini bildirmektedirler. Diğer bir

ifadeyle, insanların küresel iklim değişikliği hakkındaki bilgileri arttıkça, getirdiği ya da taşıdığı riskleri aynı oranda yüksek düzeyde algılayabilmektedirler.

Daha önce yapılan çalışmalar, gelecek zaman yönelimi ve perspektifinin, çevre dostu davranışlar ve tutumlarda belirleyici rol oynadığını işaret etmektedir (örneğin, Joireman ve ark.,2001, 2004; Corral-Verdugo, Fraijo-Sing ve Pinheiro, 2006; Milfont, Wilson ve Diniz, 2012). Bu çalışmada, gelecek zaman perspektifi, Lisans öğrencilerinin, hem küresel iklim değişikliğine ilişkin inançlarda ve hem de küresel iklim değişikliğini önlemeye yönelik davranış niyetinde belirleyici rol oynadığı sonucuna ulaşılmıştır. Ancak, gelecek zaman perspektifi, Lisans öğrencilerinin inançları ve davranış niyetlerinin açıklanmasında, anlamlı olmasına rağmen düşük düzeyde belirleyici olmuştur. Bunun nedeni, gelecek zaman yöneliminin kültürel unsurlarla farklılıklar göstermesi ile açıklanabilir. Gailly (1982) sosyal ve kültürel farklılıkların, geleceğe yönelik bakış açılarında ve motivasyonda belirleyici rol oynadığını ileri sürmektedir. Gaily, Belçikalı ve Türk gençleri ile gerçekleştirdiği çalışmada, gelecek zaman algısı ve yöneliminde kültürel farklılıkların, gençlerin gelecek planları ve motivasyonlarında önemli ölçüde rol oynadığı sonucuna ulaşmıştır. Türk aile kültürünün, İslam inançlarının etkisi ile, daha kaderci (geleceğin şekillenmesinde insan unsurunu dikkate almayan) bir yaklaşıma sahip olduğunu iddia etmektedir. Ancak, küreselleşme ve modernleşmenin sonucunda, genç neslin, geleneksel Türk toplumunun tersine, kendi geleceklerini şekillendirmede inisiyatif aldıkları ve daha çok gelecek perspektifine sahip olduklarını belirten çalışmalar da bulunmaktadır (Kabasakal ve Dastmalchian, 2001; Sircova ve ark., 2015).

Bu çalışmanın bulguları, küresel iklim değişikliğine ilişkin inançlarda ve küresel iklim değişikliğinin önlenmesine yönelik davranış niyetlerinde, cinsiyet etkisini ortaya koymuştur. Günümüzde ve geçmişte yapılan çalışmaların büyük bir çoğunluğu da, tutarlı bir biçimde cinsiyetin, çevre dostu davranışlarda, inançlarda, değer yargılarında, tutumlarda önemli bir rol oynadığına işaret etmektedir (Tuncer, Ertepinar, Tekkaya ve Sungur, 2005; Yılmaz, Şahin, Ertepınar ve Teksöz, 2012; Boone ve Anderson, 2004; Milfont ve Duckitt, 2010; Zelezny, Chua ve Aldrich, 2000; Milfont, 2012).

6. Öneriler

Küresel iklim değişikliğinin olumsuz etkilerini önlemek ve bu olumsuzluklarla yaşayabilmek için, küresel iklim değişikliğinin farkında olan ve uygun davranışlar sergileyebilen bireylere ihtiyaç bulunmaktadır. Eğitim, bireylere uygun davranışlar kazandırmanın en önemli aracı olarak görülmektedir. Küresel iklim değişikliğinin büyük ölçüde gelecek nesilleri etkileyeceği göz önünde tutulduğunda, üniversite öğrencilerinin özellikle gelecek yönelimi ve gelecek odaklı bakış açısına sahip olmaları oldukça önemlidir. Bu nedenle, mevcut eğitim programlarının, öğrencilere, şu anda aldıkları kararların ve davranışlarının sonuçlarının gelecekte yaşayacak bireylerin yaşamlarını etkileyeceğini anlamalarını sağlayacak şekilde, uygun bilgi, beceri ve tutum kazandırması gerekmektedir. Öğretim üyeleri, derslerinde, öğrencilere bu becerileri kazandırmaya yönelik, senaryo oluşturma, rol oynama, benzeşim gibi öğretim yöntemleri kullanabilirler. Buna ilave olarak, öğrencilerin gelecek ile ilgili öngörüler kazandırmaya yönelik etkinlikler düzenleyebilirler.

Üniversite öğrencilerinin, küresel iklim değişikliğinin nedenlerini, insanlık ve doğaya yönelik olumsuz etkilerini ve olumsuz etkileri gidermek ya da azaltmak için olası çözüm yollarını anlamaları, problem çözme, bilimsel düşünme ve doğru karar alabilme becerileri kazanmaları gerekmektedir. Bu hedefleri gerçekleştirmek için, Türkiye'nin yükseköğretimde küresel iklim değişikliği eğitimi müfredatının geliştirilmesine yönelik somut adımlar atması zorunludur. Küresel iklim değişikliği ile ilişkilendirilmiş bir yükseköğretim müfredatı, öğrencilere gerekli olan bilgi, beceriler ve yetkinlikler kazandırmayı hedeflemelidir. Uygulamalı ve tecrübeye dayalı yaklaşımlar bu yetkinliklerin kazandırılmasında önemli rol oynayacaktır.

Buna ilave olarak, Türkiye'nin ulusal bir eğitim stratejisine ve bu stratejiyi destekleyecek mekanizmalar yaratmaya ihtiyacı bulunmaktadır. Daha açık bir şekilde ifade etmek gerekirse, ulusal düzeyde, yükseköğretimde iklim değişikliği eğitiminin koordine edilmesine imkan sağlayacak, bu alanda iyi uygulama örneklerinin paylaşılmasına yönelik ulusal bir bilgi ağı kurulabilir ve ulusal düzeyde, yükseköğretimde iklim değişikliği eğitiminin etkinliğini ölçmek üzere sürekli değerlendirme sistemleri oluşturulabilir.

Son olarak, Türkiye'nin iklim değişikliğine yönelik mevcut ulusal politikaları kapsamında eğitim hedefleri, temel olarak sadece sanayi ve genel kamuoyu bilgilendirme ve bilinçlendirme girişimleri yönündedir. Bu nedenle, Türkiye'nin küresel iklim değişikliği konularını ulusal eğitim politikalarına entegre etmesi ve iklim değişikliği eğitimini, iklim değişikliği politikalarına ve eylem planlarına dahil etmesi gerekmektedir.

APPENDIX D. CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name: Ateş, Deniz
Nationality: Turkish (TC)
Marital Status: Married with twins
E-mail: dates@metu.edu.tr

EDUCATION

Degree	Institution	Year of Graduation
MA	Hacettepe University, Graduate School of Social Sciences, History	1998
BS	METU, Faculty of Arts & Science, History	1995

WORK EXPERIENCE

Year	Place	Enrollment
2008-2015	METU, Learning & Student Development Office	Specialist
2005-2008	Council of Higher Education, Turkish ENIC-NARIC	Head
2003-2008	Council of Higher Education, EU& International Relations Office	Director
1998-2003	Council of Higher Education, Office for Recognition of Foreign Higher Education Qualifications	Specialist

FOREIGN LANGUAGE

Advanced English, Poor Arabic, Good Ottoman Turkish

APPENDIX E. TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü	
Sosyal Bilimler Enstitüsü	X
Uygulamalı Matematik Enstitüsü	
Enformatik Enstitüsü	
Deniz Bilimleri Enstitüsü	

YAZARIN

Soyadı : Ateş

Adı : Deniz

Bölümü : İlköğretim

TEZİN ADI (İngilizce): The Role of Future Time Perspective, Environmental Attitudes, Perceived Knowledge, Self-Efficacy of Cooperation and Gender in Predicting University Students' Beliefs and Behavioral Intention about Global Climate Change

TEZİN TÜRÜ : Yüksek Lisans [ ] Doktora [X]

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. [ ]
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. [ ]
3. Tezimden bir (1) yıl süreyle fotokopi alınamaz. [X]

TEZİN KÜTÜPHANEYE TESLİM TARİHİ