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Predictors of Turkish Elementary Teacher Candidates' Energy Conservation Behaviors: An Approach on Value-Belief-Norm Theory

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Abstract

The present study aimed to explain elementary teacher candidates' energy conservation behaviors by using Value-Belief-Norm (VBN) Theory. Participants in this study were 512 students at Faculty of Education from two public universities in Turkey. Of the 512 students, 35.5% were enrolled in the early childhood education program, 30.9% were in the elementary science education program, and 27.7% were in the elementary mathematics education program. The rest of the participants were pursuing a graduate program under the department of elementary education. The results of multiple linear regression analysis reflected that VBN Theory could successfully explain the participants' energy conservation behaviors. The teacher candidates' reduction in energy consumption could be accounted by personal norms, egoistic and biospheric value orientations. However, rather than personal norms, egoistic and biospheric value orientations made greater unique contribution to explain the criterion variable. Furthermore, each predictor variable in the causal model of VBN Theory was found to be significantly associated with the next variable, but value orientations deserved more attention than VBN Theory places on them within the study context.

Keywords: Energy conservation, Value-Belief-Norm Theory, teacher candidates

Introduction

It was reported that in 1970, only 51.5% of the population had an access to electricity in Turkey but by 1987, this ratio raised up to 99.7% which indicated electricity benefit for considerably huge amount of Turkish population (Dilaver, 2009). In the early years of that period, lightening was the major intent for electricity consumption by householders. However, new appliances such as washing machine, refrigerator, and television entered the daily life of householders along with an increase in family income and technological development. As a result, household electricity demand for Turkish residential sector emerged as a significant shareholder in overall electricity consumption. The critical issue underlying this progress is that household energy consumption significantly raises greenhouse gas emissions. Being aware of the potential consequences of climate change, Turkish government ratified the Kyoto Protocol in 2009, which is an international agreement to reduce worldwide greenhouse gas emissions. However, energy consumption of Turkish population increased by about 9.8% in 2010 when compared to the year of 2009 by using natural gas and fossil fuels which are responsible for greenhouse gas emissions (Ministry of Energy and Natural Resources, 2011).

In recent years, some adaptation programs also have been proposed to cope with climate change (United Nations Development Program [UNDP], 2010). However, behavioral challenges are among the systematic barriers to climate change adaptation. While suggesting some strategies as a remedy to climate change, barrier removal activities covering enhancement of awareness, education and training at individual and community levels to build capacity and have an impact on behavioral transformations have been argued in the adaptation programs (United Nations Development Program [UNDP], 2010). Thus, it could be inferred that education for sustainable development (ESD) is a key agent within the climate change adaptation and reduction in energy use.

Education for sustainable development in higher education sector has been advocated to make a major contribution to overcome the challenges of sustainability issues such as climate change, species loss, energy use and supply (Haigh, 2005). The universities should provide highly skilled individuals necessary for every labor market such as teachers, engineers, architects, scientists, and many more. Among these professionals, teachers should be well equipped with

the competences to educate the next generations, and make important decisions which affect entire societies. More specifically, the graduates of teacher education programs have a crucially important responsibility in preparing pupils to become active citizens toward a better and self-sustainable world (Summers, Comey and Childs, 2004). Realizing social and cultural characteristics of Turkish society with a large population of young people, it is an urgent need to enable young people to cultivate awareness, values, and skills to create a sustainable future. At this point, it should be noted that education for sustainable development has been arriving into all levels of education including early childhood, elementary and high school education as well as higher education (Webster, 2004). In this context, education for sustainable development in the teacher education programs could not discard to prepare future teachers to act as role models about sustainability related issues including energy conservation and efficiency. Since young people are educated through the guidance of teachers, future teachers should be well equipped with the necessary affections, awareness, values and beliefs in order to overcome the obstacles toward a sustainable world (Alkis & Ozturk, 2007).

In this context, the present study aimed to determine which psychological attributes were associated with teacher candidates' energy conservation behaviors. With reference to Stem and colleagues' (1999), Value-Belief-Norm (VBN) Theory proposed to explain pro- environmental behaviors guided this study. As suggested by Steg, Dreijerink, and Abrahamse (2005), the complete VBN Theory was used to explain teacher candidates' energy conservation behaviors.

Theoretical Framework

Considering the field of environmental psychology and environmental education research, considerable attempts have been made to clarify the factors pertaining to individuals' engagement in a particular pro-environmental
behavior by paying attention to socio- psychological theories. The literature review pointed out special attention paid on the theories of attitude-behavior connection in the context of environmental education research. However, as reported by Kollmus and Agyeman (2002), a varying and usually very small explanatory power of attitude as well as knowledge was shown for pro-environmental behaviors. These authors also advocated that the gap among knowledge, attitude, and behavior was unexpected because there

was a common assumption on dependency of individuals' life preferences on their attitudes, beliefs, and values. Early simplistic linear models of pro- environmental behaviors were proposed based on the mentioned assumption. In detail, it was hypothesized that more knowledge and favorable attitudes toward the environment would lead to pro-environmental behaviors. On the other hand, Kollmus and Agyeman (2002) concluded that the reliance on enhancement of environmental knowledge and attitude to facilitate behavioral change is surprising since such a transition is very difficult. In this aspect, Rajecki (1982) outlined the possible causes of attitude-behavior discrepancy and emphasized the complexity of designing valid research studies that measure and compare attitude and behavior. The Theory of Reasoned Action and the Theory of Planned Behavior were proposed by Ajzen and Fishbein to overcome such measurement discrepancies (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980). Thus, some research studies (e.g Boldero, 1995; Kurz, Linden, & Sheehy, 2007; Sparks and Shepherd, 1992; Taylor & Todd, 1995a, 1995b) focused on the Theory of Planned Behavior (Ajzen, 1991) deduced from the Theory of Reasoned Action (Ajzen & Fishbein, 1980) to grasp the nature of environment-related behaviors.

The Theory of Planned Behavior, being one of the fundamental behavioral models postulates that human behavior results from three belief constructs; beliefs about the likely consequences of a particular behavior and the evaluations of these consequences (behavioral beliefs), beliefs about the normative expectations of important others (e.g parents, friends, neighbours, teachers) and motivation to comply with these expectations (normative beliefs), and beliefs about the presence of factors that may support or prevent performance of the behavior and perceived significance of these factors (control beliefs). With their respective incorporation, behavioral beliefs result in a favorable or an unfavorable attitude toward the behavior; normative beliefs yield perceived social pressure or subjective norm; and control beliefs produce perceived behavioral control. In aggregates, attitude toward the behavior, subjective norms, and perceived behavioral control give rise to the formation of an intention to perform the behavior. It is of importance to note that intention is supposed to be the immediate antecedent of human behavior. Finally, proposed by Banter (2005), the adaptive ability of the Theory of Planned Behavior reflecting any changes in content, context and environment facilitates validity and applicability of this model.

On contrary, Value-Belief-Norm Theory, which is an inclusion of values, awareness of consequences, ascription of responsibility, and personal norms, grew out of value theory (Schwartz, 1992, 1994; Stem & Dietz, 1994), the New Environmental Paradigm (NEP), and Norm- Activation Model (NAM). Regarding the significant determinants of proenvironmental behaviors, some researchers (Karp, 1996; Nordlund, & Garvill, 2002; Sener, & Hazer, 2007; Stem, Dietz, & Kalof, 1993; Van Vugt, Meertens, & Van Lange, 1995) insisted on valuebasis of a specific behavior such as energy conservation and preferences on travel mode. This theoretical perspective emerged depending on the following point of view: some proenvironmental behaviors which necessitate short-time sacrifices require an individual to suppress egoistic motives for the sake of collective interests (Steg, Dreijerink, & Abrahamse, 2005). Some researchers (Stem & Dietz, 1994; Stem, Dietz, & Kalof, 1993) showed that values oriented on different aspects influence an individual's willingness to take an active role in environmental protection. Specifically, environmental concern is associated with valued objects which are oriented around self, other people, or nonhuman species and the biosphere. In egoistic value orientation emphasis is placed on individual outcomes (Stem & Dietz, 1994). Egoistic individuals are concerned about the environment for the sake of their own interests and desires. On contrary, social-altruistic value orientation points out an overall concern for the welfare of other human beings. Behaviors of individuals with social-altruistic value orientations are determined by their concerns about environmental problems due to their adverse effect on other people. However, biospheric value orientation focuses on

nonhuman species or the biosphere and such individuals are concerned about all living things including plants and animals (Schultz et al., 2005). Value orientations have been considered in the context of clusters on universal human values proposed by Schwartz (1992, 1994). The clusters ‘conservation' and ‘self-enhancement' reflect an egoistic value orientation, while the clusters ‘self-transcendence' and ‘openness to change' reflect biospheric-altruistic value orientations. Empirical research (Guiterrez Karp, 1996; Schultz & Zelezny, 1999) carried out to investigate the role of value orientations on predicting pro-environmental behaviors pointed out that individuals with more favorable biospheric and altruistic value orientations had higher tendency to demonstrate such kind of behaviors.

Apart from the value theory, The New Environmental Paradigm (Dunlap & Van Liere, 1978; Dunlap, Van Liere, Mertig, and Jones, 2000) is a worldview supposing that environmentally responsible behaviors result from general beliefs on the interaction between human and nature. Dunlap, Van Liere, Mertig, and Jones (2000, p. 427) stated that 'New Environmental Paradigm (NEP) focused on beliefs about humanity's ability to upset the balance of nature, the existence of limits to growth for human societies, and humanity's right to rule over the rest of nature '. In the context of VBN theory, the NEP is interpreted as a representative agent of pro-environmental general beliefs and a conducive to demonstrate some behaviors for the sake of nature conservation (Dunlap et al. 2000; Menzel & Bogeholz, 2010; Schultz & Zelezny, 1999). Dunlap et al. (2000) also reported that in spite of the difficulty of explaining pro-environmental behaviors by using general beliefs, various studies could show significant associations between the NEP and some kinds of behavioral intentions as well as self-reported and observed behaviors. For instance, Menzel and Bogeholz (2010) examining pupils' commitment to protect biodiversity reported that the NEP could be regarded as a positive predictor of this behavioral type in the German sample and emphasized the significance of beliefs on human-nature interdependence in educational programmes. On the other hand, strong relationship between worldviews and pro-environmental behaviors could not be found in some research studies (e.g.Poortinga, Steg & Vick, 2004; Vining & Ebreo, 1992). This result has been attributed to the fact that behavior-specific beliefs may act as a mediator between worldviews and behaviors.

As the third baseline of VBN theory, Norm- Activation Model (Schwartz, 1977; Schwartz and Howard, 1981) was developed to predict the role of personal norms and moral values on altruistic behavior in humans; a type of behavior originating from the interest of others rather than of the self. In addition to altruistic behavior, this model has often been applied to explain pro- environmental behavior (e.g. Guagnano, Dietz, & Stem, 1994; Stem, Dietz, & Kalof, 1993; Vining & Ebreo, 1992). The NAM showing a moral approach stresses that pro-environmental behavior is more likely to be observed if people feel a moral obligation to perform the behavior (Harland and Wilke, 2007). Such a feeling of moral obligation to perform the behavior was categorized as 'personal norms', and Harland and Wilke (2007) portrayed that the NAM is associated with a complex model of human decision making in moral situations. In addition to an emphasis on personal norms in the context of the

NAM, the model suggests that the individual should be also aware of the adverse consequences of this kind of behaviors to the environment or others (awareness of consequences), and should possess feelings of responsibility for causing or preventing these adverse consequences (ascription of responsibility). The attribute of personal norms has been regarded as the substantial factor within the framework of the considered theory. The NAM was advocated to be powerful in explaining low-cost pro-environmental behaviors, but less successful when there are strong constraints (i.e effort, time, money) on the related behavior (Bamberg & Schmidt, 2003; Hunecke, Bldbaum, Matthies, and Hoger, 2001).

Considering the above mentioned perspectives used to predict pro-environmental behaviors, VBN theory proposes that awareness of consequences (AC) and ascribed responsibility (AR) are linked to general beliefs on humannature interdependence (NEP) and value orientations clustered as egoism, biospherism, and altruism. Furthermore, personal norms regarded as the ultimate predictor of behaviors could be activated by these environment-related attributes. Figure 1 presents the causal chain that could be examined within VBN Theory.

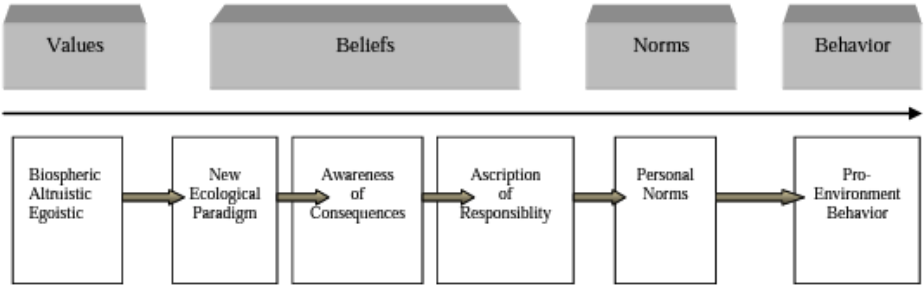

Figure 1. *Value-Belief-Norm Theory to Predict Pro-environmental Behaviors (adapted from Stern, 2000)*

Stem and colleagues (Stem et al., 1999) classified the types of behaviors that personal norms may have a direct impact on: environmental activism (e.g. participating in public demonstrations, active involvement in environmental organizations), nonactivist behaviors in the public sphere (e.g. signing a petition for nature conservation, voting a pro- environmental candidate), private sphere behaviors (e.g. purchasing environmental- friendly products, reductions in energy use) and organizational environmentalism (e.g. fostering some policies for the sake of environment). Regarding the categorization suggested by Stem and colleagues, individuals' energy conservation behaviors may fall into private sphere behaviors which have been considered as a signal to government, educational

and industrial sector pertinent to citizen concerns and consumer preferences (Stem et al., 1999).

Some research studies (Ibtissem, 2010; Menzel & Bogeholz, 2010; Nordlund & Garvill, 2003; Stem et al., 1999) have shown that VBN theory has an exploratory power in various pro- environmental behaviors and some attributes related to specific behaviors such as willingness to make some sacrifices, energy conservation behavior, consumer behavior, commitment to protect biodiversity, willingness to reduce car use. However, beliefs in ascription of responsibility were not included in some studies (i.e Nordlund & Garvill 2003) which did not let an opportunity to test the complete VBN theory. In this aspect, the present study aimed to investigate Turkish elementary teacher candidates' energy conservation behaviors by testing the full VBN theory. Thus, the following hypotheses could be addressed for this study:

- Each variable in the causal model proposed to explain Turkish elementary teacher candidates' energy conservation behaviors is significantly related to the next variable (see Figure 1).
- Each variable in the causal model proposed to explain Turkish elementary teacher candidates' energy conservation behaviors is significantly related to the variables further down to the model (see Figure 1).

Method

Sample

Participants in this study were 512 students at Faculty of Education from two public universities located in Central Anatolia Region of Turkey. These faculties as clusters were purposefully selected in that there were some initiations to integrate the vision of ‘sustainability' in the context of campus life and education programs. As a part of sustainable life style, energy saving has been planned to be considered in facultywide elective and must courses, and dissemination activities in these universities. Of the 512 students, 35.5% were enrolled in the early childhood education program, 30.9% were in the elementary science education program, and 27.7% were in the elementary mathematics education program. The rate of the participants pursuing the graduate program under the department of elementary education was 5.9%. These participants did not have any school experience in teaching. Of the participants,

49.6% were junior and 44.5% were senior class students. The average age of the participants was calculated as 22.4 years. Among this sample, 75.0% were female and 25.0% were male.

Instruments

The measuring tool used in the present study covered seven sections. The first section included some items on demographic information such as gender, grade level, age, etc. The other sections focused on the following constructs: energy

conservation behaviors, personal norms, ascription of responsibility, awareness of consequences, New Environmental Paradigm (NEP), and universal values.

Energy Conservation Behaviors

Teacher candidates' energy conservation behaviors were assessed by administrating Turkish adapted version of a scale used by Ibtissem (2010). The initial version of the scale covered 11 items, but, with respect to content and construct validity studies, a total of 9 items constituted the final version of the present study domain on energy conservation behaviors. The items rated on a 5-point scale fl’ = never, '2' = rarely, ‘3’ = sometimes, ’4' = frequently, ’5' = always) focused on direct use of electricity and natural gas for heating, lightening, etc. purposes. These items were adapted carefully by considering the daily life facilities that the university students experienced in. For instance, an item used in the original scale "I prefer to shower rather than to take a bath.” was removed from the scale since the appliances in the university dormitories do let the students only to take a shower. The scale items could be exemplified as I switch off the lights if I am the last one leaving the room I wash dirty clothes without prewashing and at low temperatures I leave the electric machines on standby mode and ‘In the winter, I keep the heat on so that I do not have to wear a sweater ’.

Furthermore, in order to eliminate ambiguities, the items were evaluated by three environmental educators and an expert on modem languages. Turkish adapted versions of some items were revised with respect to their responses and reactive comments as well as the results of the pilot study.

To examine the construct validity of the scale, exploratory factor analysis was carried out by using a pilot data set gathered from Turkish university students. Principle component analysis was conducted to make the initial decision about the number of

dimensions in the scale. With respect to the scree plot as a statistical criterion (Green & Salkind, 2005), it was concluded that the scale on energy conservation behaviors was uni-dimensional. These results revealed that the items loaded highly on one dimension that overlapped with the one in the original scale. The boundary value of the factor score was set as .30 indicating that an item's factor loading to a component should be at least .30 in this study (Buyukozturk, 2010).

Being a second stage in the construct validity study of the scale, confirmatory factor analysis was carried out by using the present data set. According to the results of the Goodness-of-fit Test, one-factor model was clearly the best fit (Chi-square = 760.184, df = 398, p< .001), pointing out that this scale was uni-dimensional. It was also found out that nine items loaded on one dimension with r values ranging from .43 to .77. However, according to the results of confirmatory factor analysis, two items (‘In the winter, I leave the windows open for long periods of time to let in fresh air ’ and I take a shower in a short period of time (less than 10 min.) ’) did not fit the uni-dimensional model tested on energy conservation behaviors so that they were removed from the scale. The reliability coefficient of Cronbach's alpha was calculated as .72 indicating acceptable internal consistency.

Personal Norms, Ascription of Responsibility, Awareness of Consequences

Teacher candidates participating in the current study were asked to reflect to what extent they agreed with the statements targeting personal norms, ascription of responsibility, and awareness of consequences. A total of 25 items used in previous research studies conducted by Steg, Dreijerink, and Abrahamse (2005) and Ibtissem (2010) were rated on a 5-point Likert type scale (‘ 1' = strongly disagree, '2' = disagree, ‘3' = undecided, ’4' = agree, ’5' = strongly agree). In the context of construct and content validity, the procedures followed on the scale on energy conservation behaviors covering pilot administration were also carried out in the context of these scales.

Examining the construct-related evidences, the results of confirmatory factor analysis reflected uni-dimensionality of personal norms scale with 9 items (e.g ‘I feel personally obliged to save as much energy as possible ‘I feel guilty when I waste energy ‘If I would buy a new washing machine, I would feel morally obliged to buy an

energy efficient one I would be a better person if I saved energy ‘I feel obliged to bear the environment and nature in mind in my daily behaviour ’), ascription of responsibility scale with 6 items (e.g'I feel jointly responsible for global warming ‘My contribution to the energy problems is negligible ‘Not only the government and industry are responsible for high energy!
consumption levels, but me too ', ‘In principle, individuals at their own cannot contribute to the reduction of energy problems). and awareness of consequences scale with 10 items (e.g ‘Global warming is a problem for society', ‘Energy savings help reduce global warming’, ‘The exhaustion of fossil fuels is a problem ’, ‘The exhaustion of energy> sources is a problem ’, ‘Environmental quality will improve if we use less energy', ‘It is not certain whether global warming is a real problem ’).

Concerning the results of Goodness-of-fit Test, one-dimension model was clearly the best fit for each scale (Personal Norms Scale: Chi- square = 749.172, df = 362, p< .001; Ascription of Responsibility: Chi-square = 812.697, df = 351, p< .001 Awareness of Consequences: Chi- square = 721, df = 349, p< .001), pointing out that these measuring tools were uni-dimensional. It was also found out that nine items loaded on personal norms with r values ranging from .41 to .82, six items loaded on ascription of responsibility with r values ranging from .39 to .69, ten items loaded on awareness of consequences with r values ranging from .38 to 75.

The internal consistency of personal norm, ascription of responsibility, and awareness of consequences item sets was found to be .87, .80, and .87, respectively assessed with Cronbach's alpha. These values indicate a good measure of internal consistency for these constructs.

New Environmental Paradigm (NEP)

In order to assess teacher candidates' beliefs on human-nature connectedness, the revised NEP scale (Dunlap et al. 2000) on a 5-point Likert type (ranging from 1 ‘strongly disagree' to 5 ‘strongly agree') was implemented in the present As it was supported by Nunnally (1978), the study. The instrument was adapted into Turkish in a previous research study carried out by Ozsoy (2010). The Cronbach's alpha was calculated as .73 reflecting acceptable internal consistency.

Universal Values

A short version of Schwartz's (1992) universal values scale was used to assess teacher candidates' values guiding their own life. The short version of value scale was adapted from Stem, Dietz, and Guagno (1998) and used by Steg, Dreij erink, and Abrahamse (2005). As supported by Steg, Dreij erink, and Abrahamse (2005), when scholars are interested in egoistic, altruistic and biospheric value orientations, it is reasonable to focus on values pertaining to the dimensions of self-enhancement versus selftranscendence. The participants were asked to rate to what extent 12 values are important as a guiding principle in their lives on a eight-point scale which ranged from 0 ‘not at all important' to 7 ‘of supreme importance'. In case participants were opposed to the value, they were provided with that option (-1). Each value orientation was represented with 4 values; egoistic value orientation with authority, social power, wealth, influential; biospheric value orientation with pr eventing pollution, respecting the earth, unity with nature, protecting the environment; altruistic value orientation with social justice, helpful, a world at peace, equality. In the context of construct validity, multiple group method (MGM), a type of confirmatory factor analysis was used to decide whether the set of values clustered as it was indicated on theoretical grounds. The results showed that the value statements correlated highest with the value orientation to which they are assigned on theoretical bases (Table 1). basic assumption behind this method is that the loading of value statements into the three value orientations is the highest with the value orientation that they are designated to with respect to theoretical framework. Shown with the corrected correlations in Table 1, it was concluded that the value items structured the

Table 1. *Corrected correlations between value items and value orientations*

	Egoistic Values	Altruistic Values	Biospheric Values
Authority	**.84**	.01	.03
Social power	**.82**	.10	.07
Wealth	**.73**	-.00	.07
Influential	**.68**	.23	.26
Preventing pollution	.17	.59	**.78**
Respecting the earth	.07	.58	**.80**
Unity with nature	.05	.49	**.77**
Protecting the environment	.17	.70	**.86**
Social justice	.18	**.80**	.54
Helpful	-.00	**.75**	.54
A world at peace	.04	**.75**	.67
Equality	.12	**.73**	.48

Data Analysis

In order to examine Turkish elementary teacher candidates' energy conservation behaviors, personal norms, ascribed responsibility, awareness of consequences, beliefs on humannature connectedness, and value orientations, means and standard deviations were calculated through descriptive statistics for the related environmental attributes. Furthermore, a series of multiple linear regression analysis was conducted to determine the significant determinants of variables on energy conservation as proposed by VBN theory (see Figure 1). In this context, a measure of adjusted R~ was reported to represent the proportion of variance in the criterion variable that can be explained by the predictor value orientations as it was suggested by Stem, Dietz, and Guagno (1998) and Steg, Dreijerink, and Abrahamse (2005). For the components of value orientations, Cronbach's alpha values were calculated as .75 for altruistic, .81 for biospheric, and .77 for egoistic values, students were required to complete the instrument via paper and pencil on their own. It took about twenty minutes for the students to complete it.

Results

Teacher candidates participating in this study were asked to reveal their level of agreements to a series of statements about personal norm, ascribed responsibility, awareness of consequences, and NEP. As shown in Table 2, the mean scores on these attributes related to

energy conservation indicated that these teacher candidates possessed feelings of moral obligation for energy conservation and of responsibility for causing or preventing adverse consequences of variable (Pallant, 2001). Also, part correlations (semi-partial correlations) designed to eliminate the effect of one variable on two other variables while assessing the correlation between these two variables were also noted. Thus, part correlations could give us an idea about the unique contribution of a predictor variable on the criterion variable. The significance level was set to .05. However, it should be noted that significance level was adjusted by using Bonferroni method which involves dividing alpha level on the basis of the number of analyses conducted. Thus, the new adjusted alpha level became 0.01.

Table 2. *The results of descriptive statistics for the variables in VBN Theory*

Scale	Mean	Std. Deviation
Conservation Behavior	3.74	.51
A. Responsibility	4.18	.65
Awareness of Con.	4.35	.52
Personal Norms	4.10	.58
NEP	3.94	.45
Egoistic	4.53	1.16
Altruistic	6.28	.78
Biospheric	5.97	.88

Procedure

The participants of this study were informed about the purpose of the study and the procedure to complete the scales. They also were explained that their identity would be kept anonymous and that the findings of the study would have no effect on their school grades. Furthermore, the

Mean	Std. Deviation
3.74	.51
4.18	.65
4.35	.52
4.10	.58
3.94	.45
4.53	1.16

6.28	.78
5.97	.88

energy consumption, and were aware of the consequences of energy conservation to the environment, to their own life, and to people rather than own self. Moreover, it was found that the participants had moderate level of favorable general beliefs on human-nature connectedness. Although the participants had favorable feelings of moral obligation and beliefs pertaining to energy conservation, the descriptive results reflected that they did not satisfactorily demonstrate some behaviors on energy conservation. Concerning the teacher candidates' value orientations, the findings showed that altruistic and biospheric values outweigh egoistic values. However, relatively large standard deviation calculated on egoistic values indicated the participants' opinions on egoistic value items were not uniform. In order to test the complete VBN theory in explaining Turkish elementary teacher candidates' energy conservation behaviors, multiple regression analysis was carried out in this study. Table 3 presents the

results of the series of multiple regression analyses for the specified purpose. Examining the predictors of energy conservation behaviors, the linear combination of three attributes, namely egoistic value orientations, biospheric value orientations, and personal norms was significantly related to teacher candidates' such kind of behaviors (R^2 = 0.28, F(7,511) = 28.72, p < 0.001). Egoistic value orientations was the significant predictor which explained the greatest proportion of the criterion variance uniquely (β=-.21; *part correlation* = -.20). The population value of β (95% ci) for egoistic value orientation was found to be between -.13 and -.06 which excluded zero. Thus, it was reasonable to conclude that egoistic value orientation as a determinant of energy conservation behaviors was statistically significant in terms of conventional standards (Smithson, 2003). Furthermore, biospheric value orientations (β=.28; *part correlation* = .17; 95% ci: .09, .20) and personal norms (β=.18; *part correlation* = .12; 95% ci: .10 and .28) significantly and positively contributed to the causal model. The results also reflected that 28% of the variance in energy conservation behaviors could be explained by the linear combinations of these predictor variables: PN, egoistic value orientations, and biospheric value orientations. At this point, it should be noted that the contribution of NEP was not regarded as statistically significant, since a Bonferroni adjustment was applied.

With regard to factors explaining personal norms on energy conservation (R^2 = 0.56, F(6,511) = 105.81, p < 0.001), it was seen that personal norms were significantly associated with biospheric value orientations (β=.42; *part correlation* = .27; 95% ci: .23, .36), awareness of consequences (β= .33; *part correlation* = .22; 95% ci: .25, .44), and ascribed responsibility (β= .18; *part correlation* = .15; 95% ci: .10, .23). Furthermore, 95% confidence interval did not include zero for these predictor variables. The model including the mentioned predictor variables explained large amount of variance (56%) in PN but interestingly, biospheric value orientation made the largest unique contribution to explain PN rather than AR.

Looking at the associations between the belief constructs, the results (R^2 = 0.33, F(5,511) = 52.05, p < 0.001) showed that ascribed responsibility could be predicted by awareness of consequences (β=.26; *part correlation* = .18; 95% ci: .20, .45) and NEP (β=.24; *part correlation* = .18; 95% ci: .22, .49); 95% confidence intervals for these predictors did not include zero. The variability in ascription of responsibility could be accounted by the linear combination of awareness of consequences and NEP with 33% indicating large effect size. The part correlation coefficients showed that the unique contributions of these belief constructs were almost the same. On the other hand, the results reflected that value orientations were not significantly related to AR.

Concerning the teacher candidates' awareness of consequences on energy conservation, it was found that altruistic and biospheric value orientations as well as NEP could make significant contributions on energy conservation behaviors (R^2 = 0.52, F(4,511) = 138.69, p < 0.001). More specifically, large amount of variability (52%) in teacher candidates' awareness of consequences were explained by the linear combination of NEP (β=.50; *part correlation* = .46; 95% ci: .51, .67), biospheric (β=.20; *part correlation* = .13; 95% ci: .07, .17) and altruistic value orientations (β=.19; *part correlation* = .13; 95% ci: .07, .19). According to the part correlation coefficients, NEP made the largest unique contribution to the model when compared to biospheric and altruistic value orientations. The findings also indicated that egoistic value orientation was not among the significant predictors of AC.

Regarding the teacher candidates' beliefs on human-nature connectedness (R^2 = 0.16, F(3,511) = 33.47, p < 0.001), it was found that biospheric value orientation (β=.16; *part correlation* = .26; 95% ci: .13, .25) was significantly associated with NEP whereas egoistic and altruistic value orientations were not significant predictors of NEP. The variability in NEP could be accounted by bispheric value orientation with 16% which reflected medium effect size.

Table 3. *The results of multiple regression analyses*

	β	*Part-Cor.*	*t*	*p*	Adj. R^2	*F*	*p*
Criterion V: Conservation					.28	28.72	.000
PN	.18	0.12	3.10	.002*			
AR	.06	0.05	1.35	.178			
AC	.06	0.04	0.96	.339			
NEP	.11	0.08	2.21	.028			
Egoistic	-.21	-0.20	-5.42	.000*			
Altruistic	-.09	-0.06	-1.54	.125			
Biospheric	.28	0.17	4.48	.000*			
Criterion V: Personal Norms					.56	105.81	.000
AR	.18	.15	5.03	.000*			
AC	.33	.22	7.42	.000*			
NEP	.08	.06	2.09	.037			
Egoistic	.02	.01	.48	.631			
Altruistic	-.11	-08	-2.57	.011			
Biospheric	.42	.27	9.06	.000*			
Criterion V: A. Responsibility					.33	52.05	.000
AC	.26	.18	5.03	.000*			
NEP	.24	.18	5.11	.000*			
Egoistic	-.07	-.07	-1.93	.054			
Altruistic	.09	.06	1.63	.104			
Biospheric	.12	.08	2.10	.036			
Criterion V: Aware. of Cons.					.52	138.69	.000
NEP	.50	.46	14.94	.000*			
Egoistic	-.05	-.05	-1.67	.096			
Altruistic	.19	.13	4.26	.000*			
Biospheric	.20	.13	4.28	.000*			
Criterion V: NEP					.16	33.47	.000
Egoistic	-.05	-.05	-1.30	.195			
Altruistic	.04	.03	.64	.522			
Biospheric	.38	.26	6.41	.000*			

* significant at the adjusted Bonferroni alpha level.

Discussion and Implications

The present study aimed to shed light on Turkish elementary teacher candidates' behaviors pertaining to energy conservation by using Value-Belief-Norm Theory. The data gathered in this study supported the idea that these teacher candidates had a feeling of moral obligation, developed a sense of responsibility, and were aware of the consequences to human and non-human living things in the context of energy conservation. As supported by Menzel and

Bogeholz (2010), higher personal norms and favorable beliefs in energy conservation could be attributed to direct observation of negative consequences of energy consumption. To satisfy the electricity needs of current and future generations, some governmental and organizational strategies are currently under debate in Turkey. For instance, it has become a controversial issue whether hydroelectric power stations should be used to generate some electricity or not. Reflected by mass media, public agreement is generally on the opposite position of constructing more hydroelectric power stations due to confiscation of home towns or agricultural lands, and environmental degradation. On the other hand, some governmental institutions such as the Ministry of Energy and Natural Resources, and General Directorate of Electrical Power Resources have some initiations to enhance public awareness on energy conservation. Thus, it appeared that these teacher candidates exposed to such dissemination activities and current arguments could develop moral obligation and favorable beliefs on energy conversation. However, these individuals did not strongly demonstrate active engagement in energy conservation. For instance, majority of the students (66.4%) reported that they switch off the lights if they are the last one leaving the room whereas more than half of the students (52.7%) do not frequently prefer to wash their dirty clothes without prewashing and at low temperatures. Similarly, they frequently leave the electric machines on standby mode (51.8%). These results might be due to the fact that the teacher candidates did not possess a certain level of awareness and knowledge based on how some behaviors in our everyday life could make a contribution to energy conservation and environmental quality. At this point, a better understanding of attributes having an impact on energy conservation behaviors comes into prominence for educators and policy makers in formal and non-formal settings.

In order to enhance elementary teacher candidates' energy conservation behaviors, it is crucially important to determine the factors which play important roles in explaining such behavioral changes. The results of the current study showed that VBN Theory could successfully explain Turkish elementary teacher candidates' energy conservation behaviors to some extent. Each predictor variable in the causal model was found to be significantly associated with the next variable, but value orientations deserves more attention than VBN Theory places on it within the study context.

It was demonstrated that the variation in these teacher candidates' reduction in energy consumption could be accounted by the

combination of personal norms, egoistic and biospheric value orientations with a medium effect size. As supported by Schwartz (1977), behaviors to conserve energy might occur in response to personal norms relevant to such behaviors. More specifically, the participants who felt guilty when they wasted energy and felt morally obliged to save as much energy as possible possess higher tendency to demonstrate some behaviors to conserve energy. Considering the supportive evidences provided by some scholars (e.g., Bamberg & Schmidt, 2003; Dervisoglu, Menzel, Soran, & Bogeholz, 2009; Nordlund & Garvill, 2002, 2003; Vining & Ebreo, 1992), personal norms are among the significant predictors of some pro-environmental behaviors such as willingness to reduce in car use, recycling behavior, and biodiversity protection. Interestingly, the present study reflected that egoistic and biospheric value orientations made relatively greater unique contribution to explain energy conservation behaviors than personal norms did. This result indicated that the teacher candidates who attributed higher value to own self (authority, social power, wealth, having an impact on people and events) did demonstrate energy conservation behaviors less. On the other hand, the individuals who valued the quality of environment had higher tendency to reduce energy consumption in their everyday lives. Such results could be also associated with the arguments by Gagnon Thompson and Barton (1994) and Schultz and Zelezny (1999), who pointed out that egoistic value orientations are utilitarian in character. Supported by Nordlund and Garvill (2003) an egoistic individual would be less likely to protect the environment if other human-centered values like material quality of life interfered. Meanwhile, it should be noted that extravagance in energy consumption sometimes points out an individual's bonding to own comfort (e.g keeping the heat on not to wear a sweater). Thus, supported by Steg, Dreij erink, and Abrahamse (2005), the elementary teacher candidates' energy conservation behaviors which may necessitate sacrifies from own comfort require to supress egoistic motives. On the other hand, the teacher candidates with ecocentric worldviews would reduce their energy consumption to protect the environment even if their behaviors required them to sacrifice some material quality of life.

With a large effect size (%56), elementary teacher candidates' personal norms could be determined by the linear combination of biospheric value orientations, awareness of consequences, and ascription of responsibility. The attribute of ascribed responsibility was found to be associated with personal norms although small in

magnitude. It implies that the more responsibility teacher candidates feel for causing negative impacts and resolving some problems relevant to energy waste, the more moral obligation they feel to struggle with such challenges. This finding converges with VBN Theory and Norm Activation Theory which postulates that personal norms could be activated in some individuals who believe that they are jointly responsibility for causing an environmental threat and their contribution to environmental problems is significant (Ibtissem, 20100; Stem et al., 1999). On the other hand, similar to the observed results for energy conservation behaviors, biospheric value orientations made the largest unique contribution to the explanation of personal norms which contradicted with the previous research (Dervisoglu et al., 2009; Steg et al., 2005). This finding indicates that teacher candidates who have chosen environmental quality as a guiding principle in their lives feel more obliged to contribute household energy conservation.

As it was hypothesized, an individual's ascribed responsibility for causing or preventing negative consequences of overconsumption in energy could be incented more with an increase in awareness of consequences and strong beliefs on humannature connectedness (NEP). In this study context, these two constructs made similar contributions to explain the elementary teacher candidates' feelings of responsibility on energy conservation. Thus, when compared to the previous studies (Ibtissem, 2010, Steg et.al 2005), general beliefs on human-nature connectedness (NEP) has a more predictive power for their feelings of responsibility one energy conservation. In line with the VBN Theory, NEP was also found to have an explanatory role for the teacher candidates' awareness of adverse consequences of energy consumption. Moreover, the results implied that the individuals who view the environment as worth preserving and respect as a guiding principle of life would be aware of the problems and strong beliefs on human-nature connectedness.

The present study gives educators, policy makers, and administrators some significant clues which could be used to enhance energy conservation behaviors. Considering the role of biospheric value orientations in shaping behaviors and the relevant attributes, teacher candidates could be enrolled in some university-wide activities in outdoor and indoor settings. Supported by Dervisoglu et al. (2009) and Bogeholz (2006), “aesthetic nature experiences' could be integrated into their learning experiences to cultivate their energy conservation behaviors and the relevant factors. In such a learning environment, the teacher candidates

could be provided with some opportunities which could let them experience in the beauty of nature. For instance, in Turkey we are still destroying the habitats of birds and some other animals so that they are most likely to become extinct. The major reason is highly linked to construction of dams and hydroelectric power stations in order to satisfy our needs for household and industrial energy. Thus, the beauty of animals and their native environment, unity with nature and alternative strategies to live in harmony with other species could be a better approach to emphasize the human-nature interaction and reinforce biospheric value orientations.

Looking at the associations among energy conservation-related factors, computer-based scaffold learning activities (Nicolaou et al., 2009) could be developed to reinforce energy saving. In this process, the activities may include some simulations which focus on the possible contributions of energy saving actions in our daily life representing the experiences in a natural context. Such activities might also let teacher candidates simulate the challenges of carbon footprint to gain real world experience. In order to reduce energy consumption and greenhouse gas emissions, an energy-saving house was activated also as an online learning environment in Taiwan (Xiao, 2009). Similar online learning processes with some justifications to society and culture could be pursued in Turkey so that it may unfurl how green energies and sustainable energy consumption work in everyday life to minimize the greenhouse gas emission. In this sense, the teacher candidates might become aware of the consequences of our behaviors, and better grasp the connectedness between human and nonhuman living things which could result in feelings of responsibility and moral obligation for energy conservation.

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