# PRO-ENVIRONMENTAL BEHAVIORS IN TÜRKIYE: A SCALE DEVELOPMENT STUDY

## *TÜRKİYE'DE ÇEVRECİ DAVRANIŞLAR: BİR ÖLÇEK GELİŞTİRME ÇALIŞMASI*

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*Abstract*

*The increase in the global temperature, wildfires, and droughts that occurred in the past decades have presented a preview of what would happen if people do not start taking action to protect the environment. Considering the importance of human actions to save the planet, we developed a culture-specific tool to measure pro-environmental behaviors in Türkiye, one of the most polluted countries in Europe. In a pilot study, we created a pool of 52 items with subject matter experts on environmental psychology. Then, we conducted two studies to develop the Turkish Pro-Environmental Behavior Scale (TPEBS) and test its psychometric qualities. In Study 1, we examined the scale's factor structure on a sample of college students (N = 454). Exploratory factor analysis resulted in a 17-item, 4-factor structure explaining 60.03% % of the total variance. Factors were identified as environmental literacy (5 items), reducing waste (5 items), environmentally conscious consumption (5 items), and collective action (2 items). Findings indicated that the scale's internal consistency was sound, and the positive correlations with the Environmental Attitude Scale and the New Ecological Paradigm Scale supported the convergent validity. In Study 2, we tested the construct validity of the TPEBS through confirmatory factor analysis (N = 449), and the structure showed an acceptable fit with the data. The tests of the internal consistency estimates further supported the reliability of the scale. These findings suggest that the TPEBS is a reliable and valid tool to assess pro-environmental behaviors within the Turkish context, offering valuable insights for future research and environmental policy development.*

*Öz*

*Geçtiğimiz yıllardaki küresel sıcaklık artışı, orman yangınları ve kuraklıklar, insanların çevreyi korumak için harekete geçmemeleri halinde neler olabileceğinin bir göstergesi niteliğindedir. Gezegeni kurtarmada insan eylemlerinin önemini göz önünde bulundurarak, bu çalışmada, Avrupa'nın çevresel olarak en çok kirlenen ülkelerinden biri olan Türkiye'de çevreci davranışları ölçmek için kültüre özgü bir araç geliştirdik. Pilot çalışmada, çevre psikolojisi konusunda uzman kişilerle birlikte 52 maddelik bir havuz oluşturduk. Daha sonra, Türkiye Çevreci Davranış Ölçeğini geliştirmek ve psikometrik özelliklerini test etmek amacıyla iki çalışma yürüttük. Birinci çalışmada, ölçeğin faktör yapısı üniversite öğrencilerinden oluşan bir örneklem üzerinde inceledik (N = 454). Açımlayıcı faktör analizleri sonucunda toplam varyansın %60.03%'ünü açıklayan, 4 faktörlü 17 maddelik bir yapı elde ettik. Faktörler çevre okuryazarlığı (5 madde), atıkların azaltılması (5 madde), çevreye duyarlı tüketim (5 madde) ve kolektif eylem (2 madde) olarak belirlendi. Bulgulara göre, ölçeğin iç tutarlılığı psikometrik olarak sağlamdır ve uyum geçerliliği Çevresel Tutum Ölçeği ve Yeni Çevresel Paradigma Ölçeği ile pozitif korelasyonlarla desteklenmektedir. İkinci çalışmada, ölçeğin yapı geçerliliğini doğrulayıcı faktör analizi ile test ettik (N = 449) ve yapının verilerle kabul edilebilir bir uyum gösterdiği sonucuna vardık. Bulgular ölçeğin Türkiye bağlamında çevreci davranışları değerlendirmek için güvenilir ve geçerli bir araç olduğunu göstererek, gelecekteki araştırmalar ve çevre politikası geliştirme için değerli bilgiler sunmaktadır.*

**Introduction**

There is no longer doubt that the earth's climate is changing drastically, and our environment is in destruction. Global temperature is increasing alarmingly year by year. June 2023 was the hottest month ever recorded (Copernicus Climate Service, 2023; National Centers for Environmental Information, 2023). Ice sheets and the glaciers in the oceans and mountains are melting (National Aeronautics and Space Administration, 2023; Velicogna et al., 2020; World Glacier Monitoring Service, 2023), resulting in a rise in the sea levels which leaves some cities under the threat of being submerged (Intergovernmental Panel on Climate Change, 2023; Levitus et al., 2012; National Aeronautics and Space Administration, 2023). There are more frequent and large-scale wildfires (Intergovernmental Panel on Climate Change, 2023). Forests, especially Amazon forests, are deforesting at an unprecedented rate (Altman, 2023). Additionally, longer drought durations have been reported in different regions, and many are at risk of desertification (Intergovernmental Panel on Climate Change, 2023). This environmental destruction adversely affects the health and well-being of people along with millions of living organisms (Intergovernmental Panel on Climate Change, 2023). Indeed, global warming and environmental pollution are already happening, and they are the problems of the present. It is required to act now, not in the future.

Human activities since the Industrial Revolution can be seen as the main reason for climate change and environmental damage (Kaaronen, 2017; Swim et al., 2011; Wynes & Nicholas, 2017). Hence, changing human behavior is the first step to ending this destruction and saving the planet. Although the necessity is evident, not all individuals are willing to adopt pro-environmental behaviors. Therefore, who, how, and for what reasons exhibit these behaviors has increasingly become a popular subject of scholarly interest. The growing interest has also made it necessary to accurately measure pro-environmental behavior (Lange & Dewitte, 2019; Tian & Liu, 2022). Moreover, since the social context shapes the content of pro-environmental behavior, it is also essential to develop the measures in a culture-specific manner (Milfont, 2012; Nkaizirwa et al., 2021).

Accordingly, the current research aims to develop a reliable and valid tool to measure pro-environmental behavior in Türkiye. Although Türkiye may not have had a substantial historical contribution to environmental destruction (World Wildlife Fund, n.d.), it is now on the way to becoming one of the most polluting countries. Five of Europe's 15 most polluted cities are from Türkiye (IQAir, 2022). For Türkiye to achieve its 2053 greenhouse gas emission reduction target, a minimum of 35 percent absolute emission reductions

should be accomplished by 2030 (World Wildlife Fund, n.d.). However, this seems unlikely, considering that total greenhouse gas emissions rose to 520.9 million tons in 2018, up 137.5% from 1990 and 10.2% from 2015. Over the years, there has also been a significant increase in waste, wastewater, and land use in Türkiye. Considering that Türkiye is a populous country with a gradually increasing population density (Republic of Türkiye Ministry of Environment and Urbanization, 2021), encouraging pro-environmental behavior in Türkiye will come to the fore. Based on the idea that the first step in promoting pro-environmental behavior is to measure the construct adequately, this research aims to develop a pro-environmental behavior scale specific to the cultural context of Türkiye.

**Pro-Environmental Behavior**

Although it has been studied under different names, such as ecological behaviors, environmentally supportive behaviors, and environmentally significant behaviors (Larson et al., 2015), behaviors that aim to mitigate the damage to the environment and preserve and enhance the natural environment are generally called as *pro-environmental behaviors* (Ardoin et al., 2013; Gardner & Stern, 2002). There is a diverse array of ways to engage in pro-environmental behavior (Farrow et al., 2017), both privately and publicly (Lange & Dewitte, 2019), such as promoting more sustainable transportation, purchasing less consumer goods and reusing the existing ones or switching to a plant-based diet (Greenpeace UK, n.d.; iklimBU, 2018; United Nations, n.d). According to Lange and Dewitte (2019), there are different approaches to conceptualizing pro-environmental behaviors. Some approaches consider behaviors exhibited with a pro-environmental intent as pro-environmental behavior without necessarily considering their impact (e.g., Whitmarsh, 2009). On the other hand, some approaches only consider behaviors that have a tangible impact on the environment as pro-environmental behavior (e.g., Lange & Dewitte (2019). Considering that intent-oriented measures may not always be capable of assessing behaviors in terms of their impact on the environment, we adopted an impact-oriented approach in this research and only included behaviors that have an actual impact on the environment.

Earlier academic work on environmental sustainability suggests that various factors contribute to shaping individuals' pro-environmental behaviors positively or negatively (see Blankenberg & Alhusen, 2019 for a review). Among these determinants, self-transcendence (vs. self-enhancement) values (Karp, 1996; Schultz et al., 2005); personality traits (i.e., openness to experience and agreeableness; see Soutter et al., 2020 for a meta-analysis); and identifying oneself with a social group (i.e., social identity) or a specific place (i.e., place

identity; see Udall et al., 2021 for a meta-analysis) positively predict pro-environmental behaviors. Being female (Zelezny et al., 2000), having knowledge about ecological issues (Hines et al., 1987), and being aware of humankind's impact on the environment (Kollmuss & Agyeman, 2002) are the other factors motivating pro-environmental behaviors.

However, several barriers that may hinder pro-environmental engagement (Gifford, 2011) have been identified, such as lack of internal (e.g., perceived responsibility on environmental issues) and external (e.g., getting social approval for the behavior) incentives, receiving negative feedback about pro-environmental behaviors, and existing unsustainable lifestyle (Kollmuss & Agyeman, 2002). Lack of time (e.g., Blake, 1999), not receiving support from local or national authorities (e.g., Fu et al., 2018), and perceiving the behavior as difficult to perform (e.g., Yuriev et al., 2018) are other factors that discourage individuals' behavioral involvement with environmental issues.

**Measurement of Pro-Environmental Behaviors**

Examining the personal, social, and contextual factors that motivate individuals to act in an environmentally sustainable way and investigating the elements that hinder their pro-environmental engagement are essential when considering the promotion of pro-environmental behaviors among the public. To better understand pro-environmental engagement, various measurement methods (e.g., self-reports, behavior observation, technical tools) have been developed (see Lange & Dewitte, 2019 for a review). Among these methods, self-report surveys are the most popular among social scientists as they can provide detailed information about a significant number of people in a time and cost-efficient manner (Paulhus & Vazire, 2007). Self-report surveys used to assess pro-environmental behaviors mainly include statements about how often a specific behavior is exhibited (Brick et al., 2017). While some of these measures are designed to assess various dimensions of pro-environmental behaviors on a single scale (e.g., Casey & Scott, 2006; Kaiser & Wilson, 2004; Markle, 2013), there are also more specialized tools for particular behaviors such as civic environmental action (e.g., Alisat & Riemer, 2015), ecologically friendly consumption (e.g., Gupta & Agrawal, 2018), minimizing waste (e.g., De Young, 1985-1986), and transport behavior (e.g., Van Lange et al., 1998) as well as tools for specific groups like children (e.g., Erdoğan et al., 2012), tourists (e.g., Lee et al., 2013), and employees (e.g., Robertson & Barling, 2017).

Nevertheless, there seems to be a lack of theoretical consideration given to the assessment of pro-environmental behavior (Lange & Dewitte, 2019; Markle, 2013), which may restrict the capability of researchers in terms of generalizing their results to broader

samples as well as applying these findings to practice (Mateer et al., 2022). Previous research (e.g., Lange & Dewitte, 2019; Markle, 2013) also pointed out several methodological and theoretical issues regarding the measurement of pro-environmental behaviors. The existence of behavioral items that have minimal impact on addressing environmental issues in questionnaires (Hadler et al., 2022; Markle, 2013), inconsistency among measures (Levine & Strube, 2012; Mateer et al., 2022), and ignoring characteristics of the context where behavior occurs (Nkaizirwa et al., 2021) are some of these issues observed in the literature.

Careful consideration and planning are necessary to measure pro-environmental behavior accurately and meaningfully. Comprehension of culture's role in human-environment relationships is also essential in promoting environmental sustainability among cultural groups (Milfont, 2012). Prior studies indicated that cultural elements (e.g., social norms, individualism vs. collectivism) are important in forming an individual-natural environment relationship (e.g., Milfont & Schultz, 2016). In line with this, environmental concern's positive effect on pro-environmental behaviors is stronger in individualistic (vs. collectivistic) and loose (vs. tight) societies (Tam & Chan, 2017). A review study (Tam & Milfont, 2020) also indicates that most research on environmental sustainability relies on the data gathered from Western, educated, industrialized, rich, and democratic (WEIRD) samples, and researchers overgeneralize their findings despite the limitations of the sample characteristics. Besides, excessive dependence on measures developed in economically affluent countries (e.g., the United States) may result in ignoring ecological issues that are more relevant to developing countries (Nkaizirwa et al., 2021). Specifically, deforestation, water scarcity, and natural hazards caused by climate change (e.g., flooding and drought) are more common in non-Western societies (Intergovernmental Panel on Climate Change, 2022). It is therefore necessary to thoroughly understand the role of cultural and regional elements in promoting pro-environmental engagement.

Apart from these theoretical and methodological issues in existing scales and underestimation of culture's role in individuals' pro-environmental engagement, another point needs to be mentioned with specific reference to the Turkish context. The literature on the bidirectional association between individuals and the natural environment has a relatively short history in Türkiye. Thus, there is a dearth of studies investigating the effects of individuals' actions on the environment. Due to the underdevelopment of the literature, only a small number of scales have been developed to measure pro-environmental behaviors in Türkiye. Besides, most of these measures are the adapted versions of Western-based scales (e.g., Candar, 2022; Timur & Yılmaz, 2013; Kanbur et al., 2022) or they are for

particular populations like tourists (e.g., İpar, 2018; Soylu, 2019), children (e.g., Özkan et al., 2020), employees (Kanbur et al., 2022), and secondary and high school students (e.g., Ardahan, 2022; Sontay et al., 2015). Therefore, there is a need for a measurement tool to understand pro-environmental behaviors in broader samples within the Turkish context. Considering that scales previously developed and/or adapted from other languages to Turkish culture are also important, we believe that the TPEBS addresses a significant gap by focusing on a more general sample.

To summarize, prior academic work on assessing pro-environmental behaviors has several theoretical and methodological weaknesses. Besides, the existing scales seem to underestimate the culture's role in individuals' pro-environmental behaviors. To address these issues and fill the gap regarding the measurement of pro-environmental behaviors in Türkiye, the current research aims to develop a reliable and valid pro-environmental behavior scale specific to the Turkish context.

**Overview of the Present Research**

This research aims to provide a reliable and valid self-report measure of the pro-environmental behaviors in the context of Türkiye and to test its dimensionality, reliability, and validity. In the following sections, we present three studies designed to develop and test a concise measure. In the pilot study, we developed the item pool and reduced the number of items based on the evaluations of the subject matter experts. In Study 1, we conducted exploratory factor analysis (EFA) to extract the latent factors that fit our data and identify the items that balanced conceptual relevance and psychometric credentials. A scale validation process encompasses three main components: tests of dimensionality, reliability, and validity. Accordingly, we assessed the scale's dimensionality in Study 2 by employing confirmatory factor analysis (CFA), which tests the relationships between latent factors and their indicators, obtained through exploratory factor analysis or theoretically assumed (Raykov & Marcolides, 2011). We examined the scale's reliability, i.e., how consistently and predictably an instrument operates in measuring the true state of what it intends to measure (DeVellis & Thorpe, 2022), by examining the internal consistency coefficients (i.e., Cronbach's alphas and Macdonald's omegas) of the total scale and its dimension in both studies. Lastly, we tested the scale's convergent validity in Study 1 through related measures. Convergent validity can be evidenced when a newly developed scale demonstrates a strong association with another scale measuring a theoretically related construct without definite cutoffs for association (DeVellis & Thorpe, 2022).

**Pilot Study: Generating The Item Pool**

After receiving ethical clearance from the Ankara Yıldırım Beyazıt University ethical board (No: 2022-1007), we conducted a pilot study to prepare the scale items. Initially, we created a 92-item item pool considering the contemporary debates on pro-environmental behaviors in Türkiye and reviewing the existing scales in the literature. During the item-generation process, our aim was to develop a scale that prioritizes behaviors with a substantial environmental impact while excluding those with relatively limited influence. Therefore, we included behaviors that environmental authorities consider to have a significant impact on the environment, such as educating oneself and others about environmental issues, reducing waste, adopting environmentally friendly consumer habits, and engaging in environmental collective action (United Nations, n.d.; NOAA, n.d.).

In doing so, we followed the following criteria (Brinkman, 2009; DeVellis & Thorpe, 2021; Hinkin, 1998; Hinkin et al., 1997; Johanson & Brooks, 2010): clarity and comprehensibility of the items, avoidance of double-barreled or double-negative items, avoidance of jargon, avoidance of leading items, avoidance of the acquiescence and social desirability biases, and avoidance of value-laden items. Secondly, we presented the item pool to five social psychologists who are experienced in the study of environmental psychology as well as scale development. Experts evaluated the items in terms of clarity (clear/not clear) and relevance (relevant/not relevant) to the construct the scale aims to measure (i.e., environmental behaviors). Experts also gave feedback on the scale's instructions and how to improve the items. Based on their suggestions and feedback on the relevance and clarity, we reviewed the item pool and reduced the number of items to 52.

**STUDY 1: EXPLORING THE FACTOR STRUCTURE**

**Participants and Procedure**

Four hundred and fifty-four (343 women, 107 men, 42 do not want to disclose; $M_{age}$= 21.59, $SD_{age}$ = 2.24) undergraduate students reached through convenience sampling participated in the online study in exchange for course credit. Almost all participants (%97.8) considered environmental problems important; however, the majority (%86) were not members of an environmental organization.

**Measures**

**Turkish Pro-Environmental Behavior Scale (TPEBS)**

The initial scale included 52 Likert-type items that participants rated on a 1 (never) to 5 (always) scale. In addition to these five options, there was a sixth option (not valid for me) to capture the behaviors that participants did not or could not perform in their lives. We removed these responses from the dataset. The scale included seven reverse-coded items. Higher scores on the scale indicated a higher frequency of pro-environmental behaviors.

**Environmental Attitude Scale**

We used Akkuş's (2020) scale to measure environmental attitudes. The scale had 24 items (e.g., I turn off unnecessary lights), and participants indicated their responses on a 1 (strongly disagree) to 5 (strongly agree) Likert scale. Higher scores indicated a more positive attitude toward the environment ($a$ = .97).

**The New Ecological Paradigm Scale**

We used the Turkish version (Bektaş & Şirin, 2018) of the New Ecological Paradigm Scale (Dunlap & Van Liere, 1978; Dunlap et al., 2000) as a metric for assessing the level of endorsement of a "pro-ecological" worldview. The scale had 15 items that fall into two factors, namely, ecocentric (e.g., "*Humans are severely abusing the environment.*") and anthropocentric (e.g., "*The so-called ecological crisis is greatly exaggerated.*") worldviews. Participants rated the items on a 1 (strongly disagree) to 5 (strongly agree) Likert-type scale. Higher scores indicated a more environmentalist attitude. The internal consistency coefficient was $a$ = .83 for the original scale and $a$ = .65 for the Turkish version.

**Results**

Before the analyses, we checked the data in terms of normality, linearity, and homoscedasticity assumptions, and it was valid for multivariate data analyses (interested readers can access the details of data screening at (URL-1).

**Exploratory Factor Analysis (EFA)**

We employed a series of factor analyses with Direct Oblimin rotation to determine the factor structure of the scale. We decided the number of the factors and the items to retain through the Kaiser criterion of Eigenvalues over 1.00, the Catell scree plot test, Monte Carlo parallel analysis, communality scores above .30, factor loadings on pattern matrix above .40, a higher difference than .15 in factor loadings of items in pattern matrix that load onto more than one factor, and interpretability of scores. Bartlett's Test of Sphericity ($x2$ (153) =

1829.46, $p$ <.001) and Kaiser-Meyer-Olkin Measure of Sampling Adequacy value (.88) showed that the sample size was suitable for factor analysis. After removing items with intercorrelations below .30 and above .90 (DeVellis & Thorpe, 2021), we obtained a 17-item scale including four factors ($a$ = .87, $\omega$ = .87), which explained 60.03% of the variance (see Table 2 for an overview of the factors). We named these factors based on the contents of the items. The first factor (i.e., environmental literacy) included five items (items 1, 2, 3, 4, and 5) explaining 32.98% of the total variance ($a$ = .80, $\omega$ = .80). The second factor (i.e., reducing waste) included five items (items 6, 7, 8, 9 and 10) accounting for 11.24% of total variance ($a$ = .74, $\omega$ = .74). The environmentally conscious consumption thirdly, factor consisted of five items (items 13, 15, 16, 17, and 18; $a$ = .78, $\omega$ = .78) and explained with 8.3% of total variance. The collective action factor, lastly, included two items (items 11 and 12) with 7.51% of the total variance ($a$ = 82, McDonald's Omega cannot be computed due to factor including only two items). Findings are summarized in Table 1.

**Descriptive Statistics and Correlations for the Study Variables**

We used the Environmental Attitude Scale (Akkuş, 2020) and the New Ecological Paradigm Scale (Bektaş & Şirin, 2018; Dunlap & Van Liere, 1978; Dunlap et al., 2000) to test the convergent validity of the TPEBS. As expected, we found positive relationships with both scales: $r$ = .33 and $r$ = .17, $p$ < .001, respectively (see Table 2 for the descriptives, internal consistency coefficients, and bivariate correlations between the variables). The positive and significant relationships with both scales evidenced the convergent validity of the newly developed scale.

**STUDY 2: VALIDATION OF THE SCALE STRUCTURE**

To test the construct validity of TPEBS, we conducted a second study. In Study 2, we conducted confirmatory factor analyses (CFA) using AMOS to test the 4-factor structure proposed in Study 1.

**Method**

**Participants**

Three hundred ninety-nine adults (321 women, 77 men, one does not want to disclose; $M_{age}$ = 22.42, $SD_{age}$ = 4.11) voluntarily participated in the online study. Most of the participants (%89, $N$ = 355) were students, 13 (%3.3) were full-time workers, 16 (%4) were part-time workers, 6 (%1.5) were self-employed, 7 (%1.8) were unemployed, and 2 (% .05) were retired. The monthly household income was between 0-8500 TL for 64 (%16) participants, between 8501-17000 TL for 134 (%33.6) participants, between 17001-25500

TL for 100 (%25.1) participants, between 25501-34000 for 59 (%14.8) participants, and higher than 34001 for 42 (%10.6) participants. A vast majority of participants (%87.4, *N* = 349) lived either in a city, big city, or metropolis, while 50 (%12.6) lived in a village or county. Most of the participants were neither vegetarian (%93.7, *N* = 374) nor vegan (%98.5, *N* = 393), and only a small percentage (%23.6, *N* = 94) reported an effort to reduce consumption of animal products in the last six months. Almost all participants (%92, *N* = 377) considered environmental problems important, yet only a small percentage (%16, *N* = 64) were members of an environmental organization.

**Measures**

**Pro-Environmental Behavior Scale**

We used the Pro-Environmental Behavior Scale developed in the first study.

**Demographic Information Form**

Participants responded to the sociodemographic questions about their age, gender, education level, parents' education level, employment status, monthly household income, current living place, religion, ideological self-placement (on a scale from 1 to 11; 1 = left, 11 = right), perceived importance of saving money, being vegetarian or vegan, self-evaluated effort to reduce consumption of animal products in the last six months, importance of environmental problems and membership to an environmental organization.

**Results**

Before the analyses, we checked the data in terms of normality, linearity, and homoscedasticity assumptions, and all assumptions were met for multivariate data analyses (interested readers can find the details of data screening at (URL-1).

**Descriptive Statistics and Correlations**

Results indicated that age was positively correlated with environmental literacy, reducing waste, and environmentally conscious consumption. Gender was negatively correlated with collective action and positively correlated with environmentally conscious consumption. While being religious was not correlated with any of the subscales, the impact of religious belief on daily life was correlated positively with collective action. Higher satisfaction with household monthly income was correlated with a lower tendency to reduce waste. Frugality and the importance of savings were positively correlated with environmental literacy, reducing waste, and environmentally conscious consumption. In addition, the importance of savings was also positively correlated with collective action.

While being vegan was not correlated with any of the dimensions of the scale, being vegetarian was positively correlated with reducing waste, collective action, and environmentally conscious consumption. Efforts to reduce the consumption of animal products in the last six months, membership in an environmental organization, and the importance of environmental problems were positively correlated with all subscales. According to the results, education, either parent's education, political view, conservatism, and household monthly income were unrelated to any of the dimensions of the scale. Results indicated that the scale is internally consistent as indicated by the Cronbach's alphas and McDonald's Omega's for the total scale ($a$ = .88; $\omega$ = 87 ) as well as subdimensions, namely, environmental literacy ($a$ = .61; $\omega$ = 63), reducing waste ($a$ = .74; $\omega$ = .74), collective action ($a$ = .83; McDonald's Omega cannot be computed due to factor including only two items ) and environmentally conscious consumption ($a$ = .82; $\omega$ = .82). Descriptive statistics and Pearson correlations for the demographic variables and subscales are provided in Table 3 (interested readers can find the point biserial correlations for categorical variables (URL-1).

**Confirmatory Factor Analysis**

To validate the scale's factor structure, we conducted a confirmatory factor analysis (CFA) using maximum likelihood estimation on 17 items identified through exploratory factor analysis (EFA). The chi-square test x2, the root mean square of approximation (RMSEA), standardized root mean residual (SRMR), the Akaike Information Criterion (AIC), the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the comparative fit index (CFI), and Tucker Lewis Index (TLI), were used to assess the model fit. A $x2/df$ ratio ≤ 5, an RMSEA ≤ .08, an SRMR ≤ .08, a comparatively lower AIC (for nonnested models), a GFI ≥ .90, an AGFI ≥ .80, a CFI ≥ .90, and a TFI ≥ .90 were considered as indicators of acceptable fit (Awang, 2012; Byrne, 1994; Hu & Bentler, 1999; Schumacher & Lomax, 2004; Wheaton et al., 1977).

The initial results showed that the 4-factor structure of the scale had a low fit with the data, CFI = .84, TLI = .80, GFI = .85, AGFI = .80, AIC = 602,412, RMSEA = .10, SRMR = .11, and $x2$ (522,412)/$df$(113) = 4,62, $p$ < .001. Further examination of the modification indices showed that Q9 and 10 had a high modification index; hence, an error covariance was added. When evaluating the modification indices, we considered not only the potential improvement in model fit to the data but also the criterion of theoretical relevance between the items, as CFA is a theory-driven method rather than a purely data-driven one (Chou & Bentler, 2002; Hair et al., 2014). Given the conceptual relatedness of these items, the

addition of covariances between their errors is not only theoretically acceptable but also appropriate for improving model fit. The final model, as seen in Figure 1, showed an acceptable fit, CFI = .92, TLI = .91, GFI = .92, AGFI = .89, AIC = 383,995, RMSEA = .07, SRMR = .08, and $x2(300{,}995)/df(112) = 2{,}70$, $p < .001$. The results showed that the scale is acceptable for good construct validity. To summarize, the confirmatory factor analysis findings validated our measure's four-factor structure, and the internal consistency coefficients for the total scale and subdimensions further supported the finding that our measure is reliable.

**DISCUSSION**

The consequences of destructive human behavior toward the environment are already evident, and the signs of the upcoming environmental catastrophe are becoming increasingly visible (National Aeronautics and Space Administration, 2023). At this point, it is essential to change our environmentally harmful behaviors and start acting to benefit the environment. A growing body of scientific research is dedicated to understanding pro-environmental behaviors. The initial and arguably the most important step in searching for pro-environmental behavior is to accurately measure these behaviors (Lange & Dewitte, 2019). 2022). Conscious of the shortcomings in the literature, this research presents a culture-specific measurement of pro-environmental behavior. Specifically, we developed and validated the Turkish Pro-Environmental Behavior Scale for Türkiye, a country located in one of the regions most affected by global warming.

The scale has 17 items and four factors. The first factor, *environmental literacy,* deals with participants' behaviors to learn about environmental issues and improvements as well as the efforts to share the acquired knowledge with others. The second factor, i.e., *reducing waste,* includes items measuring individuals' behaviors to reduce the generation of their environmentally harmful waste, reusing and recycling their existing belongings. The third factor, i.e., *collective action,* pertains to participants' collective action engagement regarding the environment. Lastly, the fourth factor, i.e., *environmentally conscious consumption,* includes items measuring whether participants make their consumption choices pro-environmentally. Several psychometric tests (e.g., confirmatory factor analysis, tests of reliability, correlation analysis) demonstrated that our scale is a valid and reliable tool to measure pro-environmental behaviors in Türkiye's context.

Previous literature (e.g., Hadler et al., 2022; Markle, 2013) indicated that a high number of scales are composed of pro-environmental behaviors that have minimal impact on addressing ecological issues such as using a pot lid when cooking. It is recommended to

focus on behaviors that may have a significant negative impact on the air, water, and habitat and increase global warming rather than behaviors that may have very little impact on the environment (Brower & Leon, 1999; Markle, 2013). Accordingly, our primary goal was to develop a measure composed of behavioral items that are significant in terms of their environmental impact in Türkiye's cultural context. In line with this goal, we incorporated behaviors recommended by authorities as having the highest potential to influence the environment positively (e.g., IPCC, 2022).

TPEBS primarily included items related to educating oneself and others about environmental issues, reducing waste, adopting environmentally friendly consumer habits, and engaging in environmental collective action, as these behaviors are considered to have the greatest environmental impact (United Nations, n.d.; NOAA, n.d.). These dimensions of pro-environmental behaviors have the potential to increase environmental awareness among individuals and encourage environmentally friendly behavior patterns. For example, discussing environmental issues with other people (e.g., friends) and sharing social media posts related to ecological conservation can be effective in raising environmental awareness since the possession of knowledge about environmental issues is widely regarded as a fundamental prerequisite for engaging in effective pro-environmental behavior (e.g., Liobikiene & Poskus, 2019). In addition, considering the huge amount (7-9 billion tons annually) of global production of waste (see Wilson & Velis, 2015), it is imperative to adopt environmentally conscious consuming practices (e.g., preferring products using less packaging) and encourage recycling and reusing. These practices are helpful in terms of reducing dependence on resources (e.g., water, plastics) and minimizing greenhouse gas emissions. Besides, acting together is a meaningful way to mitigate the negative consequences of human-induced environmental destruction and climate change (Fritsche et al., 2018). Thus, forms of collective action such as participating in environmental signature campaigns and petitions are becoming more critical, considering collective actions' potential to reach a wider audience.

Considering the low number of pro-environmental behavior scales in Turkish and limited target populations (e.g., children, high-school students, tourists) of the existing scales (e.g., Ardahan, 2022; İpar, 2018; Sontay et al., 2015; Soylu, 2019), we focused on the behaviors adopted by the general population. For example, although transportation choices are also highly influential on the environment (Markle, 2013), we did not include items related to transportation choices. This decision was based on previous literature indicating that, in the context of Türkiye, most of the population relies on public

transportation, resulting in little to no variance in responses to such items (Akkaya & Yalçınkaya-Alkar, 2022).

To evaluate the convergent validity of the TPEBS, we utilized the Environmental Attitude Scale (Akkuş, 2020) and the New Ecological Paradigm Scale (Bektaş & Şirin, 2018; Dunlap & Van Liere, 1978; Dunlap et al., 2000). Consistent with our expectations, both scales showed positive associations with the newly developed TPEBS, with correlations of $r$ = .33 and $r$ = .17, $p$ < .001, respectively. The literature examining the relationship between attitudes and behavior suggests that although individuals have positive attitudes towards environmental protection (e.g., thinking that the environment should be protected), these attitudes do not always turn into behaviors (Bamberg & Möser, 2007; Hornsey et al., 2016). This may explain why the correlations between the newly developed TPEBS, attitudes, and the new ecological paradigm are not very high. This so-called "attitude-behavior gap" refers to various barriers between attitude and behavior, such as environmentally unfriendly habits, lack of external incentives, and lack of time (Gifford, 2011; Kollmuss & Agyeman, 2002). Bamberg and Möser's (2007) meta-analysis also indicates that the coefficient of the relationship between awareness of environmental problems and pro-environmental behaviors is .19. Similarly, Hornsey et al. (2016) found in their meta-analysis that the relationship between awareness of climate change and behaviors to mitigate climate change varies between .17 and .19.

Our data indicate that the total scale and its subscales generally are generally reliable. In both studies, reliability estimates (i.e., Cronbach's alpha and Macdonald's omega) for the total scale as well as the subscales, except environmental literacy in Study 2, exceeded .70, which is widely seen as an indicator of good reliability (Nunnally & Bernstein, 1994; Robinson et al., 1991). The environmental literacy subscale, on the other hand, had an alpha value of .61 and an omega value of .63 in the second study. We believe that the relatively low yet acceptable internal consistency coefficient (Robinson et al., 1991) might be attributable to the low salience of environmental issues in the Turkish context. For instance, in the Turkish adaptation of the Environmental Behavior Scale (Timur & Yılmaz, 2013), the environmentally conscious consumer subscale, which has items like the environmental literacy factor, is slightly below the commonly accepted threshold ($\alpha$ = .66). In another study conducted by Akkaya and her colleagues (2024), environmental attitude scale ($\alpha$ = .64) and wildlife factor ($\alpha$ = .61) is also below the acceptable threshold. Accordingly, considering the low salience of environmental issues in Türkiye, we believe the relatively low reliability score might be considered acceptable.

In addition to the psychometric qualities of our scale, our research revealed some interesting relationships among the dimensions of pro-environmental behaviors and socio-demographic characteristics. To begin with age, results indicated that an increase in participant age is related to increases in environmental literacy, waste reduction behaviors, and environmentally conscious consumption. While some studies support this result (e.g., Wiernik et al., 2013), others report opposite findings (e.g., Hines et al., 1987). Future research could explore age-related differences in environmental beliefs and behaviors, as well as how these beliefs and behaviors evolve over one's lifespan.

Secondly, gender was negatively correlated with environmental activism (i.e., collective action factor) and positively correlated with environmentally conscious consumption, suggesting that men have more tendency to participate in environmental activism, whereas women are more likely to engage in environmentally conscious consumption. These findings are in line with the dual classification of pro-environmental behavior (Kennedy & Kmec, 2018), which are private-sphere (e.g., recycling, reducing waste) and public-sphere (e.g., attending an environmental protest, writing a letter on an environmental issue, signing an environmental campaign). Although existing findings related to gender differences in public-sphere PEB engagement are mixed (Mohai 2014; O'Shaughnessy & Kennedy 2010), studies mostly report that women are more likely to participate in private-sphere PEB (Huddart-Kennedy et al., 2009; O et al., 2013).

Thirdly, participants who reported higher satisfaction with their monthly income had a greater willingness to engage in waste reduction. Moreover, individuals who exhibited higher levels of frugality and placed greater value on savings scored higher in environmental literacy, waste reduction, and environmentally conscious consumption. These findings suggest that certain aspects of environmental behavior may be closely intertwined with economic concerns (Du et al., 2024), particularly in a context such as Türkiye, which has experienced significant economic inflation in recent years. Therefore, we believe that different outcomes may emerge in contexts where economic concerns are less.

With all the mentioned strengths in mind, we believe that it is crucial to consider certain limitations when reviewing the current study's results. First, like any self-report measure, our scale is not independent of biases. In particular, previous literature indicated that participants tend to engage in self-presentation strategies aimed at positively portraying themselves (Bratt et al., 2015), and they may exhibit a desire for consistency within their answers throughout the study (Lange & Dewitte, 2019). Besides, Kormos and Gifford's (2014) meta-analysis reported that self-reported pro-environmental behavior

accounted for only 21% of the variability in objective behavior. Second, our findings are constrained in their generalizability due to the limited sample, which predominantly comprises college students. So, subsequent evaluations of the scale ought to encompass a more diverse population to enhance its generalizability.

As mentioned above, climate change has become one of the most important problems of the world as it has been affecting human life more and more directly over the years. Human activities are claimed to be the main reason for the climate crisis. Therefore, it is important to examine these activities so that we can find ways to change them.

At this point, measuring pro-environmental behavior on an individual level is an important step in preventing climate change. The aforementioned studies show that there are several ways to measure pro-environmental behaviors. The definition or implementation of pro-environmental behavior depends on the context we measure, and culture plays an important role in these practices. This research emerged because existing scales measuring pro-environmental behaviors in the literature did not fully meet the need to understand the pro-environmental behaviors of Turkish society. By developing a new pro-environmental behavior scale focusing on the Turkish population, we aimed to provide a valid and reliable measurement of pro-environmental behaviors available to those who would research the environmental issues in Türkiye. Understanding the level of pro-environmental practices would also help researchers develop strategies on what can be done to promote pro-environmental attitudes and behaviors. Also, it might be easier and more meaningful to compare the practices of different sociocultural groups within Türkiye. In addition, this new scale can be used to compare pro-environmental practices of the Turkish population with different practices around the world.

**Summary**

With the increasing number of climate-change-related disasters and the rise in the global temperature, protecting the environment has gained greater importance. As human actions account for a substantial part of the environmental damage and climate change (Kaaronen, 2017; Wynes & Nicholas, 2017), focusing on humans' behaviors and encouraging pro-environmental behaviors should be the first step in saving the planet. Thus, detecting "who, how, and why"s of pro-environmental behavior has become a prominent research purpose among researchers from different fields. To look into these questions thoroughly, one should first be able to measure pro-environmental behaviors as accurately as possible. There is a small number of existing scales in Turkish that are either adapted from Western-based scales (e.g., Candar, 2022; Kanbur et al., 2022; Timur & Yılmaz, 2013) or aimed to measure the behaviors of particular populations such as tourists (e.g., İpar, 2018; Soylu, 2019), children (e.g., Özkan et al., 2020), employees (Kanbur et al., 2022), and secondary and high school students (e.g., Ardahan, 2022; Sontay et al., 2015). Although these scales might be effective for some research purposes, they might remain insufficient in being inclusive of broader populations' features and embracing the importance of culture. Previous studies indicate that social context and cultural elements play a noteworthy role in humans' relationship with nature (Milfont, 2012; Milfont & Schultz, 2016). Taking this into account, this research aims to develop a measure

of the pro-environmental behaviors in the context of Türkiye and test its dimensionality, reliability, and validity.

We conducted three studies designed to develop and test a concise measure. In the pilot study, considering the current issues in pro-environmental behaviors in Türkiye and existing scales in the literature, we developed an item pool consisting of 92 new items. Then, we presented the item pool to subject matter experts who are experienced in the study of environmental psychology as well as scale development processes. Based on their reviews about items' clarity and relevance, we eliminated 40 items and created a 52-item-scale.

After the pilot study, in Study 1, we conducted an exploratory factor analysis (EFA) to extract the factors that fit our data ($N$ = 454, $M_{age}$= 21.59, $SD_{age}$ = 2.24). Participants rated the items on a 1 (*never*) to 5 (*always*) scale. Higher scores on the scale indicated a higher frequency of pro-environmental behaviors. After a series of EFA, we obtained an 18-item scale including four factors ($\alpha$ = .88), which explained 58.68% of the variance. Then, based on the content of the items, we named the factors as environmental literacy ($\alpha$ = .80, ω = .80), reducing waste ($\alpha$ = .74, $\omega$ = .74), environmentally conscious consumption ($\alpha$ = .80 $\omega$ = .78), and collective action (α = 82, McDonald's Omega cannot be computed due to factor including only two items), which, respectively, explained 32.98%, 11.24%, 8.30%, and 7.51% of the total variance. In addition to our scale, we asked participants to fill out the *Environmental Attitude Scale* (Akkuş, 2020) and the *New Ecological Paradigm Scale* (Bektaş & Şirin, 2018; Dunlap & Van Liere, 1978; Dunlap et al., 2000) in order to test convergent validity. As expected, we found positive relationships with both scales: $r$ = .33 and $r$ = .17, $p$ < .001, respectively. The positive and significant relationships with both scales supported the convergent validity of the newly developed scale.

In Study 2, we assessed the scale's reliability as well as its dimensionality through confirmatory factor analysis (CFA); $N$ = 399, $M_{age}$= 22.42, $SD_{age}$ = 4.11. The results of the CFA were examined through model fit indices and showed that the factor structure of the scale showed an acceptable fit with the data, CFI = .92, TLI = .91, GFI = .92, AGFI = .89, AIC = 383,995, RMSEA = .07, SRMR = .08, and $x2$(300,995)/$df$(112) = 2,70, $p$ < .001. Results for the reliability tests indicated that the scale is internally consistent as indicated by Cronbach's alphas and McDonald's Omega's for the total scale ($\alpha$ = .88; $\omega$ = 87 ) as well as subdimensions, namely, environmental literacy ($\alpha$ = .61; $\omega$ = 63), reducing waste ($\alpha$ = .74; $\omega$ = .74), collective action ($\alpha$ = .83; McDonald's Omega cannot be computed due to factor including only two items ) and environmentally conscious consumption ($\alpha$ = .82; $\omega$ = .82).

Overall, in a series of studies, we aimed to develop a reliable and valid self-report scale that measures pro-environmental behavior in the cultural context of Türkiye, a country located in one of the regions that are affected the most by global warming. The scale has 18 items consisting of four factors. The factors represent pro-environmental behavior types such as learning and sharing information regarding environmental issues (*environmental literacy*), reducing harmful waste and reusing/recycling materials (*reducing waste*), engaging in collaborative actions and team works to solve environmental problems (*collective action*), and eco-friendly consumption choices (*environmentally conscious consumption*). Psychometric tests (i.e., confirmatory factor analysis, tests of reliability, correlation analyses) supported that our scale is a valid and reliable tool to measure pro-environmental behaviors in Türkiye. Although there are several limitations due to our scale type (i.e., self-report) and sampling (i.e., college students), we believe that this measure will be useful for environmental sustainability research and, ultimately, policy practices aiming to promote pro-environmental activities.

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**APPENDICES**

**Table 1.**

*Factor Structure of Pro-Environmental Behavior Scale*

| Items | *M* | *SD* | *F1* | *F2* | *F3* | *F4* |
|---|---|---|---|---|---|---|
| 1. I talk to my friends about environmental issues. | 2.15 | 1.16 | .65 | | | |
| 2. I watch documentaries and programs on environmental issues. | 2.90 | 1.10 | .69 | | | |
| 3. I follow news and articles about the environment. | 2.79 | 1.12 | .74 | | | |
| 4. I follow the developments aimed at increasing productivity in agriculture. | 2.95 | 1.07 | .84 | | | |
| 5. I share social media posts about environmental issues. | 2.32 | 1.16 | .51 | | | |
| 6. Instead of throwing away broken electronic equipment, I repair or have it repaired. | 3.95 | .92 | | .76 | | |
| 7. When my furniture gets old, I get it serviced instead of buying a new one. | 3.71 | 1.05 | | .71 | | |
| 8. Before buying a new product (e.g., clothes, shoes, bags), I repair the ones I have or have them repaired. | 3.67 | 1.06 | | .76 | | |
| 9. If the product I purchased is in a glass/plastic container, I reuse the container instead of throwing it away. | 3.59 | 1.15 | | .65 | | |
| 10. I find a place to use leftover food instead of throwing it away. | 3.78 | 1.08 | | .66 | | |
| 11. I collect and dispose of recyclable waste (e.g., paper, plastic, organic waste, glass.) | 3.20 | 1.35 | | | .75 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| separately from non-recyclable waste. | | | | | | |
| 12. I prefer environmentally friendly personal care products (e.g., toothbrushes, sanitary pads, razors). | 2.84 | 1.21 | | | .84 | |
| 13. I prefer to shop from eco-friendly manufacturers. | 3.11 | 1.20 | | | .72 | |
| 14. When shopping, I buy environmentally friendly products (e.g., recyclable packaging, economy-size products). | 3.25 | 1.02 | | | .52 | |
| 15. I check the recycling symbols on the products. | 3.28 | 1.07 | | | .57 | |
| 16. I participate in petitions related to the improvement of the living conditions of animals. | 3.27 | 1.05 | | | | .93 |
| 17. I participate in environmental signature campaigns. | 2.62 | 1.19 | | | | .87 |
| *Eigenvalue* | | | 5.61 | 1.91 | 1.41 | 1.28 |
| *Variance* | | | 32.98 | 11.24 | 8.30 | 7.51 |
| *Cronbach's alpha* | | | .80 | .74 | .80 | .81 |
| *Mcdonald's omega* | | | .80 | .74 | .78 | - |

*Note. F1 = environmental literacy; F2 = reducing waste; F3 = environmentally conscious consumption; F4 = collective action*

**Table 2.**

*Descriptive Statistics and Correlations for Study Variables (Study 1)*

| | *n* | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Pro-environmental behavior scale (PEB) | 454 | 3.14 | .63 | - | .79** | .68** | .82** | .62** | .35** | .19** |
| 2. Environmental literacy (PEB) | 454 | 2.53 | .79 | | - | **.29**** | **.45**** | **.51**** | **.19**** | .04 |
| 3. Reducing waste (PEB) | 454 | 3.75 | .73 | | | - | **.36*** | **.18**** | **.26**** | **.16**** |
| 4. Environmentally conscious consumption (PEB) | 454 | 3.06 | .81 | | | | | **.37**** | **.25**** | .09 |
| 5. Collective action (PEB) | 451 | 2.87 | 1.18 | | | | | - | **.27**** | **.23**** |
| 6. Environmental Attitude | 454 | 4.1 | .43 | | | | | | **-** | **.68**** |
| 7. New Ecological Paradigm | 454 | 3.81 | .46 | | | | | | | - |

**Table 3.**

*Descriptive Statistics and Correlations Between Study Variables (Study 2)*

| | *n* | *M* | *SD* | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|
| 1. Environmental literacy | 399 | 3.75 | 0.56 | - | | | |
| 2. Reduce waste | 399 | 3.13 | 0.96 | **.42***** | - | | |
| 3. Collective action | 399 | 3.32 | 0.91 | **.30***** | **.41***** | - | |
| 4. Environmentally conscious consuming | 399 | 2.64 | 0.84 | **.39***** | **.67***** | **.48***** | - |
| Age | 396 | 22.42 | 4.11 | **.11*** | **.17***** | .00 | **.14**** |
| Gender[a] | 398 | 0.19 | 0.40 | .01 | .04 | **-.13**** | **.14**** |
| Education level | 399 | 4.39 | 0.86 | .03 | .08 | .01 | .10* |
| Mother's education level | 287 | 4.68 | 1.71 | -.01 | -.06 | .06 | .01 |
| Father's education level | 399 | 5.35 | 1.66 | .06 | .01 | -.04 | .01 |
| Ideological self-placement | 399 | 4.08 | 1.92 | .07 | .01 | -.03 | -.04 |
| Religious adherence[b] | 364 | .75 | 0.43 | -.02 | .05 | .01 | -.10 |
| Impact of religious belief on daily life | 399 | 5.08 | 2.98 | .08 | .03 | **.11*** | -.02 |
| Conservatism | 399 | 4.16 | 2.61 | .07 | .03 | .05 | -.05 |
| Household monthly income | 399 | 2.74 | 1.30 | -.01 | -.05 | -.06 | -.03 |
| Satisfaction with household monthly income | 399 | 5.10 | 2.25 | .02 | **-.10*** | -.05 | -.06 |
| Frugality | 399 | 6.64 | 2.16 | **.31***** | **.11*** | .06 | **.10*** |
| Importance of savings | 399 | 7.33 | 2.31 | **.23***** | **.19***** | **.11*** | **.12*** |
| Being a vegetarian[c] | 399 | .06 | 0.24 | -.04 | **.15**** | **.19***** | **.13**** |
| Being a vegan[d] | 399 | .02 | .12 | .00 | .09 | .07 | .10* |
| Effort to reduce your consumption of animal products in the last 6 months[e] | 399 | .24 | .43 | **.15**** | **.31***** | **.28***** | **.28***** |
| Importance of environmental problems | 399 | 8.76 | 1.63 | **.24***** | **.42***** | **.28***** | **.35***** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Membership in an environmental organization[e] | 399 | .16 | 0.37 | **.11*** | **.18***** | **.10*** | **.24**** |

[a] 0 = women and 1 = men

[b] 0 = not having a religious adherence and 1 = having a religious adherence

[c] 0 = not being vegetarian and 1 = being vegetarian

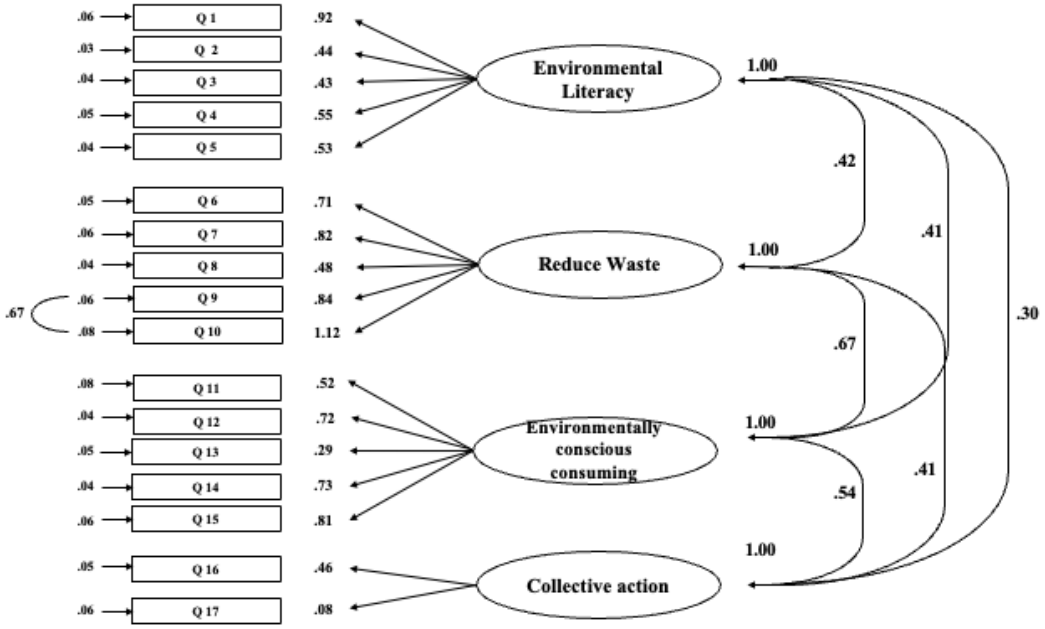
[d] 0 = not being vegan and 1 = being vegan

[e] 0 = no and 1 = yes

*$p$ < .05. ** $p$ < .01. *** p < .001.

**Figure 1**

*Confirmatory Factor Analysis of Turkish Pro-Environmental Behavior Scale*




*Note*. *** indicates findings are significant at <.001, ** indicates findings are significant at <.01.