

Ecological Life Behaviour Scale: Development, Validity and Reliability

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ABSTRACT

Increasing awareness about the significance of personal preferences is highly important for the sustainable balance of earth, because the underlying reason for today's ecological problems is always tending to or guiding into more consumption. People's desire to always consume more brings irreversible harm to all natural systems, whether living or non-living, as well as ecological balance. Consequently, ecosystems will not maintain their sustainability and future generations of people will face very serious problems, in terms of health in particular. To avoid all these, we must adopt a new lifestyle in which organic products are preferred without polluting the environment, unnatural chemical products are refrained from and wastes are recycled, in short a system based on natural healing. Hence, this study aims to develop a scale to identify the level of adult people's ecological life behaviour. For this purpose, discussing the subjects of overconsumption, industrial products and recycling, we created items involving general behaviours in such areas as eating-drinking, sheltering, clothing, detergents and plastics, transportation and energy use, presented these items to experts in their fields, and made changes in line with the feedback they provided. Purposeful sampling was selected for the candidate 32-item scale and 149 instructors from Kafkas University participated in the study group. Explanatory factor analysis (AFA) revealed a single-factor structure with 15 items. AFA results were also validated with confirmatory factor analysis (CFA). Goodness of fit index was found to be high. For assessing the reliability of the scale, item analysis was performed while also Cronbach Alpha, Guttman Split Half and Spearman Brown reliability coefficients were calculated. The scale yielded an internal consistency coefficient of .87. The language of the scale is Turkish. It was translated into English, but language validity has not been assessed yet.

Keywords: ecological, ecological life, behaviour scale, validity, reliability

INTRODUCTION

The biggest factor in ecological degradation is human behaviour. It is particularly important to increase awareness about the significance of personal preferences in lifestyles and consumption habits for the sustainable balance of earth. As human consumption increases, industrial production and the amount of resulting greenhouse gas and carbon dioxide is also rising and environmental harm caused by human activity keeps growing, turning into a chaotic ecological crisis. The researchers Devall and Sessions who has become aware of this crisis and made significant contributions to deep ecology made a great diagnosis by stating that the ecological crisis our planet has been undergoing is actually a reflection of the crisis in people's consciousness and perception (Yaylı & Yashkaya, 2015).

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The underlying reason for today's ecological problems is always tending to or guiding into more consumption. Consumption first turned into consumerism and then, a kind of consumption addiction. The cultural mindset popularizing mass consumption instead of saving with each passing day continues to exercise influence all over the world at a great pace. This system creates a consumption society that constantly generates new needs and then meets such needs rapidly (Kılıç, 2006) whereas people should not consume more than what can be reproduced (Öztürk-Demirbaş, 2015). That is because human desire to always consume more has brought harm to ecological balance, polluted air, water and soil, decreased plant and animal diversity, and consequently deranged human health. In brief, people's unconscious consumption has brought irreversible harm to all natural systems including living and non-living, and to their own nature. The way things stand, ecosystems will no longer be sustainable and future generations will experience rather serious problems, particularly concerning health. In addition, serious resource problems will continue due to the exploitation of natural resources.

Conceptual Framework

Ecological: The word ecological is usually used to refer to “not harmful to plants, animals, people, and non-living environment, not affecting natural cycles negatively, environment friendly”.

Ecological life: Ecological life is defined by Özarslan-Aktar (2012) as “a lifestyle based on healing the nature in which organic products are preferred without polluting the environment, the use of unnatural chemicals are avoided and wastes are recycled”; and as “entirely natural from the goods used to the living space, from food consumed to the paper used, a mentality, a philosophy of life, the common ground between humans and the world” by Kurtar & Ayan (2004). Ecological life refrains from harming the symbiotic balance of nature. The essence of ecological life is consuming the natural and as much as necessary in our consumption preferences. Therefore, we need to discern between the natural and unnatural, and know the measure of everything. And for understanding how our vegetable, animal or entirely artificial consumption affects us and the nature of our environment, ecological awareness should be raised (Cutter-Mackenzie & Smith, 2003).

Ecological lifestyle: A kind of lifestyle in which individual consumption is reduced voluntarily while being responsible to and respectful of the environment, and refraining from energy spending. As people adjust their lifestyles accordingly, their consumption preferences and behaviours change as well (Babaoğul, Şener & Buğday, 2012). In recent years, people have been increasingly turning towards ecological products in terms of nutrition, tourism, health and clothing in particular.

Aim of the Study

Individuals, who have come to realize that ecological balance and human health have been deteriorating, i.e. people with ecological awareness have started to prefer nature friendly products as they gain awareness of ecological life. Öztürk-Demirbaş (2015) maintains that building one's life on ecological values is only possible through raising awareness about the subject, which can be achieved through education.

For solving ecological problems, human behaviour in daily life needs to gravitate towards the ecological. According to Özdemir (2016), any human behaviour in daily life has a positive or negative impact on ecosystems and our habits seeming quite innocent such as eating-drinking, sheltering, clothing, transportation and energy use can cause ecological problems. Wrong habits concerning such issues also bring along health problems.

Thus, this study aims to develop a scale to identify the level of ecological life behaviour in adults.

METHOD

The stages of the developmental work for “Ecological Life Behaviour Scale” to determine ecological life behaviour of adults are explained below.

Study Group

For “Ecological Life Behaviour Scale” aiming at identifying adult individuals' behaviour towards ecological life in the society, purposeful sampling was selected and instructors from Kafkas University (Teaching Assistant, Research Assistant, Asst. Prof., Assoc. Prof. and Prof.) participated in the study group. 149 academics from the university the study was conducted participated in the study of “Ecological Life Behaviour Scale”. Of the instructors who responded to the scale, 54 were female and 95 were male whose ages ranged between 23 and 53. 52 instructors were single while 97 of them were married at the time of the study.

Development of Scale

During the development of “Ecological Life Behaviour Scale” aimed at identifying the level of ecological life behaviour, the order also recommended by Büyükoztürk (2005) was followed. Accordingly, first the problem was defined, and a draft form was created by writing down appropriate items, then, expert opinion was asked and preliminary application was performed, finalizing the scale.

At the first stage of development, literature review was conducted to find out what ecological life is and the competency of individuals with ecological life behaviour. Within this scope, domestic and international studies in the field of ecology were investigated and the items that can be used in the scale were determined to create an item pool.

Ecological life is based on not harming the human health and environment and healing of the nature, using natural goods only (Kurtar & Ayan, 2004; Özarslan-Aktar, 2012). Therefore, by addressing the subjects of overconsumption, industrial products and recycling, we created items involving general behaviours in the areas such as eating-drinking, sheltering, clothing, detergents and plastics, transportation and energy use (Capra, 1994, 1997, 2003, 2005, 2007, 2009). The candidate scale consisting of these items was presented to the experts in their fields who are informed of the study –one expert in biology, two experts in biology education and two experts in science education. Furthermore, for ensuring language validity, the opinion of a Turkish language teacher was asked. In line with the feedback provided by the experts, we developed the scale. The scale uses 1-5 rating with the options “Never”, “Rarely”, “Sometimes”, “Often” and “Always”. Within this framework, “Ecological Life Behaviour Scale” including 32 items was developed.

Data Collection Tool

The scale was applied on the instructors who were working at the university the study was conducted and agreed to participate in the study.

Data Analysis

The most important two basic features required from a good assessment instrument are reliability and validity. Reliability is the consistency between independent assessments of the same thing (Karasar, 2002). In the study, after application, the reliability of the scale was evaluated by internal consistency criterion. As for validity, it is the quality of being assessed without being confused with other things. The first condition to accept an assessment as valid is its reliability (Karasar, 2002). However, the validity of a reliable assessment instrument is not certain. After preliminary application, the validity of the scale was evaluated by content and construct criteria. Content validity is about whether the questions (items) of the assessment instrument are compatible with the purpose of the assessment and represents the area to be measured, and it was determined with expert opinion in our study. Construct validity defines how well an assessment instrument measures an abstract phenomenon. There are various types of construct validity: factor analysis, the impact of experimental variables on test points, internal validity (item analysis), split-validity, cross-validation, structural equation modelling (Tavşanlı, 2006). Factor analysis is a statistical technique that aims to explain the measuring with fewer numbers of factors by gathering the variables measuring the same structure or quality. It can be performed for various reasons. This study conducts factor analysis to determine the validity of the scale. The construct validity of the scale was assessed through item analysis.

According to the responses of the instructors who agreed to take part in the study, the reliability and validity of the scale was assessed. The sample size was examined for the factor analysis and was found adequate (Pallant, 2016). To assess construct validity, “Explanatory Factor Analysis (EFA)” was conducted using principle component analysis with varimax rotation. In the analysis, it was required that factor loads (item correlation coefficients) would be .30 at the least (Pallant, 2016; Tabachnick & Fidell, 2013). For assessing the reliability of the scale, item analysis was performed while also Cronbach Alpha, Guttman Split Half and Spearman Brown reliability coefficients were calculated. In addition, “Confirmatory Factor Analysis (CFA)” was performed to test the accuracy of the construct suggested by the EFA.

FINDINGS

This part of the study discusses the findings on the validity and reliability of “Ecological Life Behaviour Scale” aimed at identifying ecological life behaviours in adult individuals.

Findings of Explanatory Factor Analysis (EFA) for Ecological Life Behaviour Scale (ELBS)

Findings on the Validity of the ELBS

Factor and item analyses were conducted to reveal the construct validity of the scale and to identify and size the factor loads of the items. Through item analysis, strong or distinguishing items were selected for the scale.

The 32 items of the Ecological Life Behaviour Scale (ELBS) were subjected to principal components analysis using SPSS program. Before the analysis, the fitness of the data for factor analysis was assessed. Examination of the correlation matrix revealed the existence of many coefficients that are .30 and greater. In addition, the Kaiser-Meyer-Olkin (KMO) coefficient was calculated as well as Bartlett's test of sphericity. While the KMO value was .81, the result of the Bartlett's test of sphericity ($\chi^2 = 1669.037$; $p = .00$) was statistically significant. As the KMO coefficient was $> .60$ and chi square value was $p < .05$ according to the Bartlett's test of sphericity, it was decided that factor analysis can be conducted on the data (Şeker & Gençdoğan, 2006; George & Mallery, 2011; Tabachnick & Fidell, 2013; Pallant, 2016).

The item analysis and the principal components analysis with varimax rotation revealed the existence of nine items with an Eigen value > 1 . These nine components explain 62.82% of the variance. The scree plot shows a clear break after the first component. Using Catell's scree test (Pallant, 2016), we decided to limit the scale with a single factor for further analyses. This decision was supported by the results of the parallel analysis (Pallant, 2016) as well. These results showed the existence of a single component that exceeds the criterion values corresponding to randomly created data matrix of the same size (32 variables x 149 participants).

To see the highest significant factors more clearly, the following "Scree Plot" graph was drawn.

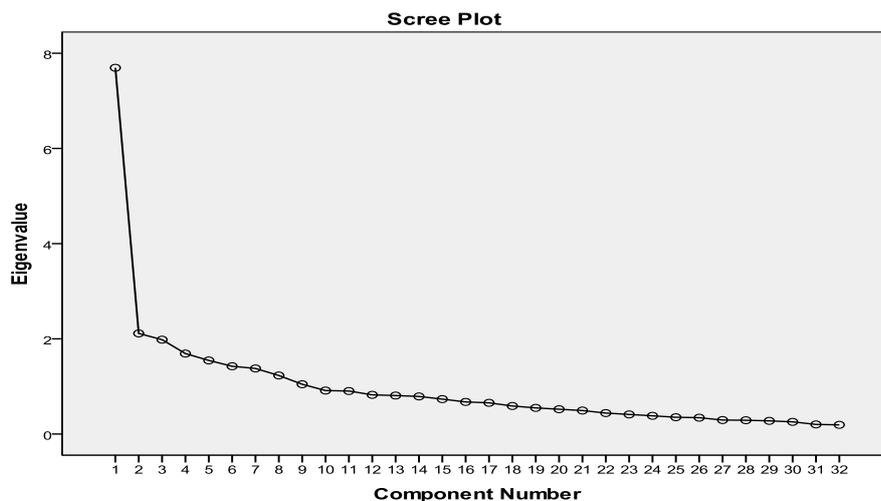


Figure 1. Scree plot graph for ecological life behaviour scale

Figure 1 indicates that there are clear and huge breaks at the first component vertically while the breaks following the second component are horizontal and smaller.

Seventeen items including those with no loading on a factor or those having loadings on more than one factor with less than .10 difference between factor loads, with less than .30 factor load and with insignificant contribution to the variance were discarded from the analysis. AFA was repeated for the ELBS consisting of fifteen items limited with a single factor.

Since the KMO coefficient was .87 and the result of the Bartlett's test of sphericity was significant - $\chi^2 = 699.805$; $p = .00$ - (the KMO coefficient $> .60$ and Bartlett's test of sphericity chi-square value $p < .01$), it was decided that factor analysis can be conducted on the data (George & Mallery, 2011; Pallant, 2016; Şeker & Gençdoğan, 2006; Tabachnick & Fidell, 2013). As result of the item analysis and varimax factor analysis rotation on the 15-item ELBS, there was only a single factor with an Eigen value > 1 . It was found that item

loads varied between .52 and .72. This single factor explains 35.49% of the variance. It is considered sufficient for single factorial scales to have an explained variance of 30% or above (Büyüköztürk, 2012).

The factors with the items and load values are given in **Table 1**.

Table 1. Factors with items and load values

Items	Direction	Factor Loads (Varimax Rotation)
b 24 - I carefully read product content of packaged foods.	+	.720
b 4 - I use my stuff carefully not to generate excess consumption waste.	+	.707
b 31 - I try to purchase ecological products when shopping.	+	.637
b 22 - I make my own fruit juice at home.	+	.616
b 11 - Not to generate excess consumption waste, I repair and reuse my stuff when necessary.	+	.613
b 25 - When buying clothes, I pay attention to whether they are made of natural fibres like cotton, wool and bamboo.	+	.610
b 2 - I spend my money economically as overconsumption harms the nature.	+	.580
b 8 - I pay more for ecological products.	+	.578
b 16 - I take care of my health so that I will not have to use medicine.	+	.568
b 32 - I try to purchase the products with recycling sign (♻️).	+	.561
b 12 - I try to reduce the amount of garbage I generate.	+	.559
b 23 - I prepare food in summer to consume in winter.	+	.547
b 1 - I make a to-buy-list before going to shopping in order not to purchase unnecessary products.	+	.538
b 19 - I consume fresh fruits and vegetables seasonably.	+	.533
b 13 - I prefer ecotourism holiday.	+	.529
Eigen value		5.323
Total variance explained		35.49
Number of items		15
Minimum and maximum scores		Min.= 15 Max.= 75
Cronbach α		.87

Findings on the Reliability of the ELBS

Item analysis was performed to determine the functioning of the fifteen items in the scale. The item analysis was conducted to select strong or discerning items for the scale. In the correlation based item analysis conducted to decide whether items measure the same property, the relationship between the points obtained for each item in the assessment tool and total points obtained for the entire assessment tool (correlation coefficient) is calculated.

Table 2 shows item-total correlation coefficients and Cronbach Alpha values of the scale.

Table 2. Corrected item-total correlation coefficients and cronbach alpha values of the scale

Scale items	n	Mean	Standard deviation	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	T (alt%27-üst%27) ¹	Cronbach's Alpha if item deleted
b 1 - I make a to-buy-list before going to shopping in order not to purchase unnecessary products.	149	3.50	1.06	48.34	73.32	.45	6.71*	.86
b 2 - I spend my money economically as overconsumption harms the nature.	149	3.59	.96	48.24	73.63	.50	6.72*	.86
b 4 - I use my stuff carefully not to generate excess consumption waste.	149	3.91	.85	47.92	72.89	.62	8.53*	.85
b 8 - I pay more for ecological products.	149	3.47	.97	48.36	73.42	.50	7.39*	.86
b 11 - Not to generate excess consumption waste, I repair and reuse my stuff when necessary.	149	3.40	1.06	48.44	72.03	.53	8.60*	.86
b 12 - I try to reduce the amount of garbage I generate.	149	3.44	1.02	48.39	73.37	.47	7.23*	.86
b 13 - I prefer ecotourism holiday.	149	2.37	1.08	49.46	73.18	.45	7.78*	.86
b 16 - I take care of my health so that I will not have to use medicine.	149	4.04	.94	47.79	74.02	.48	6.01*	.86
b 19 - I consume fresh fruits and vegetables seasonably.	149	3.88	.85	47.95	75.32	.46	6.02*	.86
b 22 - I make my own fruit juice at home.	149	2.79	1.27	49.05	69.53	.55	9.44*	.86
b 23 - I prepare food in summer to consume in winter.	149	3.09	1.25	48.75	71.25	.47	8.84*	.86
b 24 - I carefully read product content of packaged foods.	149	3.73	1.04	48.11	70.38	.65	9.27*	.85
b 25 - When buying clothes, I pay attention to whether they are made of natural fibres like cotton, wool and bamboo.	149	3.65	1.07	48.18	72.06	.52	7.65*	.86
b 31 - I try to purchase ecological products when shopping.	149	3.52	.91	48.32	73.22	.56	8.37*	.86
b 32 - I try to purchase the products with recycling sign (♻️).	149	3.47	1.00	48.36	73.49	.48	7.10*	.86
Total number of items	15							
Maximum total points	Min.= 15 Max.= 75							
Mean	51.83							
Variance	82.71							
Standard deviation	9.09							
Cronbach α	.87							
Guttman split-half	Number of items and Cronbach α for the first part			Number of items and Cronbach α for the second part				
	8 items	.80		7 items	.80			
Spearman-Brown	.75				.75			

¹n₁=n₂=40

*p<.001

To identify the items to form the scale, the arithmetic mean, standard deviation and item-total correlation for each item were calculated. The required criterion to select the items to include in the scale is that the item-total correlation coefficient is above .20 (Tavşancıl, 2006). It was found that item-total correlation coefficients varied between .45 and .65 for all the items, and t-values between the items with low (bottom 27%) and high (top 27%) points were significant ($p < .001$). The Cronbach Alpha reliability coefficient in the internal consistency test of the scale was .87. Ideally, it should be above .70 (DeVellis, 2012; Pallant, 2016). The consistency between the scale points obtained with split-half test reliability was calculated using Spearman-Brown formula, and correlation coefficient was found as .75. Accordingly, we can say that the items of the scale are consistent with each other and have high reliability.

Findings of Confirmatory Factor Analysis (CFA) for the ELBS

Table 3 indicates the fit index values for the ELBS, and normal and acceptable values.

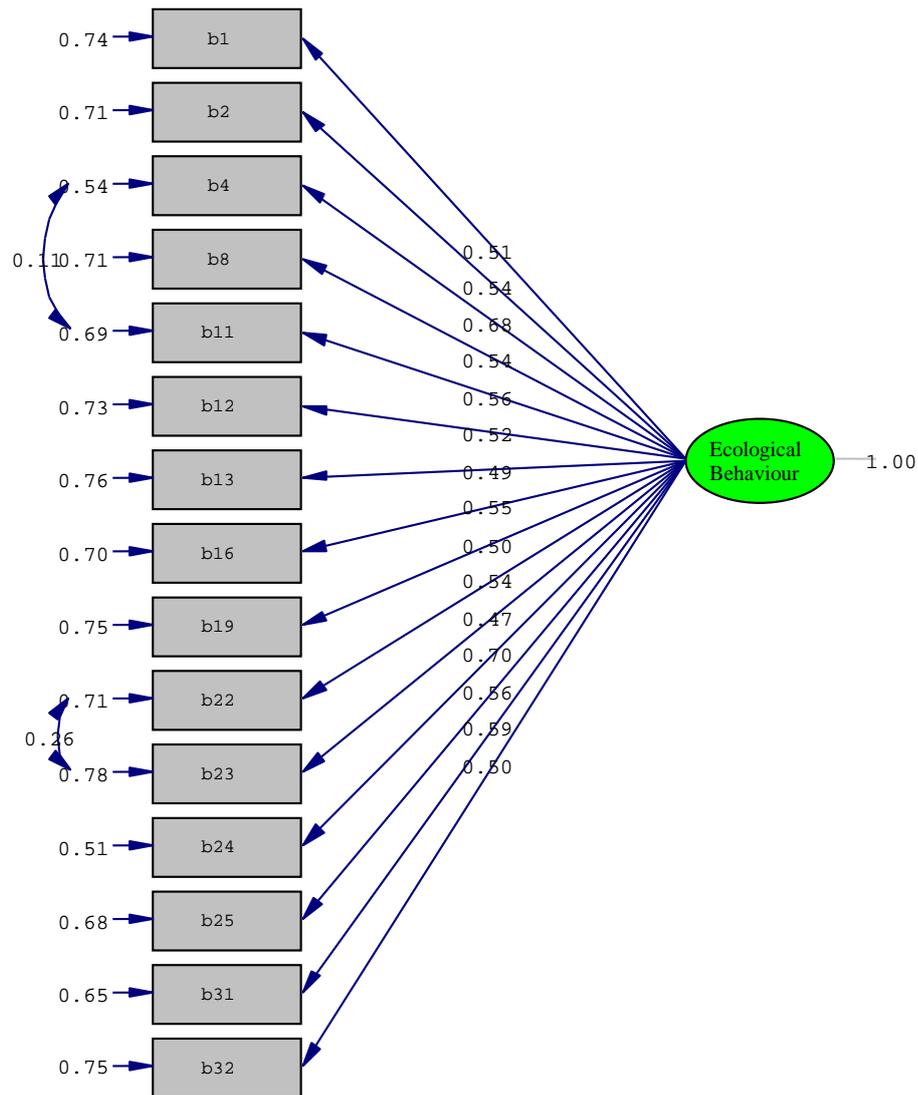
Table 3. Fit index values for ELBS, normal and acceptable values

Index	Normal values	Acceptable values	Values obtained
χ^2/sd	≤ 3	≤ 5	1.93
GFI	≥ 0.95	≥ 0.90	0.96
AGFI	≥ 0.95	≥ 0.90	0.95
CFI	≥ 0.95	≥ 0.90	0.95
NNFI	≥ 0.95	≥ 0.90	0.93
NFI	≥ 0.95	≥ 0.90	0.90
RMSEA	≤ 0.05	≤ 0.08	0.079
SRMR	≤ 0.05	≤ 0.08	0.073
RMR	≤ 0.05	≤ 0.08	0.076

As is seen in **Table 3**, we used various indices to examine the fitness of the ELBS model. In examining the fitness indices, that χ^2/sd proportion is below 3; NFI, NNFI, CFI, GFI, AGFI values are above .95 while RMSEA, RMR and standardized RMR value is .05 indicates perfect fitness. NFI, NNFI, CFI, GFI, AGFI values above .90 and RMSEA, RMR and standardized RMR value below .08 display good fitness (Çokluk, Şekercioglu & Büyüköztürk, 2012).

Fit index values for the ELBS are as follows: χ^2/sd value 1.93, GFI 0.96, AGFI 0.95, CFI 0.95, NNFI 0.93, NFI 0, 90, RMSEA 0.079, SRMR 0.073 and RMR 0.076. According to the relevant fit index values, it was decided that this version of the model is acceptable.

Figure 2 presents the factor loads for the items in the ELBS in a PATH diagram.



Chi-square= 170.02, df= 88, p-value= 0.00, RMSEA= 0.079

Figure 2. PATH diagram for ecological life behaviour scale

As is seen in **Figure 2**, this version of the model is accepted with two modifications. The factor loads of the model vary between 0.47 and 0.70, and t value for all the items is above 1.96.

CONCLUSION AND RECOMMENDATIONS

This study develops a single-factor, 15-item scale to identify ecological life behaviour in adults. It is found that the scale has sufficient properties for identifying ecological life behaviours. In the single-factor scale, the highest point that can be obtained is 75 while the lowest is 15. Higher points indicate that the level of the participant’s ecological life behaviour is also high.

The high Cronbach Alpha coefficient of the scale ($\alpha=.87$) indicates that the items in the scale are consistent with each other. In addition, the results of the EFA and CFA confirm the validity of the scale. Consequently, based on the reliability and validity work, it can be suggested that this scale can be used in the studies on the instructors.

With regard to ecological life, Kurtar & Ayan (2004) say that “*What we should do as humans is to realize the events before it is too late, and pursue a more naturalist and organic life. When the individual actions*

initiated by conscious people embrace all the society over time, maybe we can still have a chance, albeit slight, in the destruction process of our world and ourselves”.

Thus, it is important that instructors who have the opportunity to communicate with young people whose perceptions are still open, and also as individuals in the society are more sensitive to ecological issues. Indeed, in their study, Çakmak & Özkan (2016) found that university students with higher environmental awareness are more inclined to green consumption than the university students with low environmental awareness. In his study on tourism students, Kement and Demirci (2017) concluded that ecological awareness has a positive impact on environmentally friendly recreational behaviours. Furthermore, Özbebek-Tunç, Akdemir-Ömür and Düren (2012) reveal the university students' personal measures to contribute to reducing environmental problems. Öztürk-Demirbaş (2015) maintains that the studies urging to find the answer to the questions of “What kind of world I want to live in, and what kind of world I should leave as legacy?” should be conducted with social responsibility projects.

These studies on the university students indicate that students with ecological awareness are more adapt at displaying ecological behaviours. In this context, it is expected that instructors who become role models for and guide students are also expected to display ecological life behaviours.

Thus, we believe that this scale can be used in the studies on instructors as well as in the studies on adult individuals in different situations in the society.

Disclosure statement

No potential conflict of interest was reported by the authors.

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