Environmental values and education in Spanish universities: a questionnaire validation

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Abstract

Purpose – To protect the environment and society, research on responsible behavior and personal values has increased. Values have been identified as important for understanding and predicting environmental preservation behaviors. The purpose of this study is to analyze the validity and reliability of the Environmental Portrait Value Questionnaire in the Spanish context.

Design/methodology/approach – The new version of this questionnaire was administered to 742 university students (46.4% male and 53.6% female) from 16 regions in Spain.

Findings – The results of adapting and testing the instrument's psychometric properties were consistent with accepted criteria for validity and reliability. Therefore, this updated and contextualized instrument has the potential to contribute to academic advances in the sense of expanding the empirical practice of studying environmental values. Fifteen items from the original version were retained, grouped into four factors as in the original version: Altruistic – five items; Egoistic – four items; Biospheric – three items; and Hedonic – three items. The final version showed adequate fit indices and reliability measures.

Originality/value – This instrument is a powerful resource for the Spanish academic community because using this application it will be possible to assess the degree of commitment of young adults to the goals of sustainability and environmental protection.

Keywords Values, Environmental, Questionnaire, Education, Sustainability, Biospheric, Validation

Paper type Research paper

1. Introduction

1.1 Behavior values and environment

Currently, global warming is a major political, social and individual challenge due to the ecological consequences of this phenomenon affecting various spheres of society and the individual. The primary cause of this unsettling phenomenon is human behavior. Behavior can be understood as an individual's reaction to his/her interaction with the social environment (Guagnano *et al.*, 1995; Lange and Dewitte, 2019). In recent years, sustainability policies have gained prominence, and the option for green products and behaviors

emphasizes the importance of personal environmental values (Yuriev *et al.*, 2020; Reisch *et al.*, 2013). In a word, it may be stated that values shape proenvironmental behavior and vice versa (Nguyen *et al.*, 2016; Lange and Dewitte, 2019).

According to Dietz *et al.* (2005) and Li *et al.* (2019), values can be considered an invoked deliberation about a person's justifiable relationship with the environment. The study of personal values, which are relatively stable (Faccioli *et al.*, 2020; Soyez, 2012), allows a more robust understanding of their effect on human behavior because values can shape a person's life or influence the decision to choose a career (Roccas and Sagiv, 2010). According to Xie *et al.* (2020), personal values determine individual cognition and behaviors and also have an important impact on proenvironmental behaviors. Through personal values, people choose and select actions and are able to explain and evaluate people and events (Luque-Vílchez *et al.*, 2019; Rohan, 2000). It is necessary to make a clear distinction between personal values and other attributes, such as attitudes, traits and personal goals. Considered as desirable trans-situational goals and guiding principles in human life (Schwartz, 1992, 1996), personal values are cognitive representations that allow the individual to communicate and think about them (Sagiv and Schwartz, 2022).

According to Ribeiro *et al.* (2016) and Rokeach (1973), starting from the premise that values are guidelines and criteria, it is from them that people find a social justification for their choices and action behavior and can even predict proenvironmental actions (Ünal *et al.*, 2017, 2019). In line with this point of view, Bouman *et al.* (2021) and Karp (1996) point to a greater emphasis on the influence of personal values on proenvironmental behavior. Some authors, such as Dunlap *et al.* (1983), refer that individuals motivated by Maslow's "higher order" values are especially agents of pro-environmental behavior. According to Lee *et al.* (2014), environmental beliefs can be seen as concerns, values or attitudes toward the natural environment and ultimately can be influenced by personal values (Hornsey *et al.*, 2016). When personal values are transferred to the environmental domain, they have a different target, namely, the self, others or the biosphere (Cassells and Lewis, 2011; Williams and Schaefer, 2013). This shift influences beliefs, attitudes and behavior patterns related to the environment (Stern and Dietz, 1994). For instance, studies such as that by Kim and Seock (2019), Ünal *et al.* (2017, 2019) and Youn *et al.* (2020) have pointed out that personal values and norms and environmental beliefs directly or indirectly influence the adoption of pro-environmental behaviors.

On this theme, it is extremely important to bear in mind the 2030 Agenda and the 17 sustainable development goals (SDG). When evaluating pro-environmental personal values, this study contributes to the ongoing achievement of SDG 4 (Quality Education), SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action) concretely. Being environmentally conscious and guided by values that preserve the sustainability of the planet is a challenge and, at the same time, crucial to establishing a commitment with global educational action-oriented and universally applicable SDG (Kautish *et al.*, 2020; Margaça *et al.*, 2022). For instance, studies point to the fact that values are influencing factors regarding consumption behaviors (Cho *et al.*, 2018).

Based on the previous assumptions, the aim of this article is to test the validity and reliability of a questionnaire that assesses personal values in relation to environmental behavior in a sample of Spanish university students. Assessing students' environmental values makes it possible to define expected behaviors and shared norms within universities, as well as to assess socio-environmental impacts.

1.2 Personal values and environmental values

In recent years, the literature has shown an increase in the importance of values in terms of understanding their influence on individual behavior (Rohan, 2000). Values are cognitively represented, allowing people to build mental schemas, communicate and act based on them (Schwartz, 1992) and this is what distinguishes them from individual needs and motives. According to Schwartz and Bilsky (1987), values relate to individual beliefs "about end states or desirable behaviors, that transcend specific situations, guide the selection or evaluation of behaviors and events, and are ordered by relative importance" (p. 551). In turn, Kluckhon (1951) considers values as an "explicit or implicit, distinctive individual or group characteristic which influences the selection of available modes, means and ends of action" (p. 395). Personal values can influence behavior and determine actions in the various spheres of an individual's life (Roccas and Sagiv, 2010). On the one hand, values can affect behavior directly; that is, people act with a view to realizing their values (Sagiv and Schwartz, 1995). On the other hand, values can also have an indirect influence on behavior; that is, by affecting attention and the way people interpret information, it will affect their actions, consequently (Sattler and Kerr, 1991).

The first authors to formulate a pro-environmental value approach were Dunlap and van Liere (1978), emphasizing its importance because individuals are able to understand their relationship with the environment in general and the ecosystem in particular. Several studies (De Groot and Steg, 2008) analyzed which values provide a basis for environmentally relevant beliefs and behaviors. According to Schwartz (1992), values are "desirable transsituacional goals varying in importance, which serve as a guiding principle in the life of a person or other social entity" (p. 21). In addition to preceding a behavior (Allen *et al.*, 2022), personal values guide a person toward a certain behavior (Bardi and Schwartz, 2003). Schwartz's theory of personal values (1992) highlights that individuals have a set of values by which people base their lives, and, in addition, it is through them that they create reference standards and reinforce individuals' moral choices.

According to Kwiatkowska (2006), environmental ethics develops critical thinking and plays an important role in the process of modeling personal values so that a way of understanding and acting in societies that contributes to the conservation of nature and its sustainable use emerges (Himes and Muraca, 2018; Norton and Bravo-Osorio, 2019). Environmental ethics is linked to an environmental rationality supported by individual moral values, which lead to a certain type of individual or collective behavior (Rodríguez and Silva, 2016). Environmental ethics leads to values, duties and obligations toward nature and the environment, which can guarantee the future of new generations, as well as promote resources and services for sustainable development (Silva *et al.*, 2022). In this line of reasoning, environmental ethics guides individuals toward taking actions based on values (e.g. aesthetic, ecological and cultural). In this sense, when individuals have a strong sense of environmental ethics, they are more likely to implement green actions in their daily choices, which is reflected in a concern for the sustainability of the planet.

The research carried out by Steg *et al.* (2011) revealed that values are predictive of environmental behaviors and beliefs. For this reason, in conflict, the individual tends to base their choice on values that are most relevant. The person's goals, as well as the evaluation in relation to behaviors and actions, are represented through his/her personal values (Bouman *et al.*, 2021; Steg, 2016), which are general and abstract in nature (Wolske *et al.*, 2017). According to Bouman *et al.* (2018), when relating personal values to environmental values, four dimensions emerge: 1) altruistic – caring for others; 2) egoistic – taking care of oneself; 3) hedonic – taking care of own pleasure; and 4) biospheric – taking care of the environment. People with this value have a stronger environmental self-identity, which translates into

climate-conscious actions (Balundé *et al.*, 2020). Furthermore, these values are essential antecedents to actual behavior in favor of the environment. Therefore, it becomes evident that motivational factors and personal (biosphere) values, as well as individual identity, are decisive for understanding and promoting climate-conscious actions and behaviors (Bouman *et al.*, 2021).

The value-identity-personal norm model (Ruepert *et al.*, 2016; van der Werff and Steg, 2016) reinforces the importance of biospheric values, which reflect the belief that nature is important in its own right (Steg and De Groot, 2012) and are fundamental for the development of conscientious pro-environmental actions (Balundé *et al.*, 2019; Namazkhan *et al.*, 2019).

1.3 Environmental education and values

The empowerment of communities is fundamental for environmental harmony, for which an interdisciplinary educational approach is necessary: problem-oriented solving and multimethod way (Clark *et al.*, 2011), and stress that it is not just about acquiring knowledge. Sustainable development Goal 4 seeks to "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all". In this SDG, it is equally important to ensure that quality education encompasses education for environmental sustainability as a response to the environmental crisis (García-Gutierrez and Gaitero, 2021).

Living in society requires successive choices which will determine the creation and differentiation of values (Bonotto, 2008a). Desirable environmental values were established in the "Treaty on Environmental Education for Sustainable Societies and Global Responsibility," which states that "values and actions contribute to human and social transformation and ecological preservation" (Viezer and Ovalles, 1994, p. 29). Briefly, this document presents five guidelines: 1) valuing life – respecting and valuing biodiversity; 2) valuing cultural diversity; 3) valuing different forms of knowledge; 4) valuing a sustainable society – equitable sustainability and quality of life for all; and 5) valuing a participatory life – for a fair, balanced, social and environmental society.

According to Bonotto (2008) and Ndiaye *et al.* (2019), an environmental education project aimed at the formation of values is based on the interaction of three dimensions: affectivity, cognition and action. The first concerns the ability to identify feelings and to get involved, as well as the individual aesthetic experience. The cognitive dimension concerns the individual ability to reflect on a concept, feeling or values related to a particular object or specific situation. Finally, action is related to the ability to achieve. Environmental education in its entirety (i.e. natural, social, political, economic and cultural axis) points to the urgency of educating for the change of individual and social values, adding concrete and responsible actions. Subsequently, it is fundamental to integrate ethics and values in the educational and pedagogical processes of environmental education (Galán, 2019). Furthermore, environmental education must consist of an articulation between knowledge, political and social participation and individual values (Bonotto, 2008) and often redimension the individual's place in society. Based on these assumptions, it is clear that education has the power to influence social values and actions, which enables human transformation and environmental conservation.

1.4 Environmental portrait value questionnaire

Bouman *et al.* (2018) suggested the measurement of human values, proposing the understanding of environmental identity, beliefs and behaviors through the Environmental Portrait Value Questionnaire (E-PVQ). This instrument is a short and adapted version of the

PVQ for environmental research, based on the adapted and abbreviated version of the Schwartz value survey (E-SVS). Like the E-SVS, the E-PVQ and presents in common core four human values underlying environmental beliefs and behaviors: altruistic – valuing the welfare of other human beings; egoistic – valuing personal resources; biospheric – valuing the environment; and hedonic – valuing pleasure. Furthermore, Bouman *et al.* (2018) validated this scale composed of items similar to the E-SVS and compared its reliability, factor structure and predictive power with the original E-SVS.

The original instrument contains 17 items, which are grouped into four dimensions, namely, Altruistic (five items), Egoistic (five items), Biospheric (four items) and Hedonic (three items) were presented on seven-response choices. In this work, the authors performed two studies. In the first, the validity and reliability of the EPVQ were verified, along with a sample of Dutch individuals. The analyses carried out confirmed the factor structure and showed internal consistency. In the second, the authors replicated the first study with a larger sample composed of high school students.

2. Materials and methods

2.1 Translation, adaptation and validation procedures
In this study, the authors act in accordance with the methodological guidelines of the International Test Commission, with the primary objective of guaranteeing a scrupulous instrument adaptation from one culture to another (Muñiz, 2000). This process has been performed in three steps: for an accurate questionnaire translation, direct and reverse translation by two independent bilingual translators was made (Brislin, 1986); to verify the quality of accordance and accuracy regarding the original version, a reverse translation was performed (Hambleton *et al.*, 2004); and finally, after these two procedures, necessary adjustments were made.

With the ultimate aim of verifying whether the translation can be understood and interpreted correctly by the participants (Beaton *et al.*, 2007), a pretest with a group of 35 students was carried out. This procedure allows the detection of inconsistencies and necessary adjustments, increasing the validity. Finally, it was possible to ensure the internal consistency of all dimensions of the original scale: Altruistic: $\alpha = 0.780$; Egoistic: $\alpha = 0.722$; Biospheric: $\alpha = 0.901$; and Hedonic: $\alpha = 0.851$.

2.2 Data collection and ethical considerations
The EPVQ and a brief sociodemographic questionnaire were hosted on an electronic platform, and to ensure a representative sample, 1,200 e-mails were sent and 804 responses were received at the end of December 2022. Participants must be of legal age and Spanish. This process relied on the collaboration of the public relations offices of several universities. However, 62 questionnaires were excluded: 24 missing values, 18 discrepancies and 20 random responses. For this cross-sectional, quantitative and descriptive study, a total convenience sample of 742 Spanish university students was reached. Although the low response rate is the main disadvantage associated with conducting a survey via e-mail, this method of data collection has become popular due to the sum of its advantages: lower costs, speed and the ability to reach specific populations, and in addition, it allows the respondent to fill it at a convenient time and place (Aaker *et al.*, 2007).

Before starting to fill in, the participants were made aware of the nature and purpose of the study, as well as informed consent, which attests to confidentiality and anonymity. This study was conducted in accordance with ethical principles approved by American Psychological Association.

2.3 Statistical analysis

Psychometric properties and descriptive statistics were measured using the SPSS Statistical Program (version 26.0). The authors chose to perform an exploratory factor analysis (EFA) and a confirmatory factory analysis (CFA) to evaluate the internal validity since the scale under study has more than one factor (van Prooijen and van der Kloot, 2001). For this purpose, EFA and CFA were performed using the factor and AMOS programs, respectively.

To assess the fit of the obtained model, the root mean square of the residuals (RMSR) and the goodness-of-fit index (GFI) were used (Tanaka and Huba, 1989). For this to be confirmed, the RMSR must be less than 0.05 (Harman, 1980) and the GFI must be above 0.95 (Ruiz *et al.*, 2010). The creators of the factor statistical program (Ferrando and Lorenzo-Seva, 2018) proposed an index (generalized G-H index > 0.80) that guarantees the replicability of the factors, the stability of the model and how well a set of items represents a common factor, allowing its generalization to other populations. Finally, with regard to the CFA, the robust maximum likelihood estimation method was privileged. The fit of the model was guaranteed by analyzing the following indicators: the comparative fit index (CFI > 0.90), the incremental fit index (IFI > 0.90), the Tucker-Lewis index (TLI > 0.90) and the root mean square error of approximation (RMSEA).

2.4 Participants

The convenience sample is composed of 742 Spanish University students (46.4% male and 53.6% female) aged between 18 and 53 years old, with an average age of 20.48 years (SD = 2.28) from 37 Spanish higher education institutions. Table 1 presents the sociodemographic characterization.

3. Results

3.1 Psychometric properties

In Table 2, it is possible to visualize the psychometric properties of the questionnaire, namely, mean, standard deviation, asymmetry and kurtosis and item-total correlation (>0.30). The statistical measure of kurtosis is generally used to describe the characteristics of a data set. Subsequently, if this measure is greater than 3.0, the data set has heavier tails than a normal distribution. The analyses showed that there are several items with kurtosis values greater than 3.0, which may indicate that it is not possible to guarantee a normal distribution (Chou and Bentler, 1995). Regarding item-total correlation value, it was possible to observe that some items have a value lower than that stipulated in the literature (Nunnally, 1995). According to Field (2005), this is because the item in question does not correlate adequately with the total scale and; therefore, must be discarded.

3.2 Exploratory factor analysis

To measure the adequacy of sampling, which is greater than 250, the Kaiser–Meyer–Olkin (KMO) index was calculated, which must be greater than 0.8 (Hair *et al.*, 2013; Hutcheson and Sofroniou, 1999). The value of the KMO index found was 0.823, which is considered excellent. With the aim of improving the approximation to the Chi-square distribution, Bartlet's sphericity test was also measured, which obtained a value of 8,456.2 [χ^2 (136), $p < 0.001$].

Subsequently, to determine the number of factors to be retained (Lorenzo-Seva *et al.*, 2011), the parallel analysis method was used. Furthermore, factor loadings with an absolute value less than 0.40 or crossed in two or more factors were excluded. Of the various EFA performed, the authors highlight the three-factor solution, in which six items were eliminated and the four-factor solution.

Based on the EFA results and with the aim of identifying the appropriate number of factors to be extracted, the (RMSR = 0.04) and GFI (=0.99) were evaluated for the proposed

Variables	N	(%)
Gender		
Male	344	46.4
Female	398	53.6
Autonomous Community		
Madrid	71	9.6
Castilla y Leon	556	74.9
Extremadura	22	3.0
Andaluzia	24	3.2
Aragón	4	0.5
Canarias	12	1.6
La Rioja	2	0.3
Galicia	11	1.5
País Vasco	5	0.7
Cantabria	12	1.6
Comunitat Valenciana	6	0.8
Región de Murcia	7	0.9
Castilla La Mancha	4	0.5
Asturias	3	0.4
Navarra	1	0.1
Cataluña	1	0.1
Social Sciences	287	38.7
Medicine and Health Sciences	72	9.7
STEM	102	13.7
Education	53	7.1
Business and Management	38	5.1
Humanities and Law	94	12.7
Arts and Architecture	16	2.2
Other	80	10.8

Note: STEM = science, technology, engineering and mathematics
Source: Authors' own creation/work

Table 1.
Sociodemographic
characteristics

two-factor and three-factor models. The RMSR is an index of discrepancy between the original and the adjusted matrix, in which a value closer to zero indicates greater adjustment of the model (Tabachnick and Fidell, 2013). Additionally, the generalized h-Index values were all above 0.80, which reveals the possibility of replication. In Table 3, it is possible to observe that two items were excluded from the final four-factor solution and explain 71% of the variance.

3.3 Confirmatory factor analysis
Considering that the model under study consists of more than one factor, CFA was conducted. This technique can be used to test a more restricted version of a model derived from an EFA in the same sample (Van Prooijen and van der Kloot, 2001). In this sense, alongside what is to be done to verify the fit of the new factorial solution, several CFA were performed. In line with Kaiser's criteria, Hair *et al.* (2013) propose relativizing the cutoff values according to the sample size (>250) and the scale (set of items comprised between 12 and 30). Furthermore, as criteria for choosing the number of factors in the instrument, the values of good fit of the TLI, CFI (>0.92) and RMSEA (<0.07) indices suggested in the literature were followed (Brown, 2006; Hair *et al.*, 2013; Kline, 2011).

Items	Mean	SD	R IT-c	α (without item)	Sk	Kur
AL1_It is important to [him/her] that every person has equal opportunities	6.527	0.932	0.398	0.745	−2.769	9.504
AL2_It is important to [him/her] to take care of those who are worse off	6.219	1.039	0.364	0.746	−1.564	2.57
AL3_It is important to [him/her] that every person is treated justly	6.718	0.737	0.390	0.748	−3.378	13.613
AL4_It is important to [him/her] that there is no war or conflict	6.271	1.147	0.353	0.747	−1.942	4.278
AL5_It is important to [him/her] to be helpful to others	6.441	0.851	0.398	0.746	−1.650	2.685
EG1_It is important to [him/her] to have control over others' actions	3.497	1.587	0.154	0.77	0.356	−0.436
EG2_It is important to [him/her] to have authority over others	2.901	1.581	0.099	0.775	0.772	0.044
EG3_It is important to [him/her] to be influential	4.167	1.584	0.222	0.762	−0.227	−0.602
EG4_It is important to [him/her] to have money and possessions	4.798	1.347	0.199	0.761	−0.476	0.013
EG5_It is important to [him/her] to work hard and be ambitious	5.633	1.278	0.228	0.758	−1.020	0.989
BIO1_It is important to [him/her] to prevent environmental pollution	5.836	1.336	0.545	0.729	−1.230	1.179
BIO2_It is important to [him/her] to protect the environment	5.957	1.274	0.566	0.727	−1.344	1.578
BIO3_It is important to [him/her] to respect nature	6.222	1.131	0.528	0.733	−1.817	3.66
BIO4_It is important to [him/her] to be in unity with nature	5.668	1.448	0.444	0.738	−1.004	0.350
HE1_It is important to [him/her] to have fun	6.394	0.919	0.499	0.739	−1.931	4.677
HE2_It is important to [him/her] to enjoy the life's pleasures	6.553	6.553	0.493	0.740	−2.425	6.908
HE3_It is important to [him/her] to do things [he/she] enjoys	6.597	6.597	0.457	0.743	−2.632	8.91

Source: Authors' own creation/work

Table 2.
Psychometric
properties

In general, all factorial solutions derived from the EFA presented good fit indices, with the exception of the three-factor and 15-item solutions. A CFA containing the same number of factors as the original solution and 15 items showed acceptable fit indices with a slight improvement in the RMSEA index, which suggests the plausibility of the multifactorial model of the environmental values scale, as well as a good theoretical interpretation. The model's validity and reliability and replicability indicators were also satisfactory (Hair *et al.*, 2013). These values can be observed in detail in Table 4.

It is equally necessary to confirm the composite reliability (CR), the convergent validity through the extracted variance (AVE) and the discriminant validity of the construct, which are presented in Table 5. The reliability of the construct was confirmed as the CR indicates adequate levels in all dimensions and in each of the offer categories, which must be above 0.70 (Hair *et al.*, 2013). The presented results confirm the convergent validity because although the AVE is lower than expected in the altruistic and egoistic dimensions, the

Item	F1	F2	F3	F4	Com.
E-PV1	0.775				0.539
E-PV2	0.952				0.733
E-PV3	0.707				0.658
E-PV4	0.503				0.355
E-PV5	0.716				0.598
E-PV7		0.819			0.870
E-PV8		0.987			0.436
E-PV9		0.574			0.309
E-PV11			0.947		0.852
E-PV12			0.993		0.963
E-PV13			0.885		0.842
E-PV14			0.735		0.570
E-PV15				0.867	0.765
E-PV16				0.872	0.817
E-PV17				0.815	0.740
Eigenvalue	13.091	0.302	0.995	1.549	
Variance	0.356	0.162	0.107	0.082	
G-H Index	0.898	0.917	0.975	0.906	
Items	5	3	4	3	

Source: Authors' own creation/work

Table 3.
Rotated factor
structure

Factorial solution	χ^2	df	χ^2/df	RMSEA (CI)	GFI	TLI	CFI	IFI
Original scale (4 factors–17 items)	637.308	113	5.639	0.07 (0.07–0.08)	0.897	0.893	0.911	0.911
EFA (4 factors–15 items)	376.385	84	4.481	0.06 (0.06–0.07)	0.935	0.93	0.944	0.944
EFA (3 factors–15 items)	752.766	87	8.652	0.10 (0.9–10)	0.868	0.846	0.873	0.873

Source: Authors' own creation/work

Table 4.
Factorial solutions

values are considered acceptable because they are close to 0.5 and the reliability is good
(Hatcher, 1994).

Discriminant validity is the degree to which a construct is really different from others.
Hence, in Table 6, it is possible to observe that the correlation between the four factors is less
than 0.85 (Kline, 2011).

Chan (2011) states that "we cannot assume the same construct is being assessed
across groups by the same measure" without measurement invariance tests (p. 108).
The measurement invariance test is a full part of the research and considers occasion
(i.e. longitudinal invariance) or comparisons between groups (e.g. male and female)
(Murray *et al.*, 2022). To this end, measurement invariance between genders was
explored by performing a multigroup comparison analysis using structural equation
models: configurational invariance (evaluates whether the factorial structure is
invariant between groups), metric invariance (analyzes whether the factor loadings of
the items are invariant between groups) and scalar invariance (explores whether the
intercepts of items are invariant across groups) (Chen, 2007; Cieciuch and Davidov,
2015).

Items	λ	α	CR	AVE
Factor 1 – Altruistic		0.78	0.798	0.445
E-PV1	0.697			
E-PV2	0.738			
E-PV3	0.695			
E-PV4	0.499			
E-PV5	0.681			
Factor 2 – Egoistic		0.671	0.679	0.417
E-PV7	0.628			
E-PV8	0.749			
E-PV9	0.545			
Factor 3 – Biospheric		0.901	0.908	0.954
E-PV11	0.888			
E-PV12	0.968			
E-PV13	0.838			
E-PV14	0.658			
Factor 4 – Hedonic		0.851	0.85	0.663
E-PV15	0.858			
E-PV16	0.849			
E-PV17	0.73			

Source: Authors' own creation/work

Table 5.
Factorial loads,
Cronbach's alpha,
composite reliability
and average
extracted

Factors	F1	F2	F3	F4
F1	0.667			
F2	0.594	0.814		
F3	0.516	0.363	0.977	
F4	0.25	0.125	0.104	0.646

Source: Authors' own creation/work

Table 6.
Factor correlation
matrix (with square
roots of AVE on the
diagonal)

To assess the configurational invariance, no constraints were included, and the results confirmed that this model presents a good fit to the data. Next, the metric invariance model, which constrains factor loadings and correlations to be equal between groups was explored. The results revealed a good fit to the model, confirming the metric invariance regarding gender. Finally, the scalar invariance model was tested, restricting the intercepts of the variables to be equal between genders, in addition to the factor loadings of the latent variables. The good fit of the data to the more restricted model confirmed the scalar invariance between genders. These results can be seen in Table 7.

4. Discussion
The important values for coexistence in society, such as environmental values, can be learned. Furthermore, these values make it possible to understand and predict pro-environmental attitudes and behaviors (Coelho *et al.*, 2006), and Social Psychology has been seeking to explain the relationships between values and pro-environmental attitudes and

Method	χ^2/df	CFI	RMSEA	P[rmsea]	SRMR	AIC	MECVI	$\Delta \chi^2$	ΔNFI	ΔIFI
Configurational	3.162	0.932	0.05	0.005	0.049	675.237	0.921			
Metric	3.209	0.926	0.05	0.012	0.052	696.568	0.949			
Scalar								11(43.31) $p < 0.001$	0.008	0.008

Note: SRMR = standardized root mean squared residual; AIC = akaike information criterion; MECVI = modified expected cross-validation index; NFI = normed fit index
Source: Authors' own creation/work

Table 7.
Invariance methods

behaviors. The aim of this study was to develop and establish the psychometric qualities and properties of the E-PVQ. Overall, the exploratory factor analysis suggested the four-factor structure of the EPVQ, with the exclusion of two items, which maintains the original structure proposed by (Bouman *et al.*, 2018). The alternative exploratory three-factor model showed disproportionate values, which would not constitute a psychometrically robust dimension. Confirmatory factor analysis confirmed that the four-factor model presents excellent global and relative fit indices, confirming the established structure, which provides empirical evidence and supports the theoretical dimensionality of the construct. Thus, the Spanish version of the EPVQ (see Appendix) presents the original factorial structure and 15 items: Factor 1 – Altruistic (five items) – selflessly dedicated to the well-being of others; Factor 2 – Egoistic (three items) – being centered on oneself and on satisfying one's desires (as opposed to altruistic); Factor 3 – Biospheric (four items) – values related to everything related to the environment; and Factor 4 – Hedonic – attention focused on pleasure and comfort. All four factors maintained their original structure, with the exception of the Egoistic dimension. In this factor, two items were eliminated and its composition has been reduced to a set of three items.

According to Mcgregor (2005), personal values are a determinant in the conscious decision-making process. Viezer and Ovalles (1994) go beyond and claim that values are crucial for human and social transformation and ecological preservation. Personal values, such as justice and reciprocity, can be factors in questioning and reformulating a conscious choice and are considered the fourth "pillar" of sustainable development (Burford *et al.*, 2013). There are several studies that claim that values are usually associated with self-reported behaviors, the intention for a given behavior and also with factors associated with environmental concern (Corral-Verdugo, 1997). In this sense, it is extremely important considering the values related to the environment can drive the creation of an ecological and sustainable behavioral culture. Pro-environmental behaviors can be determined by the positive influence on changing the structure and dynamics of ecosystems and, based on the individual's personal values, positively impact the environment (Stern, 2000).

The education of environmental and sustainable values that contemplate the universalism dimension (e.g. social justice, concern for the others, equality, protection of the environment) can favor the development of "ecocentric" attitudes and, consequently, pro-environmental behaviors (Coelho *et al.*, 2006). Based on this premise, the incorporation of these values into teaching programs allows the socialization of young people with principles of preservation and promotion of the environment. It is in this sense that education for the promotion of the environment is urgent, for the formation, change and recycling of individual and social values, with concrete actions and based on the recognition of the responsibility of each citizen (Friede *et al.*, 2019).

Values can be understood as socially normalized and internalized, which create social identities and subjective semantics of different social representations. Based on Stern's (1999, 2000) values-beliefs-norms theory (egoistic, altruistic and biospheric determinants), it is possible to point out that values influence the way a person sees the world and the environment, which, consequently, will influence their beliefs regarding the consequences of environmental changes of the things they normally value. This set of influences can also affect perception and behavior patterns.

4.1 Limitations and future research

Limitations impinge upon this study; however, that could be addressed in future research. First, the cross-sectional design and the data collection method limited the analysis of the temporal validity of the scale, as well as the generalizability of the results, respectively.

Therefore, test-retest validity and temporal invariance could not be explored. Although resolutions based on values are universally recognized (Soyez, 2012), the influence of different cultures on different provisions must be aligned in the future. Therefore, the preliminary results of this measure must be deepened, confirmed and validated in different samples, in particular, in other Spanish-speaking cultural contexts. Finally, considering that the validation of an instrument is a continuous research process, future studies will be able to confirm and validate the factorial solution now presented.

4.2 Managerial implications
From a managerial perspective, the study of personal values is important to understand how environmental ethics is crucial for formulating and implementing policies in daily individual actions to reduce environmental impact. In addition, it is fundamental to reflect on environmental behavior to form attitudes, moral responsibility and values. For sustainability to become a reality and for it to be possible to meet the goals of the 2030 Agenda, on the one hand, rules, laws and policies that implement ecological justice are necessary. And on the other hand, it is equally important to encourage the development of certain values that make citizens more (sustainably) responsible and aware of ecological problems.

Higher education institutions assume a clear obligation aimed at implementing sustainable policies, the evaluation of which is absent from indicators based on values but on progress and success. In this sense, it is crucial that universities base their commitments to the environment on values, with the ultimate aim of implementing (environmental) ethical principles and values for sustainability.

5. Conclusions
The validation of this instrument constituted an opportunity to deepen the understanding of the theories underlying the learning of environmental values, offering empirical evidence of the reliability, validity and usefulness of the E-PVQ in the Spanish university student context.

Bearing in mind the emphasis and the need to comply with SDG, the literature (Cassells and Lewis, 2011; Williams and Schaefer, 2013) points to the fact that values (and education) are an explanatory variable for the creation and promotion of sustainable environmental practices. When considering environmental education as a project that directs its concern to society (Ndiaye *et al.*, 2019), the implementation of programs that promote this form of education will bring greater awareness of the environment, personal skills and values, that is: there is no pro-environmental education without values education. In addition, a certain collective conscience for solving current and future problems will enable the achievement of the SDGs. It is for this reason that higher education institutions play a relevant role in this matter. Universities and other higher education institutions are currently more concerned with the environmental deterioration of the planet and, consequently, with the implementation of sustainable initiatives that feed the competence of action. Hence, in view of the context of the application of the scale for its validation, attention should be paid to the implementation of participatory methodologies for collective awareness of sustainability (Margaça, *et al.*, 2022) and the environment in particular, providing people with civic awareness. Social responsibility, social and civic values not only guide the third mission of universities but also the institution's activities, such as teaching and research (García-Gutierrez and Gaitero, 2021). Subsequently, social and civic involvement in higher education must incorporate an inclusive approach, environmentally committed to the participatory process and the idea of a civic and sustainable university.

By way of conclusion, the application of the Environmental Portrait Values Questionnaire in Spanish universities allows an assessment of the profiles of individual and essential values for the adoption of environmentally responsible individual strategies and actions. In addition, through the measurement of environmental values, indications of environmental scenarios and personal profiles are collected, essential for the management of consequences and implementation of solutions. Moreover, for the satisfactory achievement of the SDGs, the application of a roadmap for encouraging global and universally applicable action is imperative (Kautish *et al.*, 2020). Scholars such as Dunlap *et al.* (1983) confirmed that both pro-environmental attitudes and behaviors depend on and are closely related to personal human values and education. Pro-environment information and promotion campaigns, run by policymakers, organizations or universities, are particularly important to make people aware of their active role in preventing and solving environmental problems. Through these campaigns, people, considering their set of (environmental) values, will be able to distinguish advantages and disadvantages, as well as alternatives to their behavior, contributing to a change in individual values and attitudes, with a view to building an *eco-environmental individual*.

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Appendix

Las siguientes preguntas se refieren a sus valores. Señale la *importancia* de los siguientes valores como *principios rectores en su vida*. La escala varía de *1* (el valor es el opuesto de sus principios rectores en la vida) a *7* (el valor es de suma importancia como principio rector):

Valores

Altruista	Igualdad: igualdad de oportunidades para todos
	Justicia social: corregir la injusticia, cuidar de los débiles
	Justicia: todas las personas deben ser tratadas con justicia
	Un mundo en paz: libre de guerras y conflictos
	Servicial: Trabajando por el bienestar de los demás
Egoísta	Autoridad: el derecho a liderar y mandar
	Influyente: tener impacto en personas y eventos
	Riqueza: posesiones materiales, dinero
Biosferico	Prevenir la contaminación: proteger los recursos naturales
	Proteger el medio ambiente: preservar la naturaleza
	Respetando la tierra: armonía con otras espécies
	Unidad con la naturaleza: encajar en la naturaleza
Hedónico	Placer: gratificación de los deseos
	Disfrutar de la vida: disfrutar de la comida, el sexo, el ocio, etc
	Gratificación para uno mismo: satisfacción, autorrealización

Table A1.
Explanation of each value

	1 2 3 4 5 6 7
Es importante para [él/ella] que todas las personas tengan las mismas oportunidades	
Es importante para [él/ella] cuidar a los que están peor	
Es importante para [él/ella] que todas las personas sean tratadas con justicia	
Es importante para [él/ella] que no haya guerra o conflicto	
Es importante para [él/ella] ayudar a los demás	
Es importante [él/ella] tener autoridad sobre los demás	
Es importante para [él/ella] ser influyente	
Es importante para [él/ella] tener dinero y posesiones	
Es importante para [él/ella] prevenir la contaminación ambiental	
Es importante para [él/ella] proteger el medio ambiente	
Es importante para [él/ella] respetar la naturaleza	
Es importante para [él/ella] estar en unidad con la naturaleza	
Es importante para [él/ella] divertirse	
Es importante para [él/ella] disfrutar de los placeres de la vida	
Es importante para [él/ella] hacer cosas que [él/ella] disfruta	

Table A2.
EPVQ – Spanish version

Source: Authors' own creation/work

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