

Article

Analyzing Attitudes to Promote Sustainability: The Adaptation of the Environmental Concern Scale (ECs) to the Italian Context

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Abstract: The aim of this study was to examine the psychometric properties of the Environmental Concern scale (ECs) in the Italian context. Three studies were conducted. In Study 1, we carried out an exploratory factor analysis and a 2-factor solution—biospheric concern and egoistic concern—was confirmed. In Study 2, we tested the structure of the eight-items version of the ECs, using confirmatory factor analysis. The 2-factor structure was the best factorial solution. In this study we correlated the dimensions of ECs with life satisfaction and climate change worry. As expected, biospheric concern was significantly related to climate change worry, and egoistic concern was significantly related to life satisfaction. In Study 3, we tested the gender invariance. The ECs structure was the same for men and women. These studies demonstrate that the ECs possess good construct validity, factor structure, and invariance between genders. The measure can be used in the Italian context for future research.

Keywords: environmental concern; psychometric properties; sustainability



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1. Introduction

In recent years, there has been growing interest in the study of environmental issues and the attitudes people have towards them. The study of environmental attitudes is central in the field of social psychology because it can provide insights into why people choose to adopt a sustainable lifestyle or not. Indeed, from a psychological research perspective, taking care of psychological well-being by considering the relationship between people and the present and future environment plays a very important role in promoting healthy and sustainable lifestyles [1,2]. In this regard, the emerging field of psychology named the Psychology of Sustainable Development and Sustainability emphasizes how psychological processes are implicated in behaviors concerning environmental respect and the promotion of an environmental sustainability culture [1,3–5]. The Psychology of sustainability and sustainable development encompasses a psychological perspective that accounts for numerous environments and their interrelatedness; this is reflected in the field's emphasis on multiple environments, their interdependence, and the natural environment's ecosystem [1,5]. The psychology of sustainability is also interested in explaining sustainable behaviors, their antecedents, and correlates, as deeper knowledge enhances the possibility to guide individuals toward a more responsible future. Following the most popular and applied model explaining the causal relationships between attitudes and behavior, the theory of reasoned action (TRA; [6]), we will explore the environmental attitudes as antecedents of sustainable behavioral intentions, and, in turn, sustainable behaviors. The term attitude refers to 'the intensity of positive and negative affect toward concepts, persons, ideas, and other 'objects' in general' [7] (p. 3). The term attitude should not be confused with the term value; the latter is generally more abstract [8]. Furthermore,

it should be considered that attitudes do not coincide with behavior but are an antecedent of people's behavior [6]. Following the structural approach to attitudes [6,9], attitudes are organized according to hierarchies; there are broad attitudes under which there are gradually more specific attitudes. This means that all attitudes on a specific topic are a reflection of more general attitudes. Regard to environmental attitudes can be defined 'both as the intensity of positive or negative affect about a particular environmental topic and as a hierarchical attitude system that connects and organizes more specific attitudes about a range of environmental topics' [10] (p. 2).

A specific aspect of environmental attitudes is environmental concern [11]. Schultz et al. [12] define environmental concern as an 'affect associated with beliefs about environmental problems' (p. 31). Schultz [13] drew a distinction between different types of environmental attitudes that are oriented around three sets of valued objects: self, other people, and biosphere. This allows us to distinguish three types of concerns; thus, people concerned about self have an egoistic environmental attitude and are concerned about the effects that air pollution might have on their health; people concerned about other people have social-altruistic attitudes; people concerned about the biosphere show concern for non-human species. All these concerns have different underlying values.

Using this model, Schultz et al. [12] found a positive correlation between biospheric concerns and environmental behavior. Other research has shown that both individuals with high levels of concern for the biosphere and themselves can engage in pro-environmental behavior [14–16]. In a more recent study, Aprile and Fiorillo [17] saw that these concerns predicted water-saving behavior. In many studies, self, altruistic, and biospheric concerns have been found to be correlated [13,18–21]. The relationship between concern and action or between concern and well-being has not been extensively studied in recent literature. A growing number of studies have attempted to answer the following question: Does adopting a green lifestyle lead to changes in the level of people's life satisfaction [22]? Results from studies conducted with different methodologies suggest that life satisfaction is positively and significantly related to different types of pro-environmental behaviors [23]. Wang and Kang [24] hypothesize and demonstrate a bidirectional effective mechanism: life satisfaction could improve individual environmental concerns, and in turn, these concerns can be translated into some actual environmental behaviors, subsequently affecting life satisfaction. Also, Binder and Blankenberg [25] studied the impacts of environmental concern on well-being and noted that there is a positive relationship between self-concerns and volunteering as an activist behavior. Thøgersen and Olander [26] identified weak relationships between environmental concerns and pro-environmental behavior. Yakut [27] showed that concern for the biosphere has a negative impact on life satisfaction, whereas self-concern has a positive impact on life satisfaction. Altruistic concerns, on the other hand, had no impact on life satisfaction. Probably, values related to environmental concerns would require more effort to be satisfied. Furthermore, higher levels of concern for the biosphere may negatively affect life satisfaction [28].

1.1. Measurement of Environmental Concerns

In a recent article, Cruz and Manata [10] conducted a review and analysis of the main scales used in the field of environmental concern.

The environmental concern scale (EC) proposed by Weigel and Weigel [29] has received a high number of citations in the literature. This scale consists of 16 items that assess concerns about conservation and pollution issues. In the original article, the scale showed good internal consistency and satisfactory temporal stability. However, in the analyses conducted by Cruz and Manata [10], although good internal consistency was confirmed, the fit indices in the one-dimensional solution were poor (RMSEA = 0.22, CFI = 0.57, AIC = 1330.14). Furthermore, some authors have classified the scale as outdated [30–32]. A bifactorial structure and the elimination of a few items proposed a more acceptable solution (RMSEA = 0.04, CFI = 0.98, AIC = 82.35).

Another popular instrument in the literature is the New Environmental Paradigm (NEP scale) by Dunlap et al. [30]. The NEP is a scale consisting of 15 items divided into five factors: limits to growth, anti-anthropocentrism, fragility of nature's balance, rejection of exceptionalism, and possibility of an eco-crisis. The analysis conducted by Cruz and Manata [10] again revealed a very poor model fit (RMSEA = 0.20, CFI = 0.59, AIC = 865.21) and low internal consistency. Only by removing some items did the fit indices improve (RMSEA = 0.05, CFI = 0.96, AIC = 159.89) as did the internal consistency, producing a three-factor model rather than a five-factor model.

The literature review provides another Environmental Concern scale (ECs), proposed by Schultz [13]. The ECs is composed of 12 items that evaluate three aspects: biospheric concern (animals, plants, marine life, birds), egoistic concern (me, my lifestyle, my health, and my future), and altruistic concern (people in my country, all people, children, and future generations). In this case, the analysis showed that the author's proposed three-factor model was fine (RMSEA = 0.06, CFI = 0.94, AIC = 333.94) and had good internal consistency, even when removing some items from the scale but retaining the three-factor solution (RMSEA = 0.03, CFI = 0.96, AIC = 172.67). Gkargkavouzi et al. [31] validated the Greek version of the same scale and confirmed the three-factor structure of the Environmental Concern scale (ECs). Additionally, the scale has been used with samples from Spain, Germany, the Czech Republic, Russia, New Zealand, India, and several Latin American countries [12,13,15], showing that altruistic concerns generally have higher scores.

Taking these results into account, the authors listed some advantages of using the Schultz [13] scale. This scale showed adequate fit indices and the highest internal consistency; it is a short instrument, and this could be a further advantage of using the scale in research; finally, it allows the assessment of environmental attitudes by distinguishing between self, socio-altruistic concern, and environmental concern represented by egoistic, altruistic, and biospheric concern factors.

1.2. Aim of the Study

The aim of the study presented is to provide the Italian validation of the Environmental Concern scale (ECs), verifying its reliability, factorial structure, and validity.

To achieve this aim, three studies with independent samples of Italian adults were conducted. The first study was carried out in two phases: the cultural adaptation of ECs and the exploratory factor analysis to verify the psychometric requisites of the scale. The second study tested the structure stability of the ECs, using confirmatory factor analysis. In the same study, we presented the concurrent validity, testing the relationships with a similar construct, the worry for climate change; moreover, as a large body of the literature has documented the role of environmental concerns on life satisfaction [24], we tested the predictive validity, using life satisfaction as a related measure [25,28]. The last study investigates gender invariance. In the final part of the paper, we presented the discussion of the results, the practical implications and directions for future studies.

2. Study 1. Cultural Adaptation of ECs and Exploratory Factor Analysis

The first study goals were the cultural adaptation of ECs and to examine the factorial structure and reliability of the ECs.

2.1. Cultural Adaptation of ECs

The procedure of Beaton et al. [32] was followed for the cultural adaptation of the ECs. The items and instructions were translated by two researchers, separately. The two versions were compared, and the two researchers agreed on a final version of the scale. This final version was translated back into English by a native speaker to check for further refinements. The resulting version was given to 30 participants during a pilot study. All participants stated that the items and instructions were understandable. This made it possible to use a reliable scale in the following studies.

2.2. Participants and Procedure

In this study, we used convenience sampling, involving participants from the general population. Participants filled out an online research protocol. Respondents were 238 Italian adults (73 males, 30.7%; 165 females, 69.3%) aged between 19 and 69 years ($M = 31.30$; $SD = 15.60$).

Data were collected from Italian adults using convenience sampling; participants were invited to take part in the research voluntarily, through a research protocol that was conducted online and disseminated via social media. The research protocol was disseminated by collaborators external to the research. The survey was preceded by the following statement: “Dear participant, we invite you to take part in the research project on attitudes towards environmental concerns. The project involves Italian adults who are invited to answer questions about their environmental concerns. Statements are presented and you are asked to mark your answer from among the proposed alternatives. There are no right or wrong answers, we are interested in knowing your point of view. The data will be processed in aggregate form to form group statistics; in this way it will be possible to trace the characteristics of the individual respondent, while respecting the anonymity of all. Please answer all questions as truthfully as possible. Thank you for your co-operation. Good work!”. The first page contained the names of the research proposers and the affiliations of the three universities. Next, some biographical information was requested (gender, age, language spoken). There was no financial incentive to participate in the research but consent to take part was required. The same procedure was used in the following studies.

The inclusion criteria considered were: (A) being over 18 years of age; (B) being a native Italian speaker; and (C) providing informed consent.

The survey followed the ethical guidelines of the Italian Psychological Association [33].

2.3. Measure

Environmental Concern scale (ECs). This measure is made up of 12 items that evaluate three aspects: biospheric concern (animals, plants, marine life, birds), egoistic concern (me, my lifestyle, my health, and my future), and altruistic concern (people in my country, all people, children, and future generations). The instructions were as follows: ‘People all over the world are generally concerned about environmental problems because of the consequences of damaging nature. However, people differ in the consequences that affect them most. Please rate each of the following from 1 (not important) to 7 (highest importance) in response to the question: I am concerned about environmental problems because of the consequences for . . .’. Participants indicated their concerns on a 7-point rating scale from 1 (not important) to 7 (highest importance).

2.4. Data Analysis

Before proceeding, we verified that the assumptions necessary to conduct an EFA were guaranteed. Indeed, performing a factor analysis, the normality of the data should be guaranteed [34]. To verify that the data were normally distributed, we used the criterion proposed by George and Mallery [35]: data are normal if skewness and kurtosis are between -2 to $+2$. The literature [36–41] suggests eliminating items that do not meet the parameters of normality for skewness or kurtosis. A second assumption relates to the sample size, which must be adequate. The Kaiser–Meyer–Olkin (KMO) sample adequacy test is one of the most widely used tools to conduct this verification. Kaiser proposed that a $KMO > 0.9$ is excellent, a KMO value between 0.80 and 0.90 indicates the presence of a good sample, a KMO value between 0.70 and 0.80 indicates an acceptable sample, between 0.60 and 0.70, the sample is mediocre, and less than 0.60 indicates an inadequate sample [42]. Another assumption concerns the correlation between the various items, which must be significant. Bartlett’s test of sphericity can provide good indications of adequacy. If the test is significant, then the matrix correlations are high enough [43,44].

To conduct an EFA, we used principal axis factoring with promax rotation for 12 items in SPSS 27.0 [45]. The number of factors was determined by parallel analysis, the scree plot, and the number of factors with an eigenvalue greater than 1 [43,44,46]. Prior to examining factor loadings, the extraction communalities were examined. We have removed items that had a commonality below 0.4 [47]. Items were considered part of a factor when the factor-loading coefficient was equal to or greater than 0.30 [48].

McDonald's Omega values were used to evaluate the internal consistency. It is an index of internal consistency more appropriate to Cronbach's alphas [49]. McDonald's Omega values must be greater than 0.7; if they are greater than 0.8, they indicate good internal reliability.

2.5. Results

Table 1 shows the descriptive statistics of the items. Using the criteria proposed by [35] George and Mallery, skewness and kurtosis values were less than 2 in absolute value for all items except items 6, 9, and 12. We removed these items.

Table 1. Descriptive statistics of the ECs.

Item	M	SD	Skewness	Kurtosis
1. Plants	5.85	1.29	−1.08	0.62
2. Me	6.01	1.17	−1.03	0.26
3. People in my country	5.97	1.14	−1.04	0.87
4. Marine life	6.00	1.17	−1.12	0.83
5. My lifestyle	5.66	1.28	−0.77	0.10
6. All people	6.05	1.15	−1.43	2.59
7. Birds	5.79	1.28	−1.01	0.53
8. My health	6.44	0.87	−1.15	1.55
9. Children	6.52	0.86	−1.95	3.18
10. Animals	6.41	0.87	−1.33	0.75
11. My future	6.42	0.88	−1.46	1.40
12. Future generations	6.65	0.67	−1.91	3.03

Note. M = Mean; SD = Standard Deviation.

Kaiser–Mayer–Olkin (KMO) test value was 0.83 and Bartlett's test was significant ($\chi^2 = 1045.68$; $p < 0.000$). This indicated that the data was good for factor analysis [50]. In the first EFA, the communalities were between 0.35 (item 3) and 0.84 (item 7). We removed item 3, as it was the only item that presented a communality lower than 0.4.

As reported in Table 2, parallel analysis suggested that two factors can be extracted.

Table 2. Parallel analysis results.

Variable	Real-Data Eigenvalues	Mean of Random Eigenvalues	95th Percentile of Random Eigenvalues
1	4.010	1.489	1.564313
2	2.037	1.400	1.454602
3	0.731	1.334	1.386972
4	0.584	1.280	1.323589
5	0.469	1.237	1.270563
6	0.346	1.194	1.231154

In the second EFA, communalities were between 0.47 (item 11) and 0.84 (item 7). The eigenvalues of the two factors were: 3.64 and 2.03. They accounted for 70.87% of the variance. Figure 1 shows the scree plot, which suggests extracting two factors.

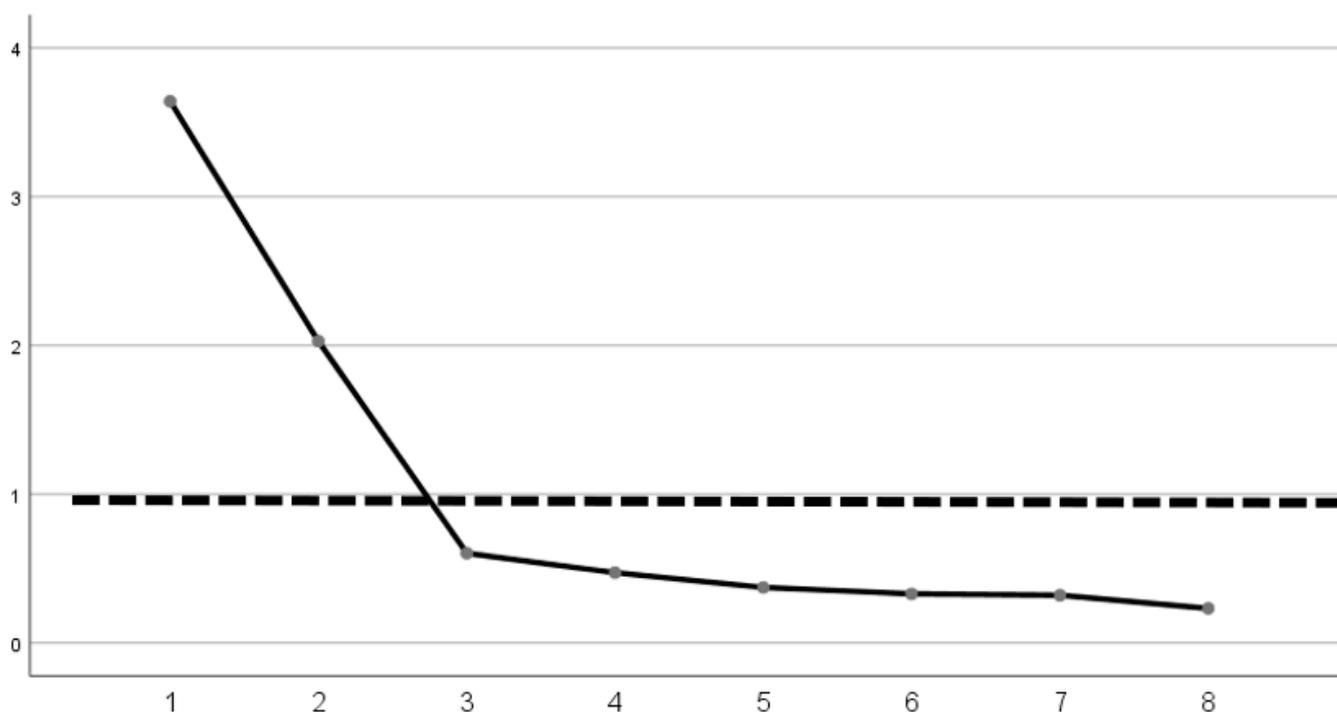


Figure 1. Scree plot. The eigenvalues = 1 is represented by the dotted line.

All items had factor loading values greater than 0.60, so they were maintained. Four items loaded in factor 1 (biospheric concern), and four in factor 2 (egoistic concern). Table 3 summarizes the results of this analysis.

Table 3. Factor Loadings for the eight-Items of ECs.

Item	Factor 1	Factor 2
1. Plants	0.75	
2. Me		0.77
3. Marine life	0.81	
4. My lifestyle		0.82
5. Birds	0.93	
6. My health		0.76
7. Animals	0.66	
8. My future		0.72

McDonald's Omega values were 0.88 for factor 1 (biospheric concern) and 0.86 for factor 2 (egoistic concern).

We tested possible gender bias, using *t*-test between two groups (man and woman). *t*-test revealed significant gender differences for one item (items 7, "Animals"). In this item, women showed higher mean values than men ($\text{Mean}_{\text{women}} = 6.50$, $\text{SD} = 0.78$; $\text{Mean}_{\text{men}} = 6.21$, $\text{SD} = 1.01$; $t = -2.46$; $p < 0.01$). Based on this result, we tested gender invariance, as suggested by the literature [51] (see study 3).

3. Study 2. Confirmatory Factor Analysis, Concurrent and Predictive Validity

The goals of Study 2 were to test the structure of the ECs using confirmatory factor analysis and to evaluate its concurrent validity.

3.1. Participants and procedure

Respondents were 213 Italian adults (38 males, 17.8%; 175 females, 82.2%) aged between 19 and 74 years ($M = 36.30$; $\text{SD} = 12.01$). The same procedures as described in

Study 1 were used. Also, in this case, the survey followed the ethical guidelines of the Italian Psychological Association [33].

3.2. Measures

Environmental Concern Scale (ECs). We used the eight-item version of the ECs, which evaluates two aspects: biospheric concern (animals, plants, marine life, birds) and egoistic concern (me, my lifestyle, my health, and my future). Participants indicated their concerns on a 7-point rating scale from 1 (not important) to 7 (highest importance). McDonald's Omega values were: 0.85 for biospheric concern and 0.83 for egoistic concern. This version is reported in Appendix A.

Satisfaction With Life Scale (SWLS; [52,53]). This measure of general life satisfaction consists of five items that require the participant to indicate their degree of agreement or disagreement on a 7-point Likert scale (1 = strongly agree, 7 = strongly disagree). Sample item is "In most ways my life is close to my ideal". McDonald's Omega value in this study was 0.88.

Climate Change Worry Scale (CCWS; [54]). The Climate Change Worry Scale (CCWS) consisted of 10 items in which the participant indicates their degree of agreement or disagreement using a 5-point Likert scale from 1 (Never) to 5 (Almost always). Sample item is "I worry about climate change more than other people". McDonald's Omega value in this study was 0.87.

3.3. Data Analysis

To test the construct validity of the scale, we used a confirmatory factor analysis (CFA), using LISREL 8.80 [55]. We tested two possible models: model 1, with one factor, and model 2, with two factors. The first model is consistent with a view of environmental concern as a unidimensional construct. In this case, all eight items load on a single factor. In the two-factor model, a distinction was made between the two factors: biospheric concern (animals, plants, marine life, and birds) and egoistic concern (me, my lifestyle, my health, and my future). This model is consistent with a conceptualization of environmental concerns as a separate factor [56].

To verify the adequacy of the models, we used the Satorra–Bentler Scaled Chi square test ($SB\chi^2$, [57]), Comparative Fit Index (CFI; [58]), Root Mean Square Error of Approximation (RMSEA; [59]), and Standardized Root Mean Square Residual (SRMR; [60]). Finally, to compare the two models, we used the Akaike Information Criterion (AIC; [61]). CFI values of 0.90 or greater are typically interpreted as indicating an acceptable fit [58,62], RMSEA index should be 0.05 or less (very good model fit) or 0.08 or less (acceptable fit) [59,63], SRMR indicates a good fit if it is less than 0.08 [60], and the lower values of AIC indicate a better fit of the models compared [64].

To evaluate convergent validity, we calculated the average variance extracted (AVE; [65]) and composite reliability coefficient (CR; [66]); these are indicators of the quality of measurement [67]. AVE is the average percentage of variation explained among the items of a construct [64]; in this case, acceptable values are 0.50 or higher. CR is the degree to which the scale indicators reflect an underlying factor [65]; acceptable values are greater than 0.70.

Discriminant validity was assessed to determine if the variables can be distinguished from one another [68]. Discriminant validity was calculated with the square roots of average variance extracted (AVE); if the results are superior to correlations between constructs, there is a good discriminant validity [65,69].

Finally, SPSS Version 25.0 was used to assess the concurrent validity by correlating the scores of the dimensions (biospheric concern and egoistic concern) with other measures: Climate Change Worry Scale [54], using Pearson's r coefficient; regression analysis was conducted to test the predictive validity on Satisfaction With Life Scale [52,53].

3.4. Results

Model 1 (eight items, unidimensional) showed the following fit to the data: $SB\chi^2_{(20)} = 63.35$, CFI = 0.90, RMSEA = 0.16 (C.I. 90% 0.13–0.19), SRMR = 0.14, AIC = 160.67. Model 2 (eight items, two factor solution) showed the following fit indexes: $SB\chi^2_{(19)} = 31.88$, CFI = 0.99, RMSEA = 0.06 (C.I. 90% 0.02–0.09), SRMR = 0.08, AIC = 65.88. The fit of Model 2 was better, and the AIC value of this model was smaller than that of Model 1.

Convergent validity was estimated through CR and the AVE for each factor. Discriminant validity was estimated by the square root of the extracted mean variance (AVE). All results are summarized in Table 4. These values confirmed a good convergent and discriminant validity. The final version of the ECs is given in the Appendix A.

Table 4. Correlations between the two factors, convergent and discriminant validity.

	AVE	CR	<i>r</i>	
Biospheric concern	0.59	0.85	(0.77)	
Egoistic concern	0.55	0.83	0.42 **	(0.74)

Note. ** $p < 0.001$; AVE = Average Variance Extracted; CR = Composite Reliability Coefficient; r = correlation; in parentheses are reported the square roots of the AVE.

To evaluate concurrent validity, we correlated the two dimensions of biospheric concern and egoistic concern climate change worry. Biospheric concern was significantly related to climate change worry. The results are shown in Table 5.

Table 5. Correlations between biospheric and egoistic concerns with climate change worry.

	Climate Change Worry
Biospheric concern	0.263 **
Egoistic concern	0.105

Note. ** $p < 0.000$.

To evaluate predictive validity, we applied a regression analysis to evaluate the contribution of biospheric concern and egoistic concern on life satisfaction. The model was significant (R^2 adjusted = 0.06, $F = 7.17$, $p < 0.001$). Egoistic concern significantly predicted life satisfaction. The results are shown in Table 6.

Table 6. Regressions analysis of biospheric concern and egoistic concern on life satisfaction.

	Life Satisfaction		
	β	<i>t</i>	<i>p</i>
Biospheric concern	0.03	0.46	0.64
Egoistic concern	0.24	3.23	0.001

Note. β = Standardized Beta.

4. Study 3. Gender Invariance

A third study was conducted to analyze the ECs across-gender measurement invariance.

The invariance measure examines whether items have a different psychological meaning between groups [51]. Specifically, gender invariance examines whether there are gender differences in the reading of the items [70].

The choice of gender as an element to assess invariance lies in the fact that previous studies have shown that there are differences in biospheric or egoistic concerns between man and women. In general, studies have shown that women tend to have a higher biospheric value orientation than men [71–73]. Regarding the egoistic aspect, research has reported conflicting results. Some studies have found no differences between males and females [13,72], while others highlight the absence of gender differences [74].

4.1. Participants and Procedure

The same procedures as in Studies 1 and 2 were used. Respondents were 249 Italian adults (111 males, 44.6%; 138 females, 55.4%) aged between 19 and 69 years ($M = 29.27$; $SD = 13.66$).

4.2. Measures

Environmental Concern scale (ECs). We used the eight-item version of the ECs. McDonald's Omega values were: 0.87 for biospheric concern and 0.86 for egoistic concern.

4.3. Data Analysis

As suggested by Vandenberg and Lance [75], we tested gender invariance with progressively restrictive stages. We first tested configural invariance, which allows us to verify that the factor structure is the same across groups. Next, we tested the metric invariance model. This type of invariance suggests that groups responded to items in the same way. Finally, we tested the scalar invariance model that implies that the measurement scales are operationally defined in the same way among men and women. The metric and scalar invariance tests were examined by evaluating the change in the CFI value, which must be less than 0.01. This cut-off is based on the literature recommendations [60].

Scalar invariance is a prerequisite for the comparison of latent means. Also, in this case the CFI of the latent means was compared with the CFI of the scalar model.

4.4. Results

Table 7 shows the results for the gender invariances of the Environmental Concern scale. The configurational invariance model demonstrated an acceptable model fit. Also, metric invariance showed good fit indexes. Furthermore, the change in CFI between configuration invariance and metric invariance is within the threshold of 0.01. This supports metric invariance between genders. Finally, the scalar invariance test also demonstrated acceptable fit indices. The change in CFI between the scalar and metric invariance tests was 0.01, supporting this latter type of invariance.

Table 7. Measurement invariance tests of ECs across genders.

	χ^2	df	p	$\Delta\chi^2$	Δdf	p	RMSEA	RMSEA 90% CI	CFI	ΔCFI	Latent Mean: Man	Latent Mean: Woman
Configural invariance	69.24	38	<0.05	-	-	-	0.077	0.045–0.108	0.975	-	-	-
Weak invariance	85.67	44	<0.001	-	-	-	0.086	0.058–0.114	0.967	0.008	-	-
Scalar invariance	103.51	50	<0.001	-	-	-	0.093	0.067–0.118	0.957	0.01	-	-
Latent mean invariance	104.89	52	<0.001	1.57	2	0.46	0.090	0.065–0.115	0.957	0.000	5.96	6.07
Latent mean invariance: Biospheric concern	104.53	51	<0.001	1.21	1	0.27	0.091	0.066–0.116	0.957	0.000	5.96	5.88
Latent mean invariance: Egoistic concern	104.23	51	<0.001	0.91	1	0.34	0.092	0.067–0.118	0.957	0.000	6.03	6.15

Note. $N = 249$; χ^2 = chi-square; df = degree of freedom; RMSEA = root mean square error of approximation; CI = confidence interval; CFI = comparative fit index.

Based on the establishment of the scalar invariance across gender, we compared the latent mean differences across gender. Latent means invariance across men and women was found.

5. Discussion

The aim of this research was to verify the psychometric properties of the Environmental Concern scale (ECs) within the Italian context. To achieve this goal, we conducted three different studies, testing construct validity (Study 1), factor structure (Study 2), and gender invariance (Study 3).

In Study 1, the scale was translated into the Italian language and the final version was used to test the factor structure through exploratory factor analysis. Following the guidelines reported in the literature [43,44], not all items were suitable for exploratory factor analysis, as they did not have a normal distribution [34,36–41]. Some items (item 6, 9, and 12) were eliminated for this reason and one item (item 3) was eliminated because it did not have satisfactory levels of communality. Subsequently, through the parallel analysis,

we verified how many factors could be extracted, and we verified if the items were part of a factor through the analysis of the factor loading, which had to be greater than 0.45 [44]; the eight remaining items were kept. Reliability was studied through McDonald's Omega values, showing excellent value for biospheric concern and egoistic concern.

This study showed that in the Italian context, the scale is composed of two factors, differently from the original version, which includes three factors. Indeed, the original scale measures concern about environmental consequences for oneself (egoistic concern), for humans in general (social-altruistic concern), and for the environment (biospheric concern). In the Italian context, only concerns for the biosphere and for oneself are retained. Our two-factor model is consistent with Thompson and Barton's [76] suggestion that there are ecocentric attitudes (nature valued for its own sake) and anthropocentric attitudes (nature valued for its contributions to humans). In the latter case, our model predicts that concerns about environmental consequences are self-referring.

Study 2 tested the construct validity of the eight-item version of the Environmental Concern Scale (ECs). The two-factor solution (concern about the environmental consequences for oneself—selfish concern—and for the environment—biospheric concern) is the best. Furthermore, the analyses performed in this study demonstrated that the scale possesses good convergent and discriminant validity. These results could further suggest that environmental concerns for Italians are for the environment and for themselves.

Although the elimination of some ECs items results from the preliminary psychometric choices, we could hypothesize that the altruistic component may be less relevant in the Italian context than the other components. In fact, the Italian social and political structure reflects an individualistic culture [77]. In this type of culture, individuals are autonomous and prioritize personal goals, while in collectivist cultures, individuals prioritize common goals [78]. Following the Hofstede indices (accessed on 18 April 2023), Italy appears to be the most individualistic country among those in which other studies using the Environmental Concern scale (ECs) have been reported, both at the European level, such as Spain, Germany, and Greece (<https://www.hofstede-insights.com/country-comparison/germany,greece,italy,spain/>, accessed on 18 April 2023) and non-European, such as India or Latin American countries (<https://www.hofstede-insights.com/country-comparison/colombia,india,italy,peru/>, accessed on 18 April 2023).

In the second study, we also showed concurrent validity and predictive validity. Concurrent validity was demonstrated with the correlation of the dimensions (biospheric and egoistic concerns) with a similar dimension and climate change concerns. In this case, only biospheric concerns showed a correlation. In fact, climate change worry is conceptualized as a concern specifically associated with climate change, so the correlation with biospheric concern is more understandable than a correlation with egoistic concern.

Predictive validity was shown by using the measures of biospheric and egoistic concerns as predictors of life satisfaction. In our study, only egoistic concerns predicted life satisfaction. These results are consistent with what is stated in the literature. Binder and Blankenberg [25] showed that there is a relationship between egoistic concerns and life satisfaction: egoistic concerns increase the likelihood that people engage in voluntary activities and increase life satisfaction. Also, Yakut [27] showed that self-concern concerns have a positive impact on life satisfaction. The relationship between environmental concerns and life satisfaction is noteworthy, as acting as feedback, life satisfaction, improved by egoistic concern, can contribute to translating pro-environmental attitudes in pro-environmental behaviors [24].

Finally, Study 3 examined the invariance of measurement between genders. The study confirmed the configurational, metric, and scalar invariance. This indicates that no item contained gender bias and that the Environmental Concern scale (ECs) measures the same dimensions in both men and women.

In summary, by examining the psychometric properties of this scale in the Italian context, these three studies demonstrate its validity and reliability in the eight-item form.

6. Conclusions and Limitations

The paper presented the validation of Environmental Concern scales (ECs) in an Italian context. The results show that the two-factor structure works best in this context. However, the study results are not without limitations. First, we used a convenience sampling in all studies, consisting predominantly of female participants. The fact that the administration of the protocol took place online did not allow the research team to match the sample, but this may not guarantee representativeness for the entire population. Furthermore, we used cross-sectional studies, so we cannot verify the predictive validity of the scale. Finally, social desirability was not controlled in our study, which could have an effect when addressing socially important issues such as environmental well-being.

7. Practical Implications and Directions for Future Studies

This study offered an update to measurements in the field of environmental concern. For researchers, the presented measure can be a useful guide for conducting research involving the measurement of environmental concerns and attitudes.

The ECs can be used within different contexts. For example, within organizations it would be possible to analyze the interaction between the environmental sustainability-oriented behavior of employees and the sustainability values of the organization where they work. In the context of building a sustainable future, the ECs can be useful in individual counselling to investigate people's attitudes and the possibly to stimulate reflections on sustainable behavior. It has been demonstrated that anxiety deriving from environmental concerns, defined as eco-anxiety [79], affects above all young people between the ages of 15 and 30; more precisely, young people, differently from adults, will more likely have to survive climatic adversities in the future [80]. For this reason, it is important to assess these attitudes and invite people to reflect on and implement sustainable environmental behavior. Future research could verify the functionality of the same instrument using longitudinal studies or by validating the scale on specific samples; moreover, due to the cross-cultural variability, other validation of the measure in different countries should be useful, as well as cross-cultural comparison.

Considering that only Italian adults were involved in this study, future research could adapt the instrument to younger populations. The tool could be used to assess youth concerns and create projects for the promotion of environmental protection and sustainable behaviors toward the environment.

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Appendix A

Table A1. Italian version of Environmental Concern scale (ECs).

Le persone in tutto il mondo sono generalmente preoccupate per i problemi ambientali a causa delle conseguenze che derivano dal danneggiare la natura. Tuttavia, le persone differiscono nelle conseguenze che le riguardano di più. Si prega di valutare ciascuno dei seguenti elementi da 1 (non importante) a 7 (massima importanza) in risposta alla domanda:

Sono preoccupato per i problemi ambientali a causa delle conseguenze per ...

[People all over the world are generally concerned about environmental problems because of the consequences of damaging nature. However, people differ in the consequences that affect them most. Please rate each of the following from 1 (not important) to 7 (highest importance) in response to the question:

I am concerned about environmental problems because of the consequences for ...]

1. [... plants] ... le piante
2. [... me] ... me stesso
3. [... marine life] ... la vita marina
4. [... my lifestyle] ... il mio stile di vita
5. [... birds] ... gli uccelli
6. [... my health] ... la mia salute
7. [... animals] ... gli animali
8. [... my future] ... il mio futuro

Note. Items 1, 3, 5, and 7 are biospheric concern; items 2, 4, 6, and 8 are egoistic concern.

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