

## Article

# Adaptation of the Revised Environmental Identity Scale to Adult Portuguese Native Speakers: A Validity and Reliability Study

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**Abstract:** Environmental identity is a dimension of personal identity that reflects an individual's sense of connection with nature and personal view of nature as part of her/his identity. There is a need to adapt and validate measures that assess environmental identity, namely in Portuguese. This study analyzed the validity and reliability of the Revised Environmental Identity Scale (Revised EID) in a sample of native speakers of Portuguese from 18 to 83 years old. The survey included the Portuguese translation of the Revised EID, measures of eco-anxiety, adult attachment, affective neurobiological systems, psychological symptoms, and sociodemographic information. Exploratory and confirmatory factor analyses were conducted to assess the construct validity of the scale. It was tied to a two-factor solution (Connectedness with Nature and Protection of Nature) found in prior research. The Revised EID was positively related to feelings of anxiety about personal impact on climate change and positive emotional systems (SEEKING, CARE, and PLAY). Older participants reported higher levels in the overall environmental identity score and the Protection of Nature factor. The results indicate that the Revised EID is an appropriate measure to assess environmental identity in adult Portuguese native speakers and should be used to conduct cross-cultural studies to drive environmental and health policies.

**Keywords:** environmental identity; connection to nature; environmental concern; reliability; cross-cultural validity



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## 1. Introduction

Climate change is viewed as a source of worry for a large portion of the population around the world [1,2], and it has become a top priority on international political agendas, requiring adjustments to economic and social development programs. Slow and persistent changes in climatic patterns manifest themselves in overheating or extremely low temperatures, rising sea levels, violent storms, wildfires, floods, melting of the polar ice caps, water scarcity, and decline in biodiversity.

The global environmental crisis can bring about noteworthy threats to different components of health, such as clean air, safe drinking water, nutritious food supply, and safe shelter [3]. Due to extreme weather events, some communities live in internal displacement and/or are at increased risk of being forced to flee their homes [4]. The consequences of the climate crisis also include changes in land use and weakened social infrastructure, which may give rise to financial and relationship instability, which increases risks of violence and aggression [5].

In the face of such ominous threats, mental health problems have become the center of many scientific studies and public policies. There is a growing body of empirical evidence that exposure, both direct and indirect, to extreme weather events is associated with anxiety,

depression, complicated grief, post-traumatic stress disorder, substance abuse, and suicidal ideation [6–10]. Some of these negative consequences on individuals' mental health may be potentially irreversible and affect the health of populations worldwide [11].

These emotional and cognitive reactions and symptoms triggered by environmental problems seem to be more severe in those people whose identity is strongly linked to the natural environment [12,13]. The consequences for mental health are probably more evident in people who are more aware of climate change. Typically, this is associated with a general human sensitivity and connection to nature, in which environmental issues and concerns will potentially have a greater emotional resonance among these individuals [14,15].

Therefore, individual differences in psychological reactions to climate change and pro-social behavior can be attributed to the degree of personal connection to the environment involving nature's incorporation into self-concept. Environmental identity (EID) is one dimension of personal identity that is built upon individual history, emotional attachment, and or similarity with the nonhuman natural environment. EID denotes individuals' sense of connection toward nature and the personal view that nature is a part of who he/she is [16,17]. People with a strong environmental identity feel strongly connected to and interdependent with the natural world, which affects how they think about nature and themselves [14].

### *1.1. Revised Environmental Identity Scale*

The EID scale was developed to assess individual differences in both cognitive and emotional components of a stable sense of interdependence and connection with nature [16]. The measure evaluates the degree to which the natural environment plays a role in one's self-definition by covering four features of the construct: the salience of environmental identity (degree and relevance of an individual's interactions with nature), self-identification with and support for environmental ideology (way in which nature contributes to the collectives with which one identifies), positive emotions associated with the environment (enjoyment obtained in nature), and memories of interactions with the natural world. Factor analysis conducted to assess the construct validity of the scale suggested a single-factor solution [14]. There is evidence of the validity of the construct of EID across different cultures [18–20].

More recently, a shorter version of the scale was developed, i.e., the Revised EID. This measure includes 14 items that individuals are asked to rate on a 1–7 scale, with the extreme points corresponding to "not at all" and "true of me". Some minor changes to some of the items included in the original scale were introduced. Specifically, some items were reworded to make them clearer and generalizable, such as the inclusion of encounters with elements of nature that could occur anywhere, even for urban residents. This measure covers the same components of the original scale. The revised scale also evaluates individuals' links to nature as a stable characteristic of their identity. The reliability and validity of the Revised EID scale were originally assessed across convenience samples from five countries (Peru, Russia, Swiss, Taiwan, and the United States). The confirmatory factor analyses found a one-factor solution that showed good internal consistency across all locations [14].

Meanwhile, the choice of the one-factor solution of the Revised EID was selected according to the parsimony criterion, despite a two-factor solution emerging in the preliminary analysis [14]. In accordance, it was found that a two-factor solution provided a better fit for the model in a study of validation of the scale in a sample of Italian pet owners. The first factor was labeled Connectedness with Nature and included nine items; the second factor was labeled Protection of Nature and included five items. Similarly to the original article on the scale, all item means were above the neutral midpoint, which resulted in a skewed distribution of both factors [21].

Overall, EID is a construct similar to other related constructs, such as connectedness to nature [22] and nature-relatedness [23]. Despite some evidence of convergent validity between different measures used to assess these constructs, there are notable conceptual differences between similar constructs [24]. In this regard, EID had stronger correlations

with pro-environmental behaviors [25–27] and mental health problems compared to related constructs such as environmental concern [12].

### *1.2. Association between Environmental Identity and Psychosocial Variables*

The association between environmental identity and measures of psychosocial variables is mixed. Research has found no gender differences in EID [14,21]. Differences between genders were only found in the Peruvian sample in the study by Clayton et al. [14], with women presenting higher mean scores compared to males. Similarly, no differences in EID have been found in terms of age and education.

Moreover, a few studies found that environmental identity was associated with measures of both well-being and ill-being. Prior studies found a statistically significant positive association between environmental identity with both quality of life and well-being [28,29]. On the other hand, a meta-analytic study found that environmental identity was moderately to largely associated with environmental concerns and anxiety [12]. These findings highlight the emotional components of people's felt relationship to the natural world.

### *1.3. Purpose of the Study and Hypotheses*

As mentioned above, the Revised EID was developed to measure the cognitive and emotional components of individuals' relationship to the natural world. Considering the psychological effects of environmental crises and potential environmental calamities worldwide, the existence of validated measures of psychological constructs with impact on both eco-anxiety, pro-environmental behaviors, and well-being, such as environmental identity, is needed to properly assess these variables and drive environmental and health policies adapted to the cultural setting. To the best of our knowledge, the Revised EID has not been adapted and validated to Portuguese. Portuguese is the seventh most spoken language worldwide, with around 230 million speakers. Today, Portuguese is the official language of ten countries in Europe, South America, Africa, and Asia, but it is spoken in 18 countries. It is therefore necessary to develop a valid measure that assesses environmental identity in Portuguese-speaking adults so that information can be gathered on the phenomenon, as well as the development of cross-cultural studies. The aim of the study is to conduct a validity and reliability study of the Revised EID in native speakers of Portuguese.

## **2. Materials and Methods**

### *2.1. Sample and Study Design*

A sample of 545 Portuguese and native speakers of Portuguese from other countries (Angola, Brazil, Mozambique) aged 18 or older were selected for this study. The mean age was 37.1 years old (SD = 16.4, age range: 18–83 years old). Regarding the distribution by sex, the proportion of females was higher than the proportion of male participants. Concerning gender identity, the proportion of participants whose self-conception as a female was higher compared with other categories. More than half of the participants (82.0%) were born in Portugal, and all the participants lived in Portugal. The sample included native Portuguese speakers of other nationalities who have been living in Portugal for the last five years. The aim of including these participants was to get as close to the distribution as possible of distribution of non-Portuguese native speakers living in Portugal collected in the last census carried out in Portugal. Almost half of the participants were single, and a large proportion were married or cohabited. Most participants had twelve years of education, and a small proportion had six years of education. The large majority were employed and reported that they belonged to the medium socioeconomic status (Table 1).

The estimated sample size for Confirmatory Factor Analysis by Root Mean Squared Error of Approximation (RMSEA) with an expected RMSEA of 0.05, 14 items loading on 2 factors, a significance level of 0.05, and a sample size power of 95%, was 216 participants [30].

**Table 1.** Sample demographic characteristics.

Variables	<i>n</i>	%
<b>Sex</b>		
Female	343	62.9
Male	202	37.1
<b>Gender</b>		
Female	340	62.4
Male	201	36.9
Nonbinary	4	0.7
<b>Nationality</b>		
Angolan	31	5.7
Brazilian	52	9.5
Mozambican	15	2.8
Portuguese	447	82.0
<b>Civil status</b>		
Single	267	49.0
Married or cohabitation	219	40.2
Divorced	50	9.2
Widowed	9	1.7
<b>Education</b>		
Less than nine years of education	12	2.2
Nine years of education	22	4.0
12 years of education	233	42.8
Bachelor	202	37.1
Master	62	11.4
Ph.D.	14	2.6
<b>Professional status</b>		
Student	151	27.7
Working student	37	6.8
Employee	286	52.5
Unemployed	36	6.6
Retired	35	6.4
<b>Socioeconomic status</b>		
Low	52	9.5
Medium	404	74.1
Medium-high	85	15.6
High	4	0.7

The aim of this study was to collect data on psychological variables associated with climate change in native Portuguese-speaking participants. The study was reviewed and approved by the institutional review board (IRB) of the Universidade Europeia (UE). As necessary, the questionnaire was translated into Portuguese following the guidelines of the International Test Commission [31]. The scale was translated by two independent translators who were blind to the study objectives. The first translator was a native Portuguese speaker with Portuguese nationality, whereas the second translator was an Angolan individual with Portuguese dominant language. Both translators had proficiency in both Portuguese and English and were trained in methods and psychometric methods and item construction, and both were experts in the field of environmental psychology. The two independent translations were compared, and it was noticed that there was a high consensus between translations (Cohen's kappa = 0.93). There were a few differences in some items, which were discussed until a consensus version of each item was obtained. This procedure was carried out by the two translators and the research team, whose members were familiar with the cultural context of the other Portuguese-speaking countries. In some items, modifications were made to have a better adaptation to the cultural setting. As an example, in item 12 ("I consider myself a steward of our natural resources"), the word "steward" was translated into "guardião", whose meaning in Portuguese relates to being a "keeper", because it was more adapted to the cultural context of both Portugal and the other

Portuguese-speaking countries. The original version of the scale [14] and the translated version are presented in Appendix A.

Before data collection, a pilot study of the final version of the translated scale was conducted with a group of participants representative of the target population. This group was comprised of 27 participants (age range: 18–73 years old), including 18 females and 9 males: 19 Portuguese, 2 Brazilians, 2 Angolans, and 2 Mozambicans. As a result of this procedure, no changes were made to the scale. A convenience sampling technique was used to collect the data. Participants were invited via an online survey. Participants were recruited via mailing lists and social networks (Facebook, Instagram, LinkedIn, and WhatsApp). The participants were all native speakers of Portuguese and aged 18 or older. All participants gave their informed consent directly in the online questionnaire's platform before the questionnaire's completion. Following the World Medical Association Declaration of Helsinki's guidelines, participants were informed about the study aims, procedures, and their role as participants in the study. The participation was voluntary, and participants did not receive any monetary reward.

Data were collected through a survey that included self-reported questionnaires inserted in an online platform using the Jotform 4.0. Participants filled out a questionnaire package containing questions concerning environmental identity, emotional and cognitive responses to environmental problems related to climate change, attachment dimensions, primary emotional systems, and sociodemographic variables. The participants were able to access the link and complete the questionnaire which took just under 20 min to complete. Inclusion criteria were: participants were all native speakers of Portuguese and aged 18 or older.

## 2.2. Measures

The Revised Environmental Identity Scale (Revised EID) [14] was used to assess the environmental identity levels of individuals. It includes 14 items. Respondents are asked to indicate how each of the statements describes them on a 7-point scale from "not at all" (1) to "true of me" (7) with a midpoint of "neither true nor untrue" (4). The items encompass characteristics of environmental identity, for example, "I like to spend time outdoors in natural settings (such as woods, mountains, rivers, fields, local parks, lake or beach, or a leafy yard or garden)" and "I feel that I have a lot in common with wild animals". The total sum of the items was calculated to assess the total score of the scale, and higher scores in the total score of the scale indicate stronger environmental identity.

The Hogg Eco-Anxiety Scale (HEAS) [32] assesses the eco-anxiety levels of individuals in the last two weeks. This measure contains 13 items to which respondents answer how often each symptom has bothered them as "not at all" (0), "several of the days" (1), "over half the days" (2), "nearly every day" (3), and "every day" (4). This measure includes four dimensions. Four items assess emotional symptoms ("feeling nervous, anxious or on edge"), three items assess rumination ("unable to stop thinking about future climate change and other global environmental problems"), three items assess behavioral symptoms ("difficulty sleeping"), and three items assess anxiety about personal impact ("feeling anxious about the impact of your personal behaviors on the earth"). The total sum of the items was calculated to assess the total score of the scale, and the mean scores for each dimension were calculated. Higher scores in the total score of the scale and higher mean scores for each dimension indicate an increase in the levels of eco-anxiety. This measure also evaluates four dimensions of eco-anxiety: emotional symptoms, behavioral symptoms, rumination thoughts, and anxiety about the personal impact. The reliability of the overall scale (Cronbach's alpha = 0.91), the emotional symptoms dimension (Cronbach's alpha = 0.84), the behavioral symptoms dimension (Cronbach's alpha = 0.78), the rumination thoughts dimension (Cronbach's alpha = 0.88), and the anxiety about the personal impact dimension (Cronbach's alpha = 0.85) were satisfactory to good.

The Revised Adult Attachment Scale (RAAS) [33] is a self-report scale that includes 18 items scored on a five-point Likert scale from "not at all characteristic of me" (1) to "very

characteristic of me" (5). The scale covers three dimensions of adult attachment, including (a) six items on closeness attachment, (b) six items on dependency attachment, and (c) six items on the anxious attachment dimension. The sum of items in the three dimensions was used as the index score of each dimension. The reliability of the attachment closeness scale (Cronbach's alpha = 0.78), attachment dependence scale (Cronbach's alpha = 0.82), and attachment avoidance scale (Cronbach's alpha = 0.83) were satisfactory to good.

The Brief Form of the Affective Neuroscience Personality Scales (BANPS) [34,35] is a self-report measure that assesses six affective neurobiological systems underlying emotional behaviors: ANGER, FEAR, PANIC/DISTRESS, PLAY, SEEKING, and CARE. This measure includes 33 items answered on a five-point Likert scale from "strongly disagree" (1) to "strongly agree" (5). The reliability of the ANGER (Cronbach's alpha = 0.80), FEAR (Cronbach's alpha = 0.81), PANIC/DISTRESS (Cronbach's alpha = 0.84), PLAY (Cronbach's alpha = 0.83), SEEKING (Cronbach's alpha = 0.85), and CARE subscales (Cronbach's alpha = 0.84) were good.

The Brief Symptom Inventory (BSI) [36] is a measure of general psychiatric distress with 53 items. The BSI is composed of nine clinical scales and three global indices of disturbance. Participants were asked to rate the degree to which each symptom was distressing in the last week along a 5-point scale as "not at all" (0), "a little bit" (1), "moderately" (2), "quite a lot" (3), and "extremely" (4). The sum of items for each scale was used as the index of psychological distress. Considering the evidence from research that environmental psychological problems are associated with physical symptoms as well as anxiety and depression (Clayton, 2018), only the anxiety, depression, and somatization scales were used in this study. The reliability of the anxiety (Cronbach's alpha = 0.88), depression (Cronbach's alpha = 0.90), and somatization subscales (Cronbach's alpha = 0.86) were good.

The sociodemographic questionnaire included questions on sex, gender, age, civil status, education, and socioeconomic status.

### 2.3. Statistical Methods

Analysis of the data was conducted using the IBM SPSS Statistics for Windows (version 29) and AMOS 29 package programs. Exploratory factor analysis (EFA) was applied to the 14 items in the original form of the Revised EID, using the principal component analysis method. The construct validity was assessed with EFA despite the original form of the scale consisting of a single factor. Following, it was tested whether the new scale structure was in the appropriate form by using confirmatory factor analysis (CFA). The factor structure was tested by conducting a structural equation modeling. The following criteria were used to select the best-fit model: (a)  $\chi^2$  test should be non-significant; (b) comparative fit index (CFI), normed fit index (NFI), and Tucker Lewis Index (TLI) > 0.95; (c) root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR) ranging from 0.00 to 0.08. We computed the  $\chi^2$  test, but as it is sensitive to sample size, we used the ratio of  $\chi^2$  to degrees of freedom. Values between 1 and 5 indicate a satisfactory fit between the theoretical model [37]. To test the internal consistency of the scale, Cronbach's alpha value was examined.

To assess the construct validity of the scale, multiple Pearson correlation analyses were conducted to test bi-variate relationships between the Revised EID with the HEAS, the dimensions of the RAAS, the primary emotional systems assessed by the BANPS, and the symptoms of depression, anxiety, and somatization measured by the BSI. The following criteria were assessed for convergent validity: (1) if the correlation between two measures measuring the same construct was >0.50, the convergent validity is considered adequate, i.e., meaning that >75% of hypotheses are correct; (2) the correlations with related constructs should be higher than with unrelated constructs [38,39]. A *t*-test was conducted to compare the mean of the global score and the dimensions of the Revised EID between the females and males, and between young adults and older participants with a Bonferroni correction. All statistical analyses were carried out at a significance level of 0.05.

### 3. Results

#### 3.1. Validity and Reliability

EFA was first conducted to identify the latent (unobserved) structure behind the data set. First, the applicability of EFA was tested by analyzing the correlation coefficients between the observed variables (items), which did not show multicollinearity. In terms of sample adequacy, Bartlett's test of sphericity was performed to test the equality of the correlation matrix between the Kaiser–Meyer–Olkin (KMO) criterion and the observed variables to the unit matrix. Since the value of the KMO criterion was 0.96 and Bartlett's sphericity test was at a significant level ( $p < 0.001$ ,  $df = 91$ ,  $\chi^2 = 5407.92$ ), the data were found to be suitable for factor analysis.

The principal component analysis method was used for EFA. Determination of the appropriate number of factors was performed by analyzing the KMO criterion, percentage of variance explained, and the slope trend test. It was observed that a two-factor solution should be selected through all the criteria. This solution explained 66.87% of the total variance in the population (Factor 1—Connectedness with Nature: 58.67% of the variance; Factor 2—Protection of Nature: 8.21% of the variance). This solution provided construct validity in its current form (Table 2).

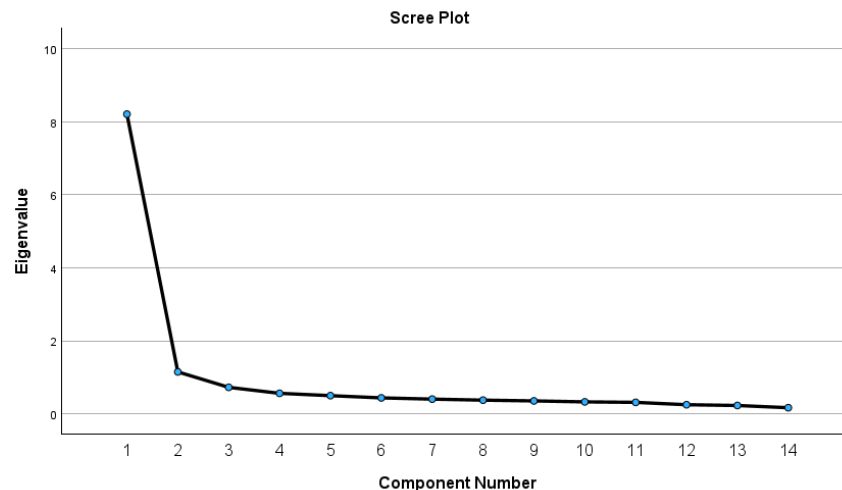
**Table 2.** Item coefficients of the two and one-factor structure of the scale.

Item	Two-Factor Solution		One-Factor Solution
	Factor 1	Factor 2	
1	0.78	0.18	0.76
2	0.47	0.65	0.73
3	0.60	0.47	0.76
4	0.82	0.29	0.85
5	0.15	0.79	0.53
6	0.56	0.66	0.77
7	0.73	0.23	0.74
8	0.77	0.27	0.80
9	0.81	0.33	0.87
10	0.71	0.22	0.72
11	0.80	0.34	0.87
12	0.21	0.83	0.60
13	0.85	0.23	0.85
14	0.75	0.32	0.81
Cronbach's $\alpha$	0.94	0.80	0.94

Considering the need to choose between a two-factor solution suggested in the first analysis and a one-factor solution according to the original structure of the scale, a second principal component analysis was carried out without removing any items. It was found that a one-factor solution explained 58.67% of the variance in the population (Figure 1 and Table 2).

Next, a CFA was conducted in which the fit indices of the two-factor solutions retrieved in EFA were analyzed. The factors of the scale were defined as latent (unobserved) variables, and the items of the scale were defined as manifest variables and loaded onto a single factor in accordance with the construct validity of the scale.

The CFA of both factor solutions—one- and two-factor solution—suggested that the two-factor solution provided a better fit for the model. The one-factor solution showed a poor model fit ( $\chi^2 (90) = 642.49$ ,  $p < 0.01$ ; ratio of  $\chi^2$  to degrees of freedom = 7.14; NFI = 0.88; CFI = 0.90; TLI = 0.90; RMSEA = 0.11; SMSR = 0.07), indicating a lack of compatibility between the observed and the targeted model. The two-factor solution showed an acceptable model fit ( $\chi^2 (77) = 285.77$ ,  $p < 0.01$ ; ratio of  $\chi^2$  to degrees of freedom = 3.71; NFI = 0.94; CFI = 0.95; TLI = 0.95; RMSEA = 0.07; SMSR = 0.04) indicating compatibility between the observed and the targeted model (Table 3).



**Figure 1.** The eigenvalue graph.

**Table 3.** Regression coefficients between scale items and the factors for the two-factor solution.

Item	Subscales	Standardized Regression Coefficient
1	Connectedness with Nature	0.76 (0.64–0.88) ***
3	Connectedness with Nature	0.72 (0.59–0.85) ***
4	Connectedness with Nature	0.86 (0.74–0.98) ***
7	Connectedness with Nature	0.72 (0.61–0.83) ***
8	Connectedness with Nature	0.78 (0.65–0.91) ***
9	Connectedness with Nature	0.86 (0.74–0.98) ***
10	Connectedness with Nature	0.70 (0.58–0.82) ***
11	Connectedness with Nature	0.87 (0.76–0.98) ***
13	Connectedness with Nature	0.85 (0.75–0.95) ***
14	Connectedness with Nature	0.79 (0.67–0.91) ***
2	Protection of Nature	0.68 (0.54–0.82) ***
5	Protection of Nature	0.47 (0.31–0.63) ***
6	Protection of Nature	0.72 (0.59–0.85) ***
12	Protection of Nature	0.54 (0.40–0.68) ***

Note. \*\*\*  $p < 0.001$ .

The internal consistency of the global scale (Cronbach's alpha = 0.94) was good. The internal consistency of the Connectedness with Nature factor (Cronbach's alpha = 0.94) and the Protection of Nature factor (Cronbach's alpha = 0.80) were satisfactory to good.

### 3.2. Association with Related Variables

The associations between the global score of environmental identity and the factors retrieved in the two-factor solution (Connectedness with Nature and Protection of Nature) with eco-anxiety and adult attachment dimensions were analyzed. As can be seen in Table 4, the correlations between both the global score of environmental identity and the Connectedness with Nature factor with the global score of eco-anxiety, emotional symptoms of eco-anxiety, rumination symptoms of eco-anxiety, anxiety about personal impact, and attachment dependency were weak and positive. The association between both the global score of environmental identity and the Connectedness with Nature factor with attachment closeness was negative and weak. The correlations between the Protection of Nature factor with the global score of eco-anxiety, emotional symptoms of eco-anxiety, rumination symptoms of eco-anxiety, and attachment dependency were positive and weak. The correlations between the Protection of Nature factor and anxiety about personal impact were positive and moderate, and the association between the Protection of Nature factor and attachment closeness was negative and weak. The remaining associations were non-significant.

**Table 4.** Association of the Revised EID two-factor solution with eco-anxiety and adult attachment measures.

Variables	Eco-Anxiety Global Score	Emotional Symptoms	Behavioral Symptoms	Rumination Symptoms	Anxiety about Personal Impact	Closeness Attachment	Dependency Attachment	Anxiety Attachment
EID global score	0.19 ***	0.12 **	0.01	0.20 ***	0.28 ***	−0.16 ***	0.10 *	0.07
EID: Connectedness with Nature	0.14 ***	0.09 *	0−0.01	0.15 ***	0.23 ***	−0.16 ***	0.11 *	0.08
EID: Protection of Nature	0.26 ***	0.16 ***	0.06	0.29 ***	0.33 ***	−0.11 ***	0.07	0.02

Note. \*  $p < 0.05$ . \*\*  $p < 0.01$ . \*\*\*  $p < 0.001$ .

The associations between the global score of environmental identity and the factors retrieved in the two-factor solution (Connectedness with Nature and Protection of Nature) with the six primary emotional systems measured by the BANPS and psychological symptoms were also analyzed.

The global scores of environmental identity and the Connectedness with Nature factor were positively and weakly associated with PLAY, SEEKING, and CARE. The former two variables were negatively and weakly associated with ANGER. The Protection of Nature factor was weakly and positively associated with PANIC/DISTRESS, PLAY, SEEKING, and CARE. The former variable was negatively and positively associated with ANGER. The remaining associations were non-significant (Table 5).

**Table 5.** Association of the Revised EID two-factor solution with primary emotional systems and psychological symptoms.

Variables	ANGER	FEAR	PANIC	PLAY	SEEKING	CARE	Anxiety Symptoms	Depression Symptoms	Somatization Symptoms
EID global score	−0.17 ***	0.01	−0.08	0.12 **	0.19 ***	0.22 ***	0.07	−0.01	0.01
Connectedness with Nature	−0.16 ***	0.04	−0.06	0.17 ***	0.22 ***	0.12 **	0.07	0.01	0.01
Protection of Nature	−0.15 ***	−0.04	−0.10 *	0.21 ***	0.17 ***	0.10 *	0.07	−0.01	0.04

Note. \*  $p < 0.05$ . \*\*  $p < 0.01$ . \*\*\*  $p < 0.001$ .

### 3.3. Comparison of Groups on Environmental Identity

As can be seen in Table 6, there were no statistically significant differences between both sexes on the global score of environmental identity and the two factors of environmental identity.

**Table 6.** Means, standard deviations, and mean differences between females and males on environmental identity dimensions.

Variables	Females ( $n = 343$ )		Males ( $n = 202$ )		$t$	$p$	$d$
	M	SD	M	SD			
EID global score	5.12	1.35	5.17	1.20	−0.42	0.67	0.04
Connectedness with Nature	5.47	1.41	5.48	1.24	−0.14	0.66	0.01
Protection of Nature	4.26	1.48	4.38	1.41	−0.99	0.16	0.09

Note. EID = Environmental identity.

Regarding the comparison of variables between participants aged between 18 and 36 years old and participants aged 37 years old or older, there were statistically significant differences in the global score of environmental identity and the Protection of Nature factor. The group of participants aged 37 years old or older had higher mean scores on both variables compared to the other group. However, there were no statistically significant differences between both groups on the Connectedness with Nature factor (Table 7).

**Table 7.** Means, standard deviations, and mean differences between participants aged between 18 and 36 and participants aged 37 or older on environmental identity dimensions.

	18 to 36 Years Old ( <i>n</i> = 287)		37 Years Old or Older ( <i>n</i> = 257)		<i>t</i>	<i>p</i>	<i>d</i>
	M	SD	M	SD			
EID global score	5.01	1.26	5.29	1.32	−2.55	0.01	0.22
Connectedness with Nature	5.39	1.33	5.57	1.37	−1.51	0.13	0.13
Protection of Nature	4.05	1.44	4.60	1.42	−4.48	0.001	0.38

Note. EID = Environmental identity.

## 4. Discussion

### 4.1. Validity and Reliability of the Revised EID

The main purpose of the current study was to conduct a validity and reliability analysis of the Revised EID in a sample of Portuguese and native speakers of Portuguese. To the best of our knowledge, no previous study has analyzed the validity of this measure among adult Portuguese native speakers. This study is highly relevant due to the need to develop validated measures that assess environmental identity, which seems to be related to individual responses to climate change, namely psychological reactions [12] and pro-social behaviors [25,27].

In this regard, the Revised EID is a shorter version of a measure developed to assess environmental identity which also covers the same components of the original scale. Likewise, the Revised EID assesses the degree to which individuals appraise themselves (cognitive component) and feel (emotional component) interdependent and connected to nature as a characteristic of their identity [14].

To the best of our knowledge, the Revised EID has not yet been validated and adapted into Portuguese. Nevertheless, there is a need to adapt and test the validity of this measure in Portuguese. Portuguese is the seventh most spoken language worldwide, with around 230 million speakers. Moreover, Portuguese is the official language of ten countries located in different continents (Europe, South America, Africa, and Asia), but it is spoken in 18 countries. Therefore, it is necessary to develop a valid measure to assess environmental identity in Portuguese-speaking adults so that information can be gathered on the phenomenon, as well as the development of cross-cultural studies. The aim of the study is to conduct a validity and reliability study of the Revised EID in native speakers of Portuguese.

The current findings indicate that environmental identity seems to be a multi-dimensional construct composed of two underlying factors. As found in the preliminary analyses of the scale in the validation study of the shorter version [14] and in another study with a sample of Italian pet owners [21], a two-factor solution was retrieved. This solution captured the same two components of environmental identity found in the study by Ariccio and Mosca [21]: Connectedness with Nature and Protection of Nature.

Further evidence of the multidimensionality of the environmental identity construct was observed. A CFA was conducted to test the original one-factor solution, which had a poor model fit. All fit indices, apart from the SMSR, were not within acceptable bounds which did not provide support for a one-factor structure of the measure in assessing environmental identity. These results suggest that environmental identity, as measured by the Revised EID, is not a unidimensional construct related only to individuals' link to nature as a stable characteristic of their identity [18,19].

The two-factor solution in the original form of the measure presented suitable construct validity. The results indicated that the two-factor solution was acceptable for the model. As observed in previous studies, the fit indices in the CFA showed a general trend toward values within the limits, which indicates the model's fit [14,21]. Probably, some of the scale's characteristics, such as the length of the scale and the scale response length (i.e., 1–7), may explain the results obtained in the model's fit indices. Moreover, all item means were

above the neutral midpoint (“neither true nor untrue”) which may also have contributed to the fit indices found in the study [14].

However, the two-factor solution found in this study showed some differences compared to the same-factor solution found in prior research [21]. While the former authors’ two-factor solution together explained 52% of the total variance, our two-factor solution together explained almost 67% of the total variance. Although the factors that evaluated the same components of environmental identity were retrieved, Connectedness with Nature and Protection of Nature, there were a few differences in the items that loaded on the factors. In the study by Ariccio and Mosca [21], nine items were loaded on the factor Connectedness with Nature, and five items were loaded on the factor Protection of Nature. In our study, 10 items were loaded on the first factor, and four items were loaded on the second factor.

Specifically, item 3 (“If I had enough resources such as time or money, I would spend some of them to protect the natural environment”), which in a previous study was loaded on the factor Protection of Nature [21], in our study was loaded on the factor Connectedness with Nature. Differences in the characteristics of the sample may explain this modification regarding this item. While the sample in the previous study consisted of pet owners, our sample was selected from the general population. This item is probably not evaluated as an indicator of nature protection in our sample but rather reflects a feeling of connection to nature that could lead to nature-protection behaviors. Future studies should be carried out on other samples to assess the factorial structure of the scale.

Although the sample included participants who were born in Portuguese-speaking African and South American countries, they had been living in Portugal for the last five years. The selection of these participants aimed to follow the distribution of the nationalities of native Portuguese-speaking residents found in the 2021 Census in Portugal. Meanwhile, the aim of the current study was not to validate the Revised EID in these countries but to adapt and validate the measure for the Portuguese language.

The results indicate the usefulness and validity of the Revised EID in assessing individual differences in the dimensions of connection and protection of the nature of environmental identity in the general population [14,19]. The Revised EID seems to be a measure able to capture the different dimensions of environmental identity that have been identified in the literature, namely individuals’ sense of connection toward nature as part of his/her identity [16,17] and pro-environmental behaviors aimed at protecting the environmental world [14,40].

#### *4.2. Association of the Revised EID with Related Measures and Comparison of Groups*

The analysis of the correlations between the overall score and the two factors of environmental identity with the dimensions of eco-anxiety indicated that, in general, the association between the two groups of variables was weak to moderate and positive. These results indicate, with some caution, that people whose identity is more sensitive and connected to nature are more likely to present emotional and cognitive reactions associated with the environmental crisis [12,13]. However, these reactions may not necessarily be mental health problems, as none of the mental health variables showed a statistically significant association with any of the clinical symptom variables.

Overall, the eco-anxiety dimension related to feelings of anxiety about personal impact on climate change showed the highest associations with all the environmental identity variables. These results suggest that the Revised EID captures a key dimension of environmental identity, the interdependence with the natural world, which makes people more aware of climate change and also more aware of the impact of their behaviors on climate change and its consequences [14,41].

Regarding the association between the overall score and the two factors of environmental identity with the primary emotional systems assessed by the BANPS, there was a homogeneous pattern of relationship with the latter variables. The three environmental identity variables showed weak and positive associations with SEEKING, CARE, and PLAY;

the former variables also showed weak and negative associations with ANGER. Overall, environmental identity seems to be associated with positive emotional systems that actively work to obtain the system's arousal [40]. The association with primary emotional systems related to nurturing tendencies for others and the tendency to explore and achieve relevant goals may explain the association between environmental identity and pro-environmental behaviors [25–27].

The association between environmental variables and attachment dimensions indicated that the dimensions assessed by the Revised EID are not related to individuals' expectations, perceptions, and behaviors toward attachment figures and close relationships. It was observed that all the environmental identity variables had a weak and negative correlation with closeness attachment, and both the overall score of the scale and the Connectedness with Nature factor were weakly and positively associated with dependency attachment. Some authors have proposed that environmental identity is built on emotional attachment to others [16,17]. However, our results suggest that individuals' sense of connection toward nature is inversely related to being comfortable with intimacy and positively related to being comfortable with depending on others [32]. Future studies should better explore the relationship between the two constructs.

Finally, the analysis of the differences in levels of environmental identity between sexes showed that there were no statistically significant differences between both groups. These results are in line with previous studies which also found no differences between the two sexes in different samples in the strength of their environmental identity [14,21].

Unlike prior research, there were statistically significant differences in the overall environmental identity score and the Protection of Nature factor between younger and older participants. Older participants reported higher levels in both variables compared to younger participants. Although the evidence is not very robust, a meta-analytical study found that older individuals are more likely to engage with nature and avoid environmental harm, which may explain the results observed in the current study [42].

Overall, the results obtained on the global scale and the Connection with Nature subscale were like those found in previous studies, indicating that our samples present similar levels of both a sense of connection toward nature and the feeling that nature is part of their identity compared to other samples from other countries [14,21]. However, it was found that our sample had a lower mean level in the Protection of Nature factor compared to the mean level found by Ariccio and Mosca [21]. These differences are probably due to the characteristics of the sample since the sample of the latter study was made up exclusively of pet owners who probably have higher levels of nature protection behaviors and pro-environmental behaviors.

The current study should be interpreted considering some limitations. First, it is not possible to make plausible generalizations given the non-representativeness of the sample. Future studies should use probabilistic samples. Second, the sample mostly comprised female participants. Future studies should include samples with an equivalent proportion of both sexes. Thirdly, subjects over 65 years of age were not largely represented in this sample. Fourthly, the direct experience of a climate crisis was not assessed in this study. Bearing in mind that the direct experience of an environmental crisis may impact the strength of individuals' environmental identity, future studies should assess this variable.

## 5. Conclusions

The results of our study support the reliability and validity of the Revised EID to be used in the Portuguese language among adults. Bearing in mind that Portuguese is the seventh most spoken language in the world, being the official language of ten countries and approximately 230 million speakers, the adaptation and validation of this measure is particularly relevant. As a result, the validation of the scale in adults allows the study of environmental identity in a large population. As a result of the examination of the psychometric properties of the Revised EID, it can be recognized as a valid measure to assess the connection to nature as part of the identity of individuals and their relationship

with potential consequences of environmental crisis and pro-environmental behaviors. The current results provide an indication of the multi-dimensional nature of environmental identity. Our results indicate that the Revised EID captures two dimensions of environmental identity, namely, Connectedness with Nature and Protection of Nature. It seems that this measure could be used both to measure individual connectedness to the environment as a fundamental factor in psychological responses to environmental changes as well as to assess pro-environmental behaviors involving the adoption of individual and collective actions that minimize environmental damage and restore the natural environment. Despite the evidence of the validity of the measure in the present population, there is a need to test the validity of this measure in other populations, particularly in geographical areas where populations have already directly experienced the effects of climate change.

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## Appendix A. Items from the Original Version and the Portuguese Version

Item	Original Version	Portuguese Version
1	I like to spend time outdoors in natural settings (such as woods, mountains, rivers, fields, local parks, lake or beach, or a leafy yard or garden).	Gosto de passar o meu tempo ao ar livre em ambientes naturais (tais como bosques, montanhas, rios, campos, parques locais, lago ou praia, ou um quintal ou jardim).
2	I think of myself as a part of nature, not separate from it.	Penso em mim como uma parte da natureza e não separado(a) dela.
3	If I had enough resources such as time or money, I would spend some of them to protect the natural environment.	Se eu tivesse recursos suficientes, como tempo ou dinheiro, gastaria alguns deles para proteger o ambiente natural.
4	When I am upset or stressed, I can feel better by spending some time outdoors surrounded by nature.	Quando estou perturbado(a) ou stressado(a), sinto-me melhor se passar algum tempo ao ar livre rodeado(a) pela natureza.
5	I feel that I have a lot in common with wild animals.	Sinto que tenho muito em comum com os animais selvagens.
6	Behaving responsibly toward nature—living a sustainable lifestyle—is important to who I am.	Comportar-me de forma responsável em relação à natureza—viver um estilo de vida sustentável—é importante para quem eu sou.
7	Learning about the natural world should be part of everyone’s upbringing.	A aprendizagem sobre o mundo natural deveria fazer parte da educação de todo(a)s.
8	If I could choose, I would prefer to live where I can have a view of the natural environment, such as trees or fields.	Se eu pudesse escolher, preferia viver onde pudesse ter uma visão do ambiente natural, tais como árvores ou campos.

Item	Original Version	Portuguese Version
9	An important part of my life would be missing if I was not able to get outside and enjoy nature from time to time.	Uma parte importante da minha vida estaria em falta se eu não fosse capaz de sair e desfrutar da natureza de tempos a tempos
10	I think elements of the natural world are more beautiful than any work of art.	Penso que os elementos do mundo natural são mais bonitos do que qualquer obra de arte.
11	I feel refreshed when I spend time in nature.	Sinto-me renovado(a) quando passo tempo na natureza.
12	I consider myself a steward of our natural resources.	Considero-me um(a) guardião(o) dos nossos recursos naturais.
13	I feel comfortable out in nature.	Sinto-me confortável na natureza.
14	I enjoy encountering elements of nature, like trees or grass, even when I am in a city setting.	Gosto de encontrar elementos da natureza, tais como árvores ou relva, mesmo quando estou num ambiente urbano.

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