Universidade do Minho
Escola de Psicologia

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Psychometric Properties of The Portuguese Version of Ecological Identity Scale (EIS): A Study With Youth

outubro 2021

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Trabalho efetuado sob a orientação da
Professora Doutora Teresa Freire

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DECLARAÇÃO DE INTEGRIDADE

Declaro ter atuado com integridade na elaboração do presente trabalho académico e confirmo que não recorri à prática de plágio nem a qualquer forma de utilização indevida ou falsificação de informações ou resultados em nenhuma das etapas conducente à sua elaboração.

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Universidade do Minho, 18/10/2021

Marta Neves

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ABSTRACT

A defining feature of environmental psychology has been the attention to the individuals' relationships with their environments (Swim et al., 2009). Many children feel powerless and hopeless about influencing environmental issues (Ojala, 2015), thus it is important to build their sense of self-efficacy (belief that they can make a difference) and collective efficacy. The present study aims to explore psychometric properties and construct validity of the Ecological Identity Scale (EIS) (Walton & Jones, 2017) in a Portuguese sample of 526 individuals aged between 16 and 25 years old. This instrument is a succinct assessment measure of to what extent self and group ecological identity influence the likelihood of an individual to take (or not take) efforts to minimize the impact, they and others have on the environment. The Portuguese version (EIE) showed adequate reliability and the Confirmatory Factorial Analysis suggested the removal of 4 items, resulting in a 14 items scale. The lack of evidence for full scalar invariance across gender and age groups indicates that female and males (and adolescents and young adults) are not responding similarly to the items of the scale.

Suggestions are made regarding the importance of extending research and further validation of the scale to ensure its proper application and the need to correlate this construct with other variables.

Keywords: Centrality, differentiation, ecological identity, measurement, pro-environmental behavior, sameness, youth

Propriedades Psicométricas Da Versão Portuguesa Da Escala De Identidade Ecológica (EIE): Um Estudo Com Jovens

RESUMO

Uma característica definidora da psicologia ambiental tem sido a atenção às relações dos indivíduos com os seus ambientes (Swim et al., 2009). Muitas crianças sentem-se impotentes e sem esperança para influenciar as questões ambientais (Ojala, 2015), portanto, é importante construir o sentimento de autoeficácia (crença de que podem fazer a diferença) e eficácia coletiva nas mesmas. O presente estudo tem como objetivo explorar as propriedades psicométricas e a validade do construto da Escala de Identidade Ecológica (EIE) (Walton & Jones, 2017) numa amostra portuguesa de 526 indivíduos com idades entre os 16 e 25 anos. Este instrumento é uma medida de avaliação sucinta de até que ponto a identidade ecológica própria e de grupo influencia a probabilidade de um individuo fazer (ou não) esforços para minimizar o impacto que tem e outros/as têm sobre o meio ambiente. A versão em português apresentou confiabilidade adequada e a Análise Fatorial Confirmatória sugeriu a retirada de 4 itens, resultando numa escala de 14 itens. A falta de evidência de invariância escalar completa entre os grupos de género e idade indica que indivíduos do sexo feminino e masculino (e adolescentes e jovens adultos) não respondem de forma semelhante aos itens da escala.

Sugestões são feitas relativamente à importância de ampliar a pesquisa e validação adicional contínua da escala para garantir a sua aplicação adequada e a necessidade de correlacionar este construto com outras variáveis.

Palavras-chave: Centralidade, comportamento pró-ambiental, diferenciação, identidade ecológica, jovens, medição, semelhança

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ACRONYMS LIST

CFA – Confirmatory Factor Analysis

CFI – Comparative Fit Index

CNS – Connectedness to Nature Scale

EI – Ecological Identity

EIE – Portuguese Version of Ecological Identity Scale (Escala de Identidade Ecológica)

EIS – Ecological Identity Scale

INS – Inclusion of Nature in Self Scale

M – Mean

PEB – Pro-Environmental Behavior

PYD – Positive Youth Development

PYD/red – Portuguese Version of Measure of PYD

RMSEA – Root Mean Square Error of Approximation

SD – Standard Deviation

SDRS-5 – Socially Desirable Response Set- 5

TLI – Tucker Lewis Index

X2/df – Qui-Square with Degrees of Freedom

INTRODUCTION

Social scientists have a long history on conceptualizing and measuring the different facets of the self to research on public concern for the environment and its relation to behavior. Maloney and Ward (1973) gave the responsibility to psychologists to reexamine environmental problems in human rather than technological terms. Since the 1970s, many researchers have investigated relations between various predictor variables and measures of environmental concern, attitude, and behavior (Perrin & Benassi, 2009).

On this note, is relevant to understand that one's identities are composed of the self-views that emerge from the reflexive activity of self-categorization or identification in terms of membership in particular groups or roles (Stets & Burke, 2010). When studying the relationship between identity and the natural world, Clayton (2003) conceived the Environmental Identity Scale (EIS), understanding identity as "a way of organizing information about the self" and argued that natural environment has the potential to be a distinctively rich source of self-relevant beliefs that allow individuals to define themselves, which encompasses values, attitudes and behaviors. Other authors have tackled this issue and a manifold of instruments arose in order to measure self-environment relation. For instances, Mayer and Frantz (2004) proposed that their Connectedness to Nature Scale (CNS) provides a measure of people's emotional connection to nature, connectivity with nature (Dutcher et al., 2007), disposition to connect with nature (Brugger et al., *in press*), and Schultz's Inclusion of Nature in Self (INS) scale (Schultz et al., 2004).

The Concept of Ecological Identity

Owing to the diversified conceptualizations of connectedness to nature, according to Dunlap and McCright (2008), "one finds multiple, competing, and typically ambiguous meanings of environmental identity in the literature" making unclear what counts as an environmental identity. Moreover, Fishbein and Ajzen (2010) remark that measures of identity often lack construct validity for not addressing a person's identification with a social group or role, and instead measure attitudes, norms, or past behavior. Toward this end, Ecological Identity Scale (EIS) (Walton & Jones, 2014) was developed, as an attempt to overcome major methodological, conceptual and theoretical weaknesses within current conceptualizations of identity in relation to nature and the bio-physical environment as it has been discussed in both the environmental literature and the broader social psychology literature. It does so by developing a framework built upon a foundation that connects methodological, conceptual and theoretical facets of identity into a more integral model termed "Ecological Identity" (EI). Thus, our understanding of ecological identity lies on the definition which Walton (2014) states that ecological identity is "the extent

and ways by which an individual views him or herself as part of an integrated social and biophysical (i.e., ecological) system characterized by interconnected processes and relationships" (p.13). The EIS is composed by 18 items that integrates key features of both Identity Theory (Stets & Burke, 2010) and Social Identity Theory (Tajfel & Turner, 1979), positioning individuals within a structure of socioecological relations that reflect greater or lesser sameness, difference, and centrality (Walton & Jones, 2017). On this matter, it is important to underline that "existing measures of environmental identity are focused exclusively on identification with nature and like others, failing to acknowledge that identities are also a product of differentiation from unlike others" (Walton & Jones, 2017).

Taking this in consideration, it is expected that individuals with a strong internalized ecological identification engage in specific pro-environmental behaviors such as recycling, purchasing eco-friendly products, identifying with certain groups and social categories as well as differentiating themselves from various salient oppositional others. Furthermore, the internalization of a strong EI also involves prioritizing the relationships that are connected to environmental issues, roles, and group affiliations, occupying a more central position within the self-concept (Walton, 2014).

Although measuring environmental identity has been well documented, this is, to the best of our knowledge, only the second validation study of EIS in a different language from the original scale. The first validation used a sample of Turkish university students (Gezer & Ilhan, 2018). Thereafter the pertinence of this work lies on the potential to increase our understanding of the reason why some hold pro-environmental beliefs, attitudes, values, and worldviews, while others do not. Furthermore, by linking behavior directly to the self-concept via roles and group affiliations, EI has the potential to explain a wide array of behaviors and behavioral change across situations, including shifts in overall lifestyle toward more sustainable practices (Walton, 2014).

The Relevance of Pro-Environmental Behavior

Addressing climate change and other environmental crises requires an understanding of the processes that influence pro-environmental behavior (PEB). Stets and Biga (2003) found significant and unique effects of identity in relation to various pro-environmental behaviors (willingness to pay higher prices, making changes to everyday behavior, etc). Despite some differences in the conceptualization of nature connection, measures of this construct are similar in their attempt to capture the extent to which nature is self-defining (Mackay & Schmitt, 2019), due to its influence on attitudes, goals and behavior (Tajfel & Turner, 1979). Thus, a person with a sense of oneness with nature, may view threats to the natural world as more serious than people who do not feel connected (Schmitt et al., 2019), which may

compel attempts to mitigate those threats through PEB (Schmitt et al., 2018). Furthermore, failure to engage in a given pro-ecological behavior may be a function of contextual influences as opposed to a lack of personal motivation (Walton, 2014).

A Psychological Perspective on Climate Change

The science of global warming is entrenched. However, psychological and mental health impacts of climate events have been less well-researched. Most young people know about climate change and express negative feelings such as worry, fear, sadness, and a sense of powerlessness about its impact on their lives (Sanson et al., 2019; UNICEF UK, 2013). Many children feel powerless and hopeless about influencing environmental issues (Ojala, 2015), thus it is important to build their sense of self-efficacy (belief that they can make a difference) and collective efficacy. Conforming to the Australian Psychological Society (2018), a meaningful approach to develop young people's self-efficacy and resilience is encouraging and supporting their involvement in activities to both mitigate and adapt to climate change. Furthermore, research on resilience, agency and positive development (Hawkins et al., 2009) identifies some characteristics that will be most valuable for the next generation to adapt successfully, including to one of the most serious social problems – global climate change. On an individual level, they advocate emotional self-regulation, behavioral and attentional self-regulation to support persistence of efforts, values such as empathy and beliefs in social justice; on the matter of interpersonal skill and relationships it is suggested to develop negotiation and conflict-resolution skills and the capacity to cooperate and work with others; finally, related to civic engagement they emphasize volunteering and joining community groups.

A defining feature of environmental psychology has been the attention to the individuals' relationships with their environments (Swim et al., 2009). This field of psychology explicitly addresses the importance of the contexts (specifically physical environment) for determining behaviors, and this is important for environmental behaviors as well (Clayton & Brook, 2005).

AIM OF THE STUDY

The main purpose of this study was to validate the Ecological Identity Scale (Walton & Jones, 2017) to a Portuguese sample of youth. Furthermore, the intention was to evaluate if the EIS is an adequate instrument in measuring identity in relation to nature and the environment, for the Portuguese youth population. To that end, this study aimed to analyze its psychometric properties through reliability,

factorial structure (construct validity), and relations to other constructs. This instrument is a succinct assessment measure of to what extent self and group ecological identity influence the likelihood of an individual to take (or not take) efforts to minimize the impact, themselves and others have on the environment (Walton & Jones, 2017). Therefore, allowing the implementation of more environmentally responsible actions and policies.

The present research focuses on the importance of self-concepts associated with ecological identification in positive functioning. In this sense, as a test of convergent validity, it was investigated the associations between self and group ecological identity of the EIS, specifically in terms of place identity, social desirability, positive development and behaviors to mitigate the climate change. It was hypothesized that an ecological identity would be positively associated with place identity and positive development.

MATERIALS AND METHODS

Participants

Participants were 526 individuals (69.2 % female), aged between 16 and 25 years old (M=19.67, SD=2.54). Table 1 reports the percentages, means and standard deviations of the demographic characteristics analyzed in this study, being these gender, education status and age. In addition to these aspects, the social status was also assessed. Of a sample of 526 participants, 440 consider their standard of living to be average (83.7%) while 12% consider to be above average.

Table 1. Demographic characteristics of the participants: gender, education status, age

		Gender				Total (male & female)		Age	
		Male		Female					
		N	Percentage	N	Percentage	N	Percentage	Mean	SD
School Grade	Basic (7, 8 and 9)	19	3.6%	17	3.2%	36	6.8%	17.36	1.099
	Secondary (10, 11, 12)	86	16.3%	146	27.8%	232	44.1%	18.07	1.487
	University	56	10.6%	184	35.0%	240	45.6%	21.29	2.185
	Non-student/ Workers	1	0.2%	17	3.2%	18	3.4%	23.22	1.896
Total		162	30.8%	364	69.2%	526	100.0%	19.67	2.544

Instruments

Demographic questionnaire – all participants completed a brief questionnaire that includes items assessing age, gender, geographic context in which they live (regions of Portugal), if located in an urban or rural environment and whether they develop activities in nature.

Ecological Identity Scale (Walton and Jones, 2017; Escala de Identidade Ecológica, Portuguese translation) consists of 18 items for assessing the sameness (strong identification with other) feature of ecological identity, differentiation (strong dis-identification with a salient oppositional other or out-group) and the centrality of the identity (the relative importance or salience of EI in relation to other identities) by measuring its prominence, commitment and salience. Each of these factors has, respectively, 7, 5 and 6 items. The scale had shown high internal consistency (α=.91) (Walton and Jones, 2017). All of the items are scored on a 5-point Likert-type scale ranging from 1 (completely disagree) to 5 (completely agree). With high scores reflecting a stronger ecological identity.

Place Identity Scale (Schuman & Presser, 1981; research version translated by Freire & Teixeira, 2011) consists of four items. The answer is given based on a 5-point scale (1-5) in which 1 corresponds to completely disagree and 5 completely agree (average point 3, neither agree or disagree). The high values on the scale correspond to higher levels of place identity. The Cronbach's alpha of the original scale was .76.

Table 2. The Ecological Identity Scale (EIS) and Portuguese translated version (EIE)

	EIS (Walton & Jones, 2017)	EIE (Portuguese Items)
Sameness	I am someone who...	Sou alguém que...
	1. Is aware of and cares about my impact on the environment	1. Está ciente e se preocupa com o impacto que tem no ambiente
	2. Is strongly connected to nature and the environment	2. Está fortemente ligado à natureza e ao ambiente
	3. Is a protector/nurturer of wildlife and their habitats	3. É protetor/promotor da vida selvagem e dos seus habitats
	4. Others view as being an environmentalist	4. Outros vêem como sendo ambientalista
	5. Views myself as an environmentalist	5. Se vê a si próprio como ambientalista
	6. Is trying to be a better environmentalist	6. Está a tentar ser um ambientalista melhor
	I identify with people who...	Identifico-me com pessoas que...
	7. Make significant changes in their lifestyle for environmental reasons	7. Fazem mudanças significativas no seu estilo de vida por razões ambientais
Differentiation	8. Feel they have the right to consume as much as they want	8. Sentem que têm o direito de consumir tanto quanto querem

	9. Don't care about their environmental impacts	9. Não se importam com o seu impacto ambiental
	10. Doubt global warming is happening	10.Duvidam que o aquecimento global está a acontecer
	11. Doubt global warming is mostly caused by humans	11.Duvidam que o aquecimento global é maioritariamente causado por humanos
	I identify with...	Identifico-me com...
	12. Big business and corporations	12. Grandes empresas e corporações
Centrality	How likely are you to discuss wildlife, nature or environmental issues with each of the following people?	Quão provável é discutir assuntos da vida selvagem, natureza ou ambiente com cada uma das seguintes pessoas?
	13. Classmates or coworkers	13. Colegas de turma ou de trabalho
	14. My friends	14. Os meus amigos
	15. My family	15. A minha família
	16. How close are you to people who want to protect and preserve the environment?	16. Quão próximo é de pessoas que querem proteger e preservar o ambiente?
	17. How much of a role does protecting and preserving the environment play in your life?	17. Que importância têm na sua vida a proteção e preservação do ambiente?
	18. How large of a role do these activities or actions play in the ideal person you strive to be?	18. Que importância têm estas atividades ou ações na construção da pessoa que se esforça por ser?

The tendency to over-report pro-environmental behavior has been suggested as an important limitation of self-report measures of pro-environmental behavior. Evidence points to social desirability bias as a cause for this over-reporting (Kormos & Gifford, 2014). To address this issue and control what could be a nuisance variable in this study, the Portuguese version of SDRS-5 (Pechorro et al., 2016), Socially Desirable Response Set- 5 (Hays et al., 1989) will be used as a self-report measure in a short format consisting of 5 items that assess social desirability. The analysis of the internal consistency on the Portuguese scale revealed good values (α=.72). Each item is rated on a 5-point scale, from Totally true to Totally false. Higher scores indicate higher levels of social desirability.

The PYDp /red (Tomé et al., 2019) the Portuguese version of Measure of PYD (Lerner et al., 2005) consists of 30 items, equally divided into five subscales: character, care, connection, confidence and competence. The items are assessed on a Likert scale, through which the subjects specify the level of agreement with the way each statement is applied to them, having as an answer option four possibilities between 1 (Not Important) and 4 (Very Important), or similar options, always between 1 and 4, according to the adaptation of the answer to the question. The Portuguese scale had shown high internal consistency (Competence α= .79, Confidence α= .82, Connection α= .65, Character α= .71 and Caring/Compassion α= .73).

Procedures

Sampling and scaling procedures

Participants were recruited through social media platforms, such as Facebook, and Instagram, by means of convenience sampling. The research team assembled an online survey on Qualtrics composed by an informed consent and the questionnaires mentioned above, in order to assess the validity of the scale under study. This survey took about 15 minutes to be completed. Given it was administered more than one questionnaire to each participant, the questionnaires were administered using counterbalanced order. This design refers to exposing participants to different orders to ensure that such carryover and order effects fall equally on all conditions (Foley, 2004), leading to concerns about carryover effects and order effects.

A total of 832 individuals opened the survey. However, a great percentage of this sample represent dropouts of people who did not complete the survey fully, who did not give their informed consent to participate in this study, who were not Portuguese nor lived for at least 5 years in Portugal.

The present study was conducted under a master's project in psychology and was submitted and approved by the ethics committee of the School of Psychology of the University of Minho. All ethical and deontological research principles were followed during the collection of data (APA, 2010).

The original EIS measure (Walton and Jones, 2017) was first translated into Portuguese and then back translated by bilingual psychologists. Some expressions perchance slightly altered in the Portuguese version in order to obtain the same connotation as in the original version.

Statistical procedures

In order to characterize our sample in terms of ecological identity and positive functioning, it was generated descriptive statistics (i.e. means and standard deviations) for each ecological identity subscale (sameness, differentiation and centrality) and for place identity and social desirability variables.

To explore the psychometric properties of the EIS, reliability analysis for each ecological identity subscale were performed, using the Cronbach model of internal consistency that refers to the interrelatedness of a set of items (Gliem & Gliem 2003). These analyses were conducted using the software Statistical Package for the Social Sciences (SPSS Amos, v. 27.0).

Then, the construct validity of the EIS was examined, which tests the capacity of a scale to actually measure the construct that it proposes to measure (Westen & Rosenthal 2003). In this sense, it was performed a Confirmatory Factor Analysis (CFA) using SPSS Amos 27. The factorial analysis consists in

a set of methods conducted to examine how latent variables (constructs) influence the response on the observed variables (items) (DeCoster 1998). In addition, it allows to analyze whether the tested structure fits better with the observed data through adjustment indices and also allows the comparison of different factorial structure models. In this case, through CFA analysis it was examined the fit of the three-factor structure of the EIS version (Walton & Jones, 2017) for the total sample.

Furthermore, tests of model invariance were included to explore invariance across the different respondent subgroups, which is a required test when one intends to make valid and meaningful comparisons among groups (Milfont & Fischer, 2010). Configural, Metric and Scalar Invariance were tested.

In the present study, the following adjustment indices were used: ratio of the chi-square test with degrees of freedom (X2/df), Comparative Fit Index (CFI), Tucker Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). A good fit of this model is achieved with the ratio $\chi 2/df$ below 3.00, given the high sensitivity of the chi-square test ($\chi 2$) to the sample size (Jöreskog and Sörbom,1989), for the CFI and TLI indexes, values above 0.9 and values in the RMSEA near or below 0.6.

Concerning measurement invariance, regarding the chi-square difference test ($\Delta\chi 2$), non-significant differences between models indicate invariance at the level being tested, and also differences in CFI values of the models compared. Cheung and Rensvold (2002) suggest that changes of below or equal to .01 indicate invariance.

RESULTS

Descriptive Statistics

Table 3 shows the means and standard deviations for sameness, differentiation and centrality subscales of the EIS according to gender and school grade. The theoretical mean for the scale is 3 and all of the subscales' average scores by gender and school grade are above this value, with the exception for university and non-student/workers are well above the theoretical mean (4.16 and 4.10, respectively). With this, we can verify that they reported a strong disidentification with a salient oppositional other or out-group. There are no severe violations of normality, meaning all subscales are adequate for the subsequent factorial analysis.

Table 3. Descriptive statistics and reliability for EIS subscales

		Sameness (7 items)			Differentiation (5items)			Centrality (6 items)		
Demographic groups		Mean	SD	Alpha	Mean	SD	Alpha	Mean	SD	Alpha
Gender	Female	3.58	0.65		3.95	0.72		3.60	0.70	
	Male	3.31	0.80		3.58	0.92		3.28	0.83	
School Grade	Basic	3.27	0.83		3.13	0.89		3.27	0.85	
	Secondary	3.40	0.73		3.60	0.87		3.37	0.84	
	University	3.61	0.66		4.16	0.56		3.65	0.63	
	Non-student/ workers	3.57	0.69		4.10	0.57		3.69	0.75	
Subscale total score Mean		3.50	0.71	0.88	3.84	0.80	0.82	3.50	0.76	0.83

Table 4 presents means and standard deviations of place identity, social desirability and positive youth development across gender and school grades. According to item mean scores, males revealed higher social desirability levels than females, but not so different from each other. Concerning school grades different results exist among participants.

Table 4. Descriptive Statistics of Place Identity (PIS), Positive Youth Development (PYDp/red) and Social Desirability (SDRS) Scales

		Place Identity (4 items)				Positive Youth Development (30 items)				Social Desirability (5 items)			
Demographic groups		M	SD	Min.	Max.	M	SD	Min.	Max.	M	SD	Min.	Max.
Gender	Female	3.06	0.84	1.00	5.00	3.64	0.45	2.12	5.00	2.61	0.61	1.00	5.00
	Male	3.07	0.81	1.00	5.00	3.62	0.51	1.12	5.00	2.75	0.55	1.20	4.20
School Grade	Basic	3.21	0.80	1.50	4.75	3.55	0.44	2.38	4.59	2.70	0.62	1.60	4.00
	Secondary	2.95	0.87	1.00	5.00	3.56	0.53	1.12	5.00	2.67	0.61	1.00	5.00
	University	3.12	0.80	1.00	5.00	3.69	0.40	2.21	4.56	2.64	0.58	1.20	4.20
	Non-student/ workers	3.50	0.64	2.75	4.50	3.94	0.24	3.65	4.38	2.50	0.47	1.40	3.00
Subscale total score		3.06	0.83	1.00	5.00	3.63	0.47	1.12	5.00	2.65	0.59	1.12	5.00

Note. M=mean; SD=standard deviation. PIS items Likert scale (1-5); SDRS items Likert scale (1-5); PYDp/red items Likert scale (1-4)

Reliability

Concerning Cronbach alpha analysis, results of the total sample showed an alpha of .873 for the EI total scale. When we take into consideration the subscales, Cronbach coefficient was higher for the centrality subscale than sameness and differentiation (Table 3).

Construct Validity

We performed a Confirmatory Factorial Analysis (CFA), using SPSS Amos 27, to examine the fit of the three-factor structure of the EIS (Walton & Jones, 2017) for the total sample.

A three-factor structure model was first tested, without any constraints in the 18-item version of the EIS. This model revealed a poor fit to the data, $\chi 2(132) = 685.392$, $p = .000$, $\chi 2/df = 5.192$, CFI = .878, TLI = .858, RMSEA = .089. The results of this first model suggested the elimination of the items 12, 13, 14, and 15, since their squared multiple correlations coefficients were less than .30 (Hair et al., 2010). We then tested a three-factor structure model, in the remaining 14 items. This second model has demonstrated a better adjustment than the first one, however with some indices still revealing a poor fit to the data, $\chi 2(74) = 381.399$, $p = .000$, $\chi 2/df = 5.154$, CFI = .919, TLI = .900, RMSEA = .089. Thus, in a third model, we tested the same three-factor structure, but added four constraints specifying that measurement errors of item 4 and item 5, item 8 and item 9, item 2 and item 6, and item 5 and item 6 are correlated in order to achieve an acceptable model fit (See Figure 1). Results of this third model demonstrated a good fit to the data for all analyzed fit indices, $\chi 2(70) = 206.413$, $p = .000$, $\chi 2/df = 2.949$, CFI = .964, TLI = .953, RMSEA = .061, comparable to the Turkish version of the EIS (Gezer & Ilhan, 2018).

Measurement Invariance

We performed multiple-group CFA analysis to test invariance across different groups (gender and age).

Before running the multi-group analysis, the three-factor structure for the EIS was fitted separately in both samples (female and male; adolescents and young adults). Regarding gender groups, the proposed factorial structure adequately fitted the data for the female, $\chi 2(50) = 159.579$, $p = .000$, $\chi 2/df = 2.280$, CFI = .961, TLI = .950, RMSEA = .059 and for the male, $\chi 2(70) = 142.204$, $p = .000$, $\chi 2/df = 2.031$, CFI = .947, TLI = .930, RMSEA = .080 samples considered separately. For these models, all parameter estimates were statistically significant, standardized regression weights were above .40 and squared multiple correlations coefficients were above .30.

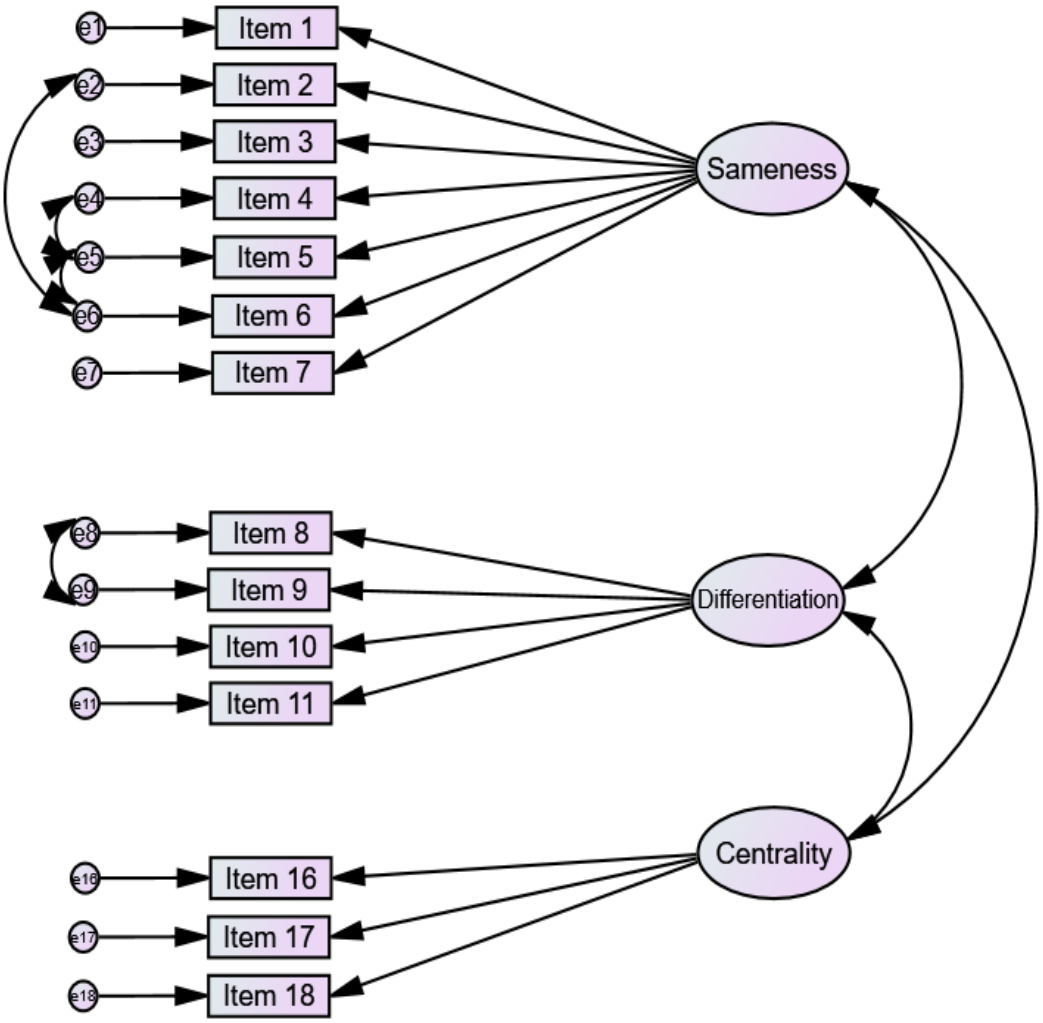
The multi-group baseline model has evidenced support for configural invariance between the female and male samples. Results showed an acceptable fit to the data, $\chi 2/df = 2.157$, CFI = .956, TLI = .943, RMSEA = .047. These results support the presence of a three-factor model across gender groups. Consequently, the configural model was used as the baseline against which the next model was compared

to determine metric invariance. Chi-square difference was non-significant between the configural and the metric model ($\Delta\chi2$= 9.557, p=.571) and no changes on CFI were found (ΔCFI=0.000) between these two models. These results demonstrate support for the factor loading invariance (metric invariance). Regarding scalar invariance, which reports to the invariance in factor loadings and in intercepts, the results showed a significant chi-square difference between metric and scalar models ($\Delta\chi2$= 70.302, p=.000). This means that support for the full scalar invariance between the female and the male samples was not found. In addition, the cutoff criteria for CFI was not achieved (ΔCFI=0.015), which confirms the lack of invariance at this level. This result suggests that, as we introduced additional constraints of item intercepts in the model, the model fit substantially decreased, although still presenting an acceptable fit, $\chi2/df$ = 2.314, CFI = .941, TLI = .935, RMSEA = .050. In order to investigate the source of invariance, we analyzed single-item invariance. We found that items 1, 6, 7, 8, 9, and 11 were non-invariant, since significant chi-square differences between models were obtained, although the respective changes in CFI did not exceeded the criterion value .01. All these results seem to present evidence of partial measurement invariance across gender, since invariance was not found at the scalar level. Although some authors (Milfont & Fischer, 2010) assert that cross-group comparisons can be made with partial measurement invariance, we found that more than a half of the items did not evidenced scalar invariance, which compromises mean comparisons between groups.

Regarding age groups, the factorial structure adequately fitted the data for the adolescents, $\chi2(70)$ = 127.711, p = .000, $\chi2/df$ = 1.824, CFI = .968, TLI = .959, RMSEA = .060 and for the young adults, $\chi2(70)$ = 137.936, p = .000, $\chi2/df$ = 1.971, CFI = .964, TLI = .953, RMSEA = .057 samples considered separately. For both groups, all parameter estimates were statistically significant, standardized regression weights were above .40 and squared multiple correlations coefficients were above .30.

We found support for configural invariance between the adolescents and young adults samples, with results showing an acceptable fit to the data, $\chi2/df$ = 1.898, CFI = .966, TLI = .956, RMSEA = .041. This shows that the factorial structure of the model holds when comparing the two age groups. However, the invariance is no longer supported when factor loadings are constrained to be equal across groups in the metric model. In this sense, metric invariance is not supported as important differences were found in the factor loadings across the two samples ($\Delta\chi2$= 29.873, p=.002), although the differences in CFI were under the criterion value of .01 (ΔCFI=0.005). Results also did not support for scalar invariance since the chi-square difference was significant between the metric and the scalar model ($\Delta\chi2$= 75.408, p=.000) and changes on CFI were above .01 (ΔCFI=0.017) between the two models. Again, full scalar invariance was not found when comparing the adolescents and the young adults' samples.

Figure 1. Three-factor model without items 12,13,14 and 15



Convergent Validity

Convergent validity was also assessed by examining Pearson correlations between EIS subscales, Place Identity, Positive Youth Development and Social Desirability in overall sample. As shown in table 5, we have some significant correlations. The total EIS score is positively related to positive youth development (r=.289, p<.01) and negatively related to place identity and social desirability (r=-.013 and r=-.219, p<.01, respectively), and there is not a significant correlation with place identity. At the subscale level both sameness and centrality correlate positively to place identity and positive youth development. Negative correlations are observed between differentiation and all of the studied scales. Place identity only correlates significantly with differentiation (-.134, p<.01).

Table 5. Pearson correlations between EIS scale and subscales, Place Identity, Positive Youth Development and Social Desirability

Scale	Place Identity	Positive Youth Development	Social Desirability
Total EIS	-.013	.289**	-.219**
Sameness	.024	.329**	-.209**
Differentiation	-.134**	-.035	-.072
Centrality	.075	.346	-.189**

Note. **p<.01.

DISCUSSION

The main purpose of this study was to evaluate if the Portuguese version of the Ecological Identity Scale (Walton & Jones, 2017) is an adequate instrument in measuring how self and group ecological identity influence the likelihood of an individual to take (or not take) efforts to minimize the impact, they and others have on the environment, for the Portuguese youth population. To that end, this study aimed to analyze its psychometric properties through reliability, factorial structure (construct validity), and relations to other constructs.

Internal consistency values for the total scale and subscales were evaluated by Cronbach's alpha and all of the values were above the recommended cut-off, revealing good reliability of the instrument.

After the first model suggested the elimination of the items 12, 13, 14, and 15, fourteen items remained, and more tests were made. Finally, the results of the CFA of the third model we tested with some specific constraints demonstrated a good fit to the data for all analyzed fit indices comparable to the Turkish version of the EIS (Gezer & Ilhan, 2018).

Overall results confirm that the factorial structure of EIS is invariant across gender and age groups (configural invariance), which means that female/males, and adolescents/young adults exhibit a similar three-dimensional structure of ecological identity. In addition, the confirmation of metric invariance across gender indicates that no significant differences were found in female and male responses to the items (factor loadings), which suggests that the underlying construct that is being assessed has the same meaning to female and male participants. The lack of evidence for full scalar invariance across gender and age groups suggest that item intercepts are not equivalent across these groups. This indicates that female and males (and adolescents and young adults) are not responding similarly to the items of the scale. Consequently, mean comparisons across these groups could not be considered valid.

Furthermore, significant results were found across our sample when testing the relationships between the EIS subscales and measures of other constructs such as social desirability, positive functioning and place identity.

Nonetheless, this research has some limitations that must be pointed out. One of the limitations consists of the sample used for the survey. Even though the primary goal of this study was to validate the scale, we were always attentive to the diversity of our sample. Science is interested in the generalization of findings. Given that the survey was shared through social media platforms, in convenient groups, the people answering were mainly from university and high school. This limited the inference from youth still in their early age, since we could not go to schools in person, as well as from people outside of the university. Hence in future studies we suggest applying the EIS scale in more diverse populations and even other ages. Researchers should study other variables related to culture, politics and economical background across different racial and ethnic groups (Pearson et al., 2016), analyzing the important role of ecological identity, since cross-cultural samples may show specific patterns on the identification with the environment and others.

Another limitation of this study relies on the length of the survey. Hoerger (2010) states that participants who voluntarily discontinued typically choose to do so immediately after reading the consent form or after answering a rather small subset of questions, rather than fatigue or unanticipated survey content. Although we had many cases like this with only few seconds on the online page, we also had participants dropping out in the middle of our survey. There is also evidence that the amount of voluntary dropout occurs during the first dozen items completed (Hoerger, 2010). With this, we were expecting to recruit more than 600 participants in order to have at least 500 participants in our sample allowing power to our survey.

CONCLUSION

In sum, this study proved the EIS to be a valid and reliable measure for the assessment of ecological identity. The EIS composed by 14 items can be used in the Portuguese population. However future research should continue our findings and capture the abundance and intricacy of ecological identity across different ages paying attention to new factors or variables that can explain causal relations between ecological identity and taking action in pro-environmental behaviors. Furthermore, more studies should be conducted comparing ecological identity with other measures related with identity, nature and the environment. Also, in a perspective of a longitudinal study it would be interesting to evaluate how the

ecological identity can change on individuals participating in pro-environmental activities, as a measure of personal development in the environmental area of study.

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ANEXO 1. Aprovação da Comissão de Ética para a Investigação em Ciências Sociais e Humanas

Universidade do Minho

Conselho de Ética

Comissão de Ética para a Investigação em Ciências Sociais e Humanas

Identificação do documento: CEICSH 090/2020

Relator: Marlene Alexandra Veloso Matos

Título do projeto: *Atitudes e comportamentos de adolescentes no contexto das alterações climáticas: relação com dimensões de funcionamento ótimo e enquadramento na vida diária*

Equipa de Investigação: Teresa Raquel das Neves Pereira, aluna de Doutoramento em Psicologia Aplicada; Escola de Psicologia, Universidade do Minho; Marta Inês Ribeiro Neves, aluna de Mestrado Integrado em Psicologia, Escola de Psicologia, Universidade do Minho; Professora Doutora Teresa Freire (Supervisora e orientadora científica), Professora Auxiliar e Investigadora Coordenadora da Unidade de Investigação de Desenvolvimento Positivo e Funcionamento Ótimo da Escola de Psicologia, Universidade do Minho

PARECER

A Comissão de Ética para a Investigação em Ciências Sociais e Humanas (CEICSH) analisou o processo relativo ao projeto de investigação acima identificado, intitulado *Atitudes e comportamentos de adolescentes no contexto das alterações climáticas: relação com dimensões de funcionamento ótimo e enquadramento na vida diária.*

Os documentos apresentados revelam que o projeto obedece aos requisitos exigidos para as boas práticas na investigação com humanos, em conformidade com as normas nacionais e internacionais que regulam a investigação em Ciências Sociais e Humanas.

Face ao exposto, a Comissão de Ética para a Investigação em Ciências Sociais e Humanas (CEICSH) nada tem a opor à realização do projeto, emitindo o seu parecer favorável, que foi aprovado por unanimidade pelos seus membros.

Braga, 28 de setembro de 2020.

O Presidente da CEICSH

(Acílio Estanqueiro Rocha)

Anexo: Formulário de identificação e caracterização do projeto