Research article

Environmental attitudes among students at the University of Madeira, Portugal

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Abstract

In the face of the present ecological crisis, improving environmental attitudes is crucial to encourage a cultural transformation that can rebalance the equilibrium between human activities and the planet. The New Ecological Paradigm (NEP) scale was used to measure the environmental attitudes of students at the University of Madeira, Portugal, and to unveil the challenges that need to be addressed at the local and global level through an environmental education effort. This article presents two dimensions of the NEP scale: the high levels of the ecocentric world view and the rejection of anthropocentrism. It also points out some inconsistencies in the NEP scale. For example, the belief in human ingenuity to properly manage natural resources and keep the planet habitable should be seen as supporting our ability to move towards sustainability, and not the opposite. However, the lack of concern about human population growth requires this to be brought to the centre of the environmental education effort.

Introduction

Since 1960, the world human population has grown from 3 billion to more than 8 billion people, increasing resource consumption and pollution emission far beyond the Earth's biocapacity (World Bank, 2018). Socio-economic systems, together with technological advances, have led to an anthropocentric world view in which consumerism and materialism have become the backbone of our existence, reducing our commitment to environmental sustainability (Brown and Kasser, 2005; Hurst et al., 2013; Richins and Dawson, 1992; Sheldon and McGregor, 2000). In this scenario, humanity, with an ecological footprint bigger than the planet (Earth Overshoot Day, 2019), is causing an environmental crisis that threatens biodiversity as well as its own existence. Global warming and climate change, deforestation, biodiversity loss, microplastics, air pollution and water scarcity are just some of the environmental disequilibria caused by human activities (Singh and Singh, 2017). To overcome this crisis, cultural and technological changes are needed in the way in which we explore and consume natural resources, but this will not be achieved unless we change, among other things, our values, beliefs and world views (Fielding and Hornsey, 2016; Tam and Chan, 2017). Despite pro-environmental beliefs and attitudes being far from the most relevant factors that influence specific pro-environmental behaviours, they are essential to support and promote the environmental culture that is needed to overcome the present ecological crisis (Gardner and Stern, 1996; Spínola, 2021a, 2021b). There are multiple definitions and understandings of the concept of environmental attitude in the literature. Eagly and Chaiken (1993) define attitude as a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour. Milfont and Duckitt (2010) specify that if we are considering environmental attitude, this entity is the natural environment. For Yin (1999), environmental attitude is people's orientation towards environmentally related objects, and is structured as three types of environmental orientation: cognitive, affective and evaluative. However, Albarracín et al. (2005) argue that beliefs, affect and behaviour interact with attitude but are not part of it, and that the concept of attitude should be reserved for evaluative tendencies. The dimensionality of environmental attitudes is still under debate, but several authors defend a structure with two higher order dimensions (Blaikie, 1992; Milbrath, 1984; Milfont and Duckitt, 2004). Wiseman and Bogner (2003) categorise this two-dimensional model as a biocentric dimension, which reflects conservation and protection of the environment (preservation), and an anthropocentric dimension, which reflects the utilisation of natural resources (utilisation).

Since the 1980s, studies in several populations and groups have been evaluating the prevalence of a pro-environmental orientation using the New Ecological Paradigm (NEP) scale (Dunlap and Van Liere, 1978; Dunlap et al., 2002). The NEP scale was first developed by Dunlap and Van Liere in 1978, in a 12-item version to measure public concern for environmental quality. Following the emergence of an ecological world view, Dunlap et al. (2002) revised the NEP scale to a 15-item version, to better discriminate between those who agree with the NEP, the ecocentric view and those who remain committed to the Dominant Social Paradigm (DSP), the anthropocentric view (Kilbourne et al., 2002; Lundmark, 2007). In fact, López-Bonilla and López-Bonilla (2016), in their dimensionality evaluation, conclude that the NEP scale is bidirectional: one side points to an ecocentric view; the other to an anthropocentric view. The ecocentric view considers nature as a common good, with intrinsic value that should be protected, while the anthropocentric view assumes that humans have the capacity and legitimacy to use nature and control the adverse effects caused. Additionally, the revised NEP scale, with 15 statements to be classified with a degree of agreement from the respondent using a five-point Likert scale (from *strongly agree* to *strongly disagree*), aims to cover five aspects of an ecological world view: limits to growth; anti-anthropocentrism; fragility of nature's balance; rejection of exemptionalism; and possibility of an ecological crisis (Amburgey and Thoman, 2012).

Although with less consistency in developing countries (Ogunbode, 2013; Rosa et al., 2021), environmental attitude measured by the NEP scale has shown a general tendency to move away from an anthropocentric view and closer to ecocentrism (Atav et al., 2015; Corraliza et al., 2013; Ntanos et al., 2019; Spínola, 2015). However, studies have shown that environmental attitude across a population tends

not to be consistent, and several categorical and demographic variables, such as age, gender, income, residence and levels of parental education, are predictors of its level (Erdoğan, 2009). Despite its wide variance, higher levels of environmental attitude tend to be found among younger people (Bogner and Wiseman, 1997), women (Gifford et al., 1982), urban residents (Bogner and Wiseman, 1997), people with a higher socioeconomic status (Lyons and Breakwell, 1994) and people whose parents had a higher level of education (Shin et al., 2005).

In Portugal, a country integrated within European geography and culture, and within the developed world, the evaluation of environmental attitudes through the NEP scale has been carried out for different demographics and in different contexts. A study of 35 fifth-grade students living in Aveiro, a coastal city in the north of Portugal, showed the predominance of an ecocentric world view (Soares, 2015). Similar results were obtained with users of urban green spaces in Porto, especially with young adults (Vidal et al., 2022), residents in Lisbon (Castro and Lima, 2001) and Faro (Denis and Pereira, 2014), and with the general Portuguese population (Schmidt et al., 2016). Other measuring tools, such as the Environmental Attitudes Inventory, also suggest the prevalence of ecocentric values among the Portuguese population (Domingues and Gonçalves, 2020). In Madeira, a Portuguese autonomous region with 250,000 inhabitants located in the Atlantic Ocean, 900 kilometres southwest of mainland Portugal, Freitas (2007) found that the pro-NEP attitude (43.3 per cent) was much more dominant than the pro-DSP attitude (19.6 per cent) among the general population, particularly with younger individuals, those living in urban areas and those with a higher education and socio-economic status. Similarly, Spínola (2015) found that, in Madeira, a pro-NEP attitude is already present in 60.2 per cent of ninth-grade students (16.5 per cent pro-DSP and 23.4 per cent neutral), and particularly with females, urban residents, students with a higher socio-economic status, those with higher grades in the natural sciences and those participating in environmental activities (Spínola, 2016).

As young citizens can exert a strong influence on societies, and as about half of the young people in Portugal attend higher education institutions, it is important to engage university students in the challenge of sustainability. Therefore, higher education institutions in Portugal have recently started to green their campuses and embrace environmental education projects (Madeira et al., 2019). The University of Madeira is no exception. With about 3,500 students, it needs to determine the prevalence and characteristics of the ecocentric world view of its students. Thus, this article aims to evaluate and characterise the environmental attitude among these students as well as reveal the challenges that need to be addressed more effectively through the environmental education effort. This article also contributes to providing a first picture of the ecocentric world view of Portuguese students in higher education.

Methodology

At the time that data were collected for the present study, no ethical body existed at the University of Madeira. Consent for the development of the study was therefore tacitly given by the rectorship. The author followed ethical guidelines as outlined by the British Educational Research Association and the General Data Protection Regulations.

To study student environmental attitudes, a link to access an online and anonymous questionnaire was emailed to all 3,500 students of the University of Madeira. The measuring tool used was the revised NEP scale, which is widely used and validated in the measure of pro-environmental orientation (Dunlap et al., 2002; Kostova et al., 2011; Ogunbode, 2013; Ogunjinmi et al., 2012; Shoukry et al., 2012; Trobe and Acott, 2000; Watne et al., 2012). The NEP scale consists of 15 statements to which respondents answer using a five-point Likert scale of concordance: *strongly disagree*; *mildly disagree*; *unsure*; *mildly agree*; and *strongly agree*. The 15 statements make it possible to evaluate the level of concordance with the NEP (ecocentric view) and with the DSP (anthropocentric view), as well as with each one of the five group items that compose the NEP scale: limits to growth; anti-anthropocentrism; fragility of nature's balance; rejection of exemptionalism; and possibility of an ecological crisis. As well as the NEP scale, the first section of the questionnaire collected personal information, such as gender, age, place of residence and course level at the university.

In total, 220 answers were collected, mostly from female (70 per cent), undergraduate (73.6 per cent) and master's (20.9 per cent) students. As such, the total number of respondents allows for a 95 per cent

confidence interval and a margin of error below 7 per cent, which is enough to minimise sampling bias (Brace et al., 2016).

Before proceeding to analysis using the IBM SPSS statistics software (Version 27), data collected in the survey were normalised as if all statements were environmentally positive (negative statements were reversed) and converted to numeral scores ranging from 1 to 5 (1 – *strongly disagree*; 2 – *mildly disagree*; 3 – *unsure*; 4 – *mildly agree*; and 5 – *strongly agree*). There was no blank response in the collected data. First, reliability (through Cronbach's alpha) and validity (confirmed by positive and significant Pearson correlations between each pair of items) were evaluated, followed by a set of descriptive statistics. Data appropriateness for factor analysis was tested through the Kaiser–Meyer–Olkin measure of sampling adequacy (Kaiser, 1974) and Bartlett's (1954) test of sphericity, which provides a measurement of the statistical probability that the correlation matrix has significant correlations among some of its components. After the Kaiser–Meyer–Olkin measure of sampling adequacy index was found to be higher than 0.6 and the Bartlett's test of sphericity was found to be significant, an exploratory factor analysis was run using a principal component analysis with varimax rotation and Kaiser normalisation to confirm the structure of the scale. The NEP items that aggregate to a two-dimensional structure scale were used to calculate the cumulative percentage of agreement and disagreement with ecocentric and anthropocentric world views, considering the total and the different demographic variables. Additionally, following approaches in other studies (for example, Ntanos et al., 2019), the pro-NEP (ecocentric) orientation prevalence was calculated using 4 and 5 scores (*mildly* and *strongly agree*) and the DSP (anthropocentric) attitude using 1 and 2 scores, considering all 15 items, for total samples, by gender, place of residence, course level and course year, for each item and for each of the five group items mentioned above.

Logistic and multiple regression analyses were conducted to search for predictors of environmental attitude levels. Pearson correlations (*r*) and their one-tailed significance were calculated between NEP items and sociodemographic variables to search for predictive relationships. As a guideline, a correlation coefficient interval of $r = 0.10$ to 0.29 represents a small positive relationship, $r = 0.30$ to 0.49 represents a medium positive relationship and $r = 0.50$ to 1.0 represents a large positive relationship (Pallant, 2007).

Results

The Cronbach's alpha score was 0.74 for the entire NEP and was always higher than 0.7 for each item of the NEP scale. Validity of the instrument was confirmed for all of the 15 NEP items, since they show positive and significant Pearson correlations of ($p < 0.01$, where *p* is the value of statistical significance). From the 220 answers collected, 154 were from female students (70 per cent) and 66 were from male students (30 per cent), with an average age of 25 years, ranging from 18 to 60. The participants were mainly undergraduate (73.6 per cent) and master's (20.9 per cent) students, but some were studying at technical (2.7 per cent), doctoral (1.8 per cent) or other (0.9 per cent) course levels, reflecting the real distribution of students by the different levels of education at the university. The respondents were distributed between the different course years in a similar prevalence for the degrees, with about one-third in each year, and they were mainly residents in urban areas (75 per cent). The data were found to be appropriate for factor analysis, since the Kaiser–Meyer–Olkin measure of sampling adequacy was 0.76 and Bartlett's test of sphericity was significant ($p < 0.001$). Exploratory factor analysis yielded three factors with eigenvalues higher than 1, accounting for 46 per cent of the variation in the data (Table 1).

A clear structure arises from the distribution of the three factor loadings on the 15 NEP items, with factor 1 associated with ecocentric items and factor 2 with anthropocentric items. Only two statements (Q6 and Q7) are aggregated in a third factor. However, Q7, an item classified as ecocentric, also shows an overlapping membership to factor 1 of 0.39. Q6 item, of anthropocentric classification, shows the particularity of being a negative value (−0.78), which indicates an inverse impact on the factor. As expected, removing Q6 and Q7 items from the analysis, only two factors with eigenvalues higher than 1 are extracted, explaining 41 per cent of the data variance (data not shown). Since data shows that the NEP scale best fits a two-dimensional structure, the following analyses were carried out considering ecocentric versus anthropocentric world views subscales.

Table 1. Factor loadings for NEP items obtained from principal component analysis with varimax rotation

NEP items		Factor loadings			World view classification
		1*	2**	3***	
Q15	If things continue on their present course, we will soon experience a major ecological catastrophe.	0.75			Ecocentric
Q5	Humans are severely abusing the environment.	0.76			Ecocentric
Q3	When humans interfere with nature, it often produces disastrous consequences.	0.64			Ecocentric
Q9	Despite our special abilities, humans are still subject to the laws of nature.	0.63			Ecocentric
Q11	The Earth is like a spaceship with very limited room and resources.	0.57			Ecocentric
Q1	We are approaching the limit of the number of people the Earth can support.	0.53			Ecocentric
Q13	The balance of nature is very delicate and easily upset.	0.51			Ecocentric
Q10	The so-called 'ecological crisis' facing humankind has been greatly exaggerated.	0.30****	0.43		Anthropocentric
Q14	Humans will eventually learn enough about how nature works to be able to control it.		0.73		Anthropocentric
Q8	The balance of nature is strong enough to cope with the impacts of modern industrial nations.		0.61		Anthropocentric
Q12	Humans were meant to rule over the rest of nature.		0.60		Anthropocentric
Q2	Humans have the right to modify the natural environment to suit their needs.		0.58		Anthropocentric
Q4	Human ingenuity will ensure that we do not make the Earth unliveable.		0.58		Anthropocentric
Q6	The Earth has plenty of natural resources if we just learn how to develop them.			−0.78	Anthropocentric
Q7	Plants and animals have as much right as humans to exist.	0.39****		0.66	Ecocentric
	Variance accounted by each factor	25%	12%	9%	

Notes: * eigenvalues: 3.75; ** eigenvalues: 1.81; *** eigenvalues: 1.30; **** Cross-loading (overlapping at least 0.2).

Table 2 shows the cumulative percentage of agreement and disagreement with ecocentric and anthropocentric world views in regard to the two different subscales confirmed by factor analysis: ecocentric world view (Q1, Q3, Q5, Q9, Q11, Q13 and Q15 items) and anthropocentric world view (Q2, Q4, Q8, Q10, Q12 and Q14 items). It clearly shows support for the ecocentric world view and rejection of the anthropocentric world view. The variations between gender, age, place of residence, course level and course year do not show statistically significant differences for the same world view type (ecocentric or anthropocentric). However, male students' agreement with an ecocentric world view (76.2 per cent) is statistically significantly higher than their disagreement with an anthropocentric world view (62 per cent) ($p = 0.044$), which also happens for total data ($p = 0.009$), younger students ($p = 0.014$), urban residents ($p = 0.016$), undergraduate students ($p = 0.015$) and third-year undergraduate students ($p = 0.028$), but not for female ($p = 0.22$), older ($p = 0.13$), rural ($p = 0.14$), master's students ($p = 0.18$) or first- ($p = 0.089$) and second-year undergraduate students ($p = 0.32$). It is also worth noting that the neutral position percentage for the anthropocentric world view (22.1 per cent) is higher than that for the ecocentric world view (12.1 per cent) ($p = 0.003$).

Table 2. Cumulative percentage of agreement and disagreement for the two NEP subscales confirmed by factor analysis

| | | World views | | | | | |
| | | Ecocentric | | | Anthropocentric | | |
Variables		Agree	Disagree	Neutral	Agree	Disagree	Neutral
Gender	Female (n = 154)	74.8%	9.9%	10.9%	8%	71%	21%
	Male (n = 66)	76.2%	9.1%	14.7%	13%	62%	25%
	Significance	*p* = 0.43	*p* = 0.44	*p* = 0.21	*p* = 0.11	*p* = 0.11	*p* = 0.22
Age	18–22 years (n = 125)	80.4%	8.3%	11.3%	8.6%	68.7%	22.7%
	>23 years (n = 95)	75.5%	11.5%	13%	10.5%	68.1%	21.4%
	Significance	*p* = 0.19	*p* = 0.19	*p* = 0.37	*p* = 0.33	*p* = 0.48	*p* = 0.41
Place of residence	Urban (n = 165)	78.8%	8.5%	12.7%	8.3%	68.7%	23%
	Rural (n = 55)	76.6%	13.3%	10.1%	13%	67.6%	19.4%
	Significance	*p* = 0.36	*p* = 0.20	*p* = 0.36	*p* = 0.20	*p* = 0.43	*p* = 0.32
Course level	Degree (n = 162)	79.4%	9.6%	11%	9.4%	69%	21.6%
	Master's (n = 46)	73.9%	9.6%	16.5%	9.8%	65.6%	24.6%
	Significance	*p* = 0.21	*p* = 1	*p* = 0.15	*p* = 0.38	*p* = 0.31	*p* = 0.37
Course year (degrees)	1st year (n = 57)	83.2%*	5.3%*	11.5%	7%*	72.5%	20.5%
	2nd year (n = 51)	77%*	13.5%*	9.5%*	7.6%	73.2%*	19.2%*
	3rd year (n = 54)	77.5%	10.6%	11.9%*	13.6%*	61.4%*	25%*
	Significance	*p* = 0.22	*p* = 0.07	*p* = 0.41	*p* = 0.15	*p* = 0.11	*p* = 0.22
Total (n = 220)		78%	9.7%	12.1%	9.5%	68.4%	22.1%

Note: * Statistically significant differences ($p < 0.05$).

Despite not being shown in our data, Amburgey and Thoman (2012) considered that the NEP scale covers five facets of an ecological world view: limits to growth; anti-anthropocentrism; the fragility of nature's balance; the rejection of exemptionalism; and the possibility of an ecological crisis. The seven NEP items that constitute the ecocentric subscale, confirmed by factor analysis in the present study, are distributed in the following facets: limits to growth (Q1 and Q11), the fragility of nature's balance (Q3 and Q13), the rejection of exemptionalism (Q9) and the possibility of an ecological crisis (Q5 and Q15). The six NEP items from the anthropocentric subscale are from the following facets: anti-anthropocentrism (Q2 and Q12), the fragility of nature's balance (Q8), the rejection of exemptionalism (Q4 and Q14) and the possibility of an ecological crisis (Q10). As expected, despite an intermingled distribution, facets of limits to growth, the fragility of nature's balance and the possibility of an ecological crisis are predominant in the ecocentric subscale, and the facets of anti-anthropocentrism and the rejection of exemptionalism are

predominant in the anthropocentric subscale. Another pattern that stands out is the direction in which statements are constructed in each of the two subscales, with the ecocentric items having a pro-NEP orientation and the anthropocentric items reversed for pro-DSP.

The present data considers these five facets of an ecological world view as a reference for comparison, as was done in other studies (Erdoğan, 2009; Freitas, 2007; Ntanos et al., 2019). For each of the five facets, pro-NEP orientation prevalence was calculated from 4 and 5 scores (*mildly* and *strongly agree*) and the DSP attitude from 1 and 2 scores. The overall score reaches 72.3 per cent of agreement with a pro-NEP attitude, 11.9 per cent pro-DSP and 15.8 per cent neutral (Table 3). Pro-NEP attitude prevalence is not only significantly higher than pro-DSP ($p < 0.001$) in total, but also for each one of the five NEP group items. The lower levels of pro-NEP attitude were found for limits to growth (50.8 per cent) and the rejection of exemptionalism (63.3 per cent) (Table 3). Nevertheless, the NEP Q6 statement collected a majority of pro-DSP attitudes (50.4 per cent) (Table 3). Despite the pro-NEP attitude's higher prevalence, Q1 and Q4 statements show a relatively high prevalence of pro-DSP attitudes (24.6 per cent and 24.1 per cent, respectively).

Table 3. Cumulative percentages of pro-NEP, pro-DSP and neutral attitudes for students by each NEP scale statement, group item and total

NEP facets and items		Attitude (%)		
		Pro-NEP	Pro-DSP	Neutral
Limits to growth		**50.8**	**28.6**	**20.6**
Q1	We are approaching the limit of the number of people the Earth can support.	48.2	24.6	27.3
Q6	The Earth has plenty of natural resources if we just learn how to develop them.	33.6	50.4	15.9
Q11	The Earth is like a spaceship with very limited room and resources.	70.5	10.9	18.6
Anti-anthropocentrism		**84.6**	**5.1**	**10.3**
Q2	Humans have the right to modify the natural environment to suit their needs.	77.7	5.9	16.4
Q7	Plants and animals have as much right as humans to exist.	92.3	4.1	3.6
Q12	Humans were meant to rule over the rest of nature.	83.7	5.4	10.9
Fragility of nature's balance		**81.4**	**8.3**	**10.3**
Q3	When humans interfere with nature, it often produces disastrous consequences.	86.4	8.2	5.5
Q8	The balance of nature is strong enough to cope with the impacts of modern industrial nations.	77.2	6.8	15.9
Q13	The balance of nature is very delicate and easily upset.	80.5	10	9.5
Rejection of exemptionalism		**63.3**	**11.5**	**25.2**
Q4	Human ingenuity will ensure that we do not make the earth unliveable.	37.3	24.1	38.6
Q9	Despite our special abilities, humans are still subject to the laws of nature.	89.5	3.2	7.3
Q14	Humans will eventually learn enough about how nature works to be able to control it.	63.2	7.3	29.5
Possibility of an ecological crisis		**81.4**	**6**	**12.6**
Q5	Humans are severely abusing the environment.	89.1	4.6	6.4
Q10	The so-called 'ecological crisis' facing humankind has been greatly exaggerated.	71.4	7.2	21.4
Q15	If things continue on their present course, we will soon experience a major ecological catastrophe.	83.6	6.4	10
Total		**72.3**	**11.9**	**15.8**

As for ecocentric and anthropocentric subscales analyses, no significant differences were found between sociodemographic variables when considering pro-NEP and pro-DSP percentages of concordance (data not shown). However, despite urban residents not showing a significantly higher pro-NEP attitude in general, the concordance with the facet of fragility of nature's balance is statistically significantly higher (urban, 82.6 per cent; rural, 71.5 per cent; $p = 0.045$). At the level of NEP scale, two items showed a

significantly higher pro-NEP prevalence for urban residents: Q3 (urban, 89.1 per cent; rural, 78.2 per cent; p = 0.036) and Q8 (urban, 77 per cent; rural, 60 per cent; p = 0.011). There was only one item for rural residents: Q12 (urban, 81.2 per cent; rural, 90.9 per cent; p = 0.025).

Q4 and Q8 items showed significantly small negative Pearson correlations with gender (r = −0.157, p = 0.01 and r = −0.124, p = 0.034, respectively), with the female gender showing higher pro-NEP. A significantly small positive correlation was found not only for Q3 (r = 0.147, p = 0.014), but also for Q2 (r = 0.127, p = 0.03) and Q14 (r = 0.119, p = 0.039). All of them predicted better NEP scores for urban residents. Additionally, significantly small negative correlations for the course year variable were found with Q1, Q5, Q7, Q10, Q11 and Q15 NEP items (r < −0.15, p < 0.05), with better pro-NEP scores for first-year undergraduate students. For sociodemographic data, linear regression analysis only confirmed that attending the first course year of an undergraduate degree is a significant predictor of a higher pro-NEP world view (B = 0.177, p = 0.008, where B is the regression beta coefficient and is the degree of change in the outcome variable for every 1-unit of change in the predictor variable), but it explained only 3.2 per cent of the variation (R = 0.179, R^2 = 0.032, where R is the correlation coefficient between the independent variable [predictor] and the dependent variable [outcome], and R^2 is a statistical measure that represents the proportion of the variance for a dependent variable that is explained by an independent variable in a regression model). Gender, age, place of residence and course level fail to be predictors of NEP scores. Bivariate regressions performed between each NEP item and the mean NEP scores were able to select four items that could explain 71.2 per cent of total variance (R = 0.844, R^2 = 0.712): Q5 (B = 0.347, p < 0.001; R = 0.679, R^2 = 0.461); Q15 (B = 0.327, p < 0.001; R = 0.642, R^2 = 0.412); Q3 (B = 0.256, p < 0.001; R = 0.562, R^2 = 0.315); and Q14 (B = 0.238, p < 0.001; R = 0.483, R^2 = 0.233). These four NEP statements could be used as a starting point to explore the construction of a smaller and simpler scale in the future.

Discussion

The application of the NEP scale to a sample of Portuguese students proves to be an effective research tool that evaluates the prevalence and structure of ecocentric/pro-NEP and anthropocentric/pro-DSP attitudes. As previously found for other population groups in Portugal (Castro and Lima, 2001; Schmidt et al., 2016), the ecocentric/pro-NEP attitude is highly dominant among students from the University of Madeira. Furthermore, if compared with results from previous studies in Madeira, students from the university show a significantly higher prevalence of pro-NEP attitudes than the general population (43.3 per cent, p < 0.001) (Freitas, 2007) and ninth-grade students (60.2 per cent, p < 0.001) (Spínola, 2015). Although the time gap between the present study and the earlier ones may partly explain these differences, it may also be due to the sample showing higher levels of education and being predominantly comprised of female (70 per cent) and urban residents (75 per cent), as Bogner and Wiseman (1997), Gifford et al. (1982) and Shin et al. (2005) have shown. Additionally, supporting this argument, female and urban resident students from the University of Madeira show some significant positive Pearson correlation with their agreement with several pro-NEP statements. Age also shows a partial congruence with previous studies (Bogner and Wiseman, 1997), with younger students showing a higher pro-NEP attitude, but not significantly, which seems to be stronger than the level of education, since first-year students, who tend to be younger, show a better performance, albeit not significantly.

Nonetheless, the core analysis of data for the present study was substantially different from the approach followed in earlier studies. In fact, besides the classical pro-NEP and pro-DSP analysis, and after confirming by factor analysis, the NEP scale was subdivided in two: one to assess the ecocentric world view (seven items) and the other the anthropocentric world view (six items). This two-dimensional model corroborates Wiseman and Bogner's (2003) and López-Bonilla and López-Bonilla's (2016) findings, which considered a biocentric/ecocentric/preservation dimension and an anthropocentric/utilisation dimension. Although no significant differences were found for demographic variables in the same world view, the ecocentric support was significantly stronger than the anthropocentric rejection, not only in general but also for younger, urban, undergraduate and third-year students. Together with the fact that the neutral position for the anthropocentric world view is significantly higher than for the ecocentric world view, it seems that support for an ecocentric world view is not always accomplished through an anthropocentric rejection. Therefore, a separate evaluation of the ecocentric and the anthropocentric world views through different subscales could provide a better understanding of their structure and development. This article has found that, in general, about 10 per cent of those who agree with an

ecocentric world view do not reject anthropocentrism. This conclusion is impossible to reach when analysing data through the standard pro-NEP and pro-DSP classification of the responses to each of the 15 NEP statements.

Considering the five group facets that constitute the NEP scale and their respective statements, it is evident that there is an uneven distribution of the attitude's prevalence, with a higher concordance with anti-anthropocentrism, the fragility of nature's balance and the possibility of an ecological crisis, and a much lower concordance for limits to growth and the rejection of exemptionalism (Table 1). For limits to growth and rejection of exemptionalism, the low levels of discordance with only two statements explain most of the tendency to diverge from a pro-NEP/ecocentric attitude: Q6 (only 33.6 per cent pro-NEP) and Q4 (only 37.3 per cent pro-NEP). These lower pro-NEP/ecocentric results for Q4 and Q6, together with Q1 (48.2 per cent pro-NEP), show that despite realising that humans do not have the right to subdue a fragile nature that is about to crumble, many of the students interviewed still believe in the human ability to better manage natural resources and to keep growing the world population without making the Earth unliveable. This world view is also found in other studies (Atav et al., 2015; Castro and Lima, 2001; Denis and Pereira, 2014; Ntanos et al., 2019; Spínola, 2015; Vidal et al., 2022). This view could result from an illusory optimism or ecological denial and therefore could be an attitude that needs to be changed in order to mobilise people into action, notably by curbing population growth for example. However, it can also be seen as an attitude of hope in human ability to overcome the present ecological crisis, which is important if we want to keep people engaged in sustainability. Indeed, Maria Ojala (2012, 2017) identifies two kinds of hope: a constructive hope that helps engagement in positive environmental behaviours; and a hope based on denying the environmental crisis, which, like the lack of hope, makes engagement difficult.

Since a large majority of the students interviewed showed no signs of denying the seriousness of the ecological crisis, nor the fragility of nature's balance, the relatively high levels of concordance with humans' ability to rebalance the planet appears to be a constructive hope and, therefore, a positive contribution to increasing engagement with sustainability. Aligning with authors who argue some aspects of the NEP scale (Hawcroft and Milfont, 2010; Ogunbode, 2013), we must be careful when analysing the results collected with this scale.

Regardless of the theoretical background that supports the NEP scale, the recognition of our negative influence on nature while maintaining an attitude of hope in our ability to reverse our influence does not have to be incongruent belief. The environmental education that has been developing since the 1970s aims to improve knowledge and change attitudes and behaviour in order to create an equilibrium between human activities and the availability of the natural resources and, with that, to keep the Earth habitable. If this is not achieved by changing the way we manage and use natural resources, or if we do not believe in human skills to achieve this and rebalance the planet's ecosystem, then it will be difficult to identify a sliver of hope that can drive our positive actions. Indeed, in their analysis of the NEP scale, López-Bonilla and López-Bonilla (2016) argue that the two ecocentric and anthropocentric paradigms should be maintained, while Wiseman and Bogner (2003) argued that there is no reason to suppose that someone with a low ecocentric score would score high on anthropocentrism. The approach followed in the present study, which considered the different subscales for ecocentric worldview and for anthropocentric, is a contribution to incorporating López-Bonilla and López-Bonilla's (2016) and Wiseman and Bogner's (2003) findings about the NEP scale. Future approaches should analyse the compatibility between anthropocentrism and ecocentrism to understand it better and, if needed and justified, propose changes to the NEP scale, or at least to Q4 and Q6 items more specifically. For future analysis, the four items that explain more than 70 per cent of total variance (Q3, Q5, Q14 and Q15) should also be taken into consideration, particularly if a smaller and simpler scale is needed. Realising that present and past studies are barely concerned with world population growth, any approach should bring the topic of sustainability challenge to the forefront of environmental education. With 8 billion people on Earth, there is clear evidence that overpopulation has a tremendously negative impact on the planet. In fact, when analysing the world's ecological footprint from the last 50 years, it shows that the entire human population is already 75 per cent bigger than the planet itself (Earth Overshoot Day, 2019). We can see that, on average, the footprint per capita has kept a relatively constant value (below three global hectares) (Global Footprint Network, n.d.). Furthermore, if we compare the growth of the human population with the increase in the global ecological footprint since the 1960s, we can conclude that, for both cases, the growth rate is about the same (more than 250 per cent), revealing a direct correlation. This clearly means that the increase in humanity's ecological footprint is closely dependent on population growth.

Noting the surprising stability of the average ecological footprint per capita, despite an increase in the availability of consumer goods and access to services, and notably the increasing comfort and quality of life of populations (Roser, 2014), this can only mean that we have been able to substantially increase the efficiency of the use of resources and the adoption of cleaner technologies and production processes. Unfortunately, this impressive improvement in technological efficiency is not enough to compensate for the increase in consumption resulting from overpopulation. Therefore, keeping faith in human ingenuity, despite being an attitude of accepting human exemptionalism, is needed to overcome the ecological crisis, and we need to reconsider if it is incompatible with a pro-NEP attitude. However, population growth is a matter that environmental education must not keep ignoring, otherwise human ingenuity, no matter how good it is, will fail to rebalance human activities within the limits of the planet, as was seen in the United Nations Sustainable Development Goals for 2030, which do not address the issue of population growth. In general, this theme has been silenced in the approach to sustainability, but the elephant is right in the centre of the room; we cannot continue to ignore it.

Conclusion

The present study presents a picture of the environmental attitude profile of University of Madeira students, showing a good performance and confirming previous findings about European populations. This characterisation is not only useful in assisting the approach to environmental education at the University of Madeira, it identifies the topics that most need to be examined and also contributes to the international context. The work recognises a previously found tendency to stick to the belief that humans, due to their ingenuity, are able to find ways of making natural resources plentiful for their own needs. Instead of fighting back against this belief, we should embrace it to fuel our hope and boost action towards sustainability. Considering its central influence on the human global ecological footprint, the low level of concern about the effects of population growth should be a central matter for the environmental education effort.

Additionally, the evaluation of the data through different subscales, ecocentric and anthropocentric, allows us to confirm that agreeing with an ecocentric world view does not always mean that an anthropocentric world view is rejected.   This inconsistency between ecocentric agreement and anthropocentric rejection is significant in general, but also for younger, urban, undergraduate and third-year students.   Future studies with higher sample numbers could help to understand this ambivalence and the influence that demographic variables could have upon it.

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Declarations and conflicts of interest

Research ethics statement

At the time that data were collected for the present study, no ethical body existed at the University of Madeira. Consent for the development of the study was therefore tacitly given by the rectorship at the University and the author followed ethical guidelines as outlined by the British Educational Research Association and the General Data Protection Regulations.

Consent for publication statement

Not applicable to this article.

Conflicts of interest statement

The author declares no conflicts of interest with this work. All efforts to sufficiently anonymise the author during peer review of this article have been made. The author declares no further conflicts with this article.

References

Albarracín, D., Zanna, M.P., Johnson, B.T. and Kumkale, G.T. (2005) 'Attitudes: Introduction and scope'. In D. Albarracín, B.T. Johnson and M.P. Zanna (eds), *The Handbook of Attitudes*. Mahwah, NJ: Lawrence Erlbaum, 3–19.

Amburgey, J.W. and Thoman, D.B. (2012) 'Dimensionality of the new ecological paradigm: Issues of factor structure and measurement'. *Environment and Behavior*, 44 (2), 235–56. [CrossRef]

Atav, E., Altunoğlu, B.D. and Sönmez, S. (2015) 'The determination of the environmental attitudes of secondary education students'. *Procedia – Social and Behavioral Sciences*, 174, 1391–6. [CrossRef]

Bartlett, M.S. (1954) 'A note on the multiplying factors for various chi square approximations'. *Journal of the Royal Statistical Society*, 16, 296–98. [CrossRef]

Blaikie, N.W.H. (1992) 'The nature and origins of ecological world views: An Australian study'. *Social Science Quarterly*, 73, 144–65.

Bogner, F.X. and Wiseman, M. (1997) 'Environmental perception of urban and rural pupils'. *Journal of Environmental Psychology*, 17 (1), 111–22. [CrossRef]

Brace, N., Kemp, R. and Snelgar, R. (2016). *SPSS for Psychologists*. 6th ed. Basingstoke: Palgrave Macmillan Education.

Brown, K.W. and Kasser, T. (2005) 'Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle'. *Social Indicators Research*, 74, 349–68. [CrossRef]

Castro, P. and Lima, M.L. (2001) 'Old and new ideas about the environment and science: An exploratory study'. *Environment and Behavior*, 33 (3), 400–23. [CrossRef]

Corraliza, J., Collado, S. and Bethelmy, L. (2013) 'Spanish version of the New Ecological Paradigm scale for children'. *The Spanish Journal of Psychology*, 16, E27. [CrossRef]

Denis, H.D. and Pereira, L.N. (2014) 'Measuring the level of endorsement of the New Environmental Paradigm: A transnational study'. *Dos Algarves: Tourism, hospitality & management journal*, 23, 4–26.

Domingues, R.B. and Gonçalves, G. (2020) 'Assessing environmental attitudes in Portugal using a new short version of the Environmental Attitudes Inventory'. *Current Psychology*, 39, 629–39. [CrossRef]

Dunlap, R.E. and Van Liere, K.D. (1978) 'The New Environmental Paradigm: A proposed measuring instrument and preliminary results'. *The Journal of Environmental Education*, 9 (4), 10–19. [CrossRef]

Dunlap, R.E., Van Liere, K.D., Mertig, A.G. and Jones, R.E. (2002) 'New trends in measuring environmental attitudes: Measuring endorsement of the new ecological paradigm: A revised NEP scale'. *Journal of Social Issues*, 56 (3), 425–42. [CrossRef]

Eagly, A.H. and Chaiken, S. (1993). *The Psychology of Attitudes*. Orlando, FL: Harcourt Brace Jovanovich.

Earth Overshoot Day. (2019) 'Earth Overshoot Day 2019 is July 29, the earliest ever'. 26 June. Accessed 16 April 2023. https://www.overshootday.org/newsroom/press-release-june-2019-english/.

Erdoğan, M. (2009) 'Fifth-grade students' environmental literacy and the factors affecting students' environmentally responsible behaviors'. PhD thesis, Middle East Technical University, Turkey. Accessed 16 April 2023. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.633.7397&rep=rep1&type=pdf.

Fielding, K.S. and Hornsey, M.J. (2016) 'A social identity analysis of climate change and environmental attitudes and behaviors: Insights and opportunities'. *Frontiers in Psychology*, 7, 121. [CrossRef] [PubMed]

Freitas, A. (2007) 'Desenvolvimento e mudança paradigmática na Madeira: Atitudes sociais sobre ambiente'. *Sociologia, Problemas e Práticas*, 54, 101–25.

Gardner, G.T. and Stern, P.C. (1996). *Environmental Problems and Human Behavior*. Boston: Allyn and Bacon.

Gifford, R., Hay, R. and Boris, K. (1982) 'Individual differences in environmental attitudes'. *The Journal of Environmental Education*, 14 (2), 19–23. [CrossRef]

Global Footprint Network (n.d.) 'Country trends'. Accessed 16 April 2023. https://data.footprintnetwork.org/#/countryTrends?cn=5001&type=BCpc,EFCpc.

Hawcroft, L.J. and Milfont, T.L. (2010) 'The use (and abuse) of the New Environmental Paradigm scale over the last 30 years: A meta-analysis'. *Journal of Environmental Psychology*, 30 (2), 143–58. [CrossRef]

Hurst, M., Dittmar, H., Bond, R. and Kasser, T. (2013) 'The relationship between materialistic values and environmental attitudes and behaviors: A meta-analysis'. *Journal of Environmental Psychology*, 36, 257–69. [CrossRef]

Kaiser, H. (1974) 'An index of factorial simplicity'. *Psychometrika*, 39 (1), 31–6. [CrossRef]

Kilbourne, W.E., Beckmann, S.C. and Thelen, E. (2002) 'The role of the dominant social paradigm in environmental attitudes: A multinational examination'. *Journal of Business Research*, 55 (3), 193–204. [CrossRef]

Kostova, Z., Vladimirova, E. and Radoynovska, B. (2011) 'The environmental concern of ninth-grade students from a secondary professional school'. *Bulgarian Journal of Science and Education Policy (B JSEP)*, 5 (1), 178–218.

López-Bonilla, L.M. and López-Bonilla, J.M. (2016) 'From the New Environmental Paradigm to the brief ecological paradigm: A revised scale in golf tourism'. *Anatolia*, 27 (2), 227–36. [CrossRef]

Lundmark, C. (2007) 'The new ecological paradigm revisited: Anchoring the NEP scale in environmental ethics'. *Environmental Education Research*, 13 (3), 329–47. [CrossRef]

Lyons, E. and Breakwell, G.M. (1994) 'Factors predicting environmental concern and indifference in 13-to 16-year-olds'. *Environment and Behavior*, 26 (2), 223–38. [CrossRef]

Madeira, A.C., Freitas, A.C., Marques, A.T., Veiga da Costa, C.A., Dias, J.M., Pereira, M.F., Rego, P.C., Mendes, S. and Gaspar, R.T., eds. (2019) 'Desenvolvimento sustentável: Instituições de ensino superior como agentes de mudança' [Sustainable development: Higher education institutions as agents of change]. In *Livro de Resumos – 1ª Conferência Campus Sustentável*. Porto: Universidade do Porto – Faculdade de Engenharia, 181.

Milbrath, L.W. (1984). *Environmentalists: Vanguard for a new society*. Albany: SUNY Press.

Milfont, T.L. and Duckitt, J. (2004) 'The structure of environmental attitudes: A first- and second-order confirmatory factor analysis'. *Journal of Environmental Psychology*, 24 (3), 289–303. [CrossRef]

Milfont, T.L. and Duckitt, J. (2010) 'The environmental attitudes inventory: A valid and reliable measure to assess the structure of environmental attitudes'. *Journal of Environmental Psychology*, 30 (1), 80–94. [CrossRef]

Ntanos, S., Kyriakopoulos, G., Skordoulis, M., Chalikias, M. and Arabatzis, G. (2019) 'An application of the New Environmental Paradigm (NEP) scale in a Greek context'. *Energies*, 12 (2), 239. [CrossRef]

Ogunbode, C.A. (2013) 'The NEP scale: Measuring ecological attitudes/worldviews in an African context'. *Environment Development and Sustainability*, 15, 1477–94. [CrossRef]

Ogunjinmi, A.A., Onadeko, S.A. and Adewumi, A.A. (2012) 'An empirical study of the effects of personal factors on environmental attitudes of local communities around Nigeria's protected areas'. *The Journal of Transdisciplinary Environmental Studies*, 11 (1), 40–53, Accessed 19 April 2023. https://journal-tes.ruc.dk/wp-content/uploads/2021/05/no-6-Ogunjinmi.pdf.

Ojala, M. (2012) 'Hope and climate change: The importance of hope for environmental engagement among young people'. *Environmental Education Research*, 18 (5), 625–42. [CrossRef]

Ojala, M. (2017) 'Hope and anticipation in education for a sustainable future'. *Futures*, 94, 76–84. [CrossRef]

Pallant, J. (2007). *SPSS Survival Manual: A step by step guide to data analysis SPSS for Windows*. 3rd ed. New York: Open University Press.

Richins, M.L. and Dawson, S. (1992) 'A consumer values orientation for materialism and its measurement: Scale development and validation'. *Journal of Consumer Research*, 19 (3), 303–16. [CrossRef]

Rosa, C.D., Collado, S. and Profice, C.C. (2021) 'Measuring Brazilians' environmental attitudes: A systematic review and empirical analysis of the NEP scale'. *Current Psychology*, 40, 1298–309. [CrossRef]

Roser, M. (2014) 'Human Development Index (HDI)'. *Our World in Data*. Accessed 16 April 2023. https://ourworldindata.org/human-development-index.

Schmidt, L., Truninger, M., Guerra, J. and Prista, P. (2016). *Primeiro grande inquérito sobre sustentabilidade – Relatório Final.* [First major sustainability survey – Final report]. Lisbon: ICS. Accessed 16 April 2023. http://hdl.handle.net/10451/24819.

Sheldon, K.M. and McGregor, H. (2000) 'Extrinsic value orientation and "the tragedy of the commons"'. *Journal of Personality*, 68 (2), 383–411. [CrossRef] [PubMed]

Shin, D., Chu, H., Lee, E., Ko, H., Lee, M., Kang, K., Min, B. and Park, J. (2005) 'An assessment of Korean students' environmental literacy'. *Journal of Korean Earth Science Society*, 26 (4), 358–64.

Shoukry, S.H., Saad, S.G., Eltemsahi, A.M. and Abolfotouh, M.A. (2012) 'Awareness, attitude, and concerns of workers and stakeholders of an environmental organization toward the environment'. *SAGE Open*, 2 (4), 1–10.

Singh, R.L. and Singh, P.K. (2017) 'Global environmental problems'. In R. Singh (ed.), *Principles and Applications of Environmental Biotechnology for a Sustainable Future: Applied environmental science and engineering for a sustainable future*. Singapore: Springer, 13–41.

Soares, I.M.M. (2015) 'Validação e implementação do New Ecological Paradigm a alunos do 5.º ano do 2.º Ciclo do Ensino Básico' [Validation and implementation of the New Ecological Paradigm for fifth-grade students in high school]. MA thesis, University of Aveiro. Accessed 16 April 2023. https://ria.ua.pt/bitstream/10773/16647/1/Tese.pdf.

Spínola, H. (2015) 'Environmental literacy in 9th grade students from Madeira Island (Portugal)'. *The Online Journal of New Horizons in Education*, 5 (4), 28–36.

Spínola, H. (2016) 'Environmental literacy in Madeira Island (Portugal): The influence of demographic variables'. *International Electronic Journal of Environmental Education*, 6 (2), 92–107.

Spínola, H. (2021a) 'Environmental culture and education: A new conceptual framework'. *Creative Education*, 12 (5), 983–98. [CrossRef]

Spínola, H. (2021b) 'Towards environmental culture'. In S.A. Kiray and E. Tomevska-Ilievska (eds), *Current Studies in Educational Disciplines*. Konya: ISRES Publishing, 61–76. Accessed 18 April 2023. https://www.isres.org/towards-environmental-culture-239-s.html.

Tam, K.P. and Chan, H.W. (2017) 'Environmental concern has a weaker association with pro-environmental behavior in some societies than others: A cross-cultural psychology perspective'. *Journal of Environmental Psychology*, 53, 213–23. [CrossRef]

Trobe, H.L. and Acott, T.G. (2000) 'A modified NEP/DSP Environmental Attitudes Scale'. *The Journal of Environmental Education*, 32 (1), 12–20. [CrossRef]

Vidal, D.G., Dias, R.C., Seixas, P.C., Dinis, M.A.P., Fernandes, C.O., Barros, N. and Maia, R.L. (2022) 'Measuring environmental concern of urban green spaces' users (UGSU) through the application of the New Ecological Paradigm Scale (NEPS): Evidence from a southern European city'. In W. Leal Filho, D.G. Vidal, M.A.P. Dinis and R.C. Dias (eds), *Sustainable Policies and Practices in Energy, Environment and Health Research*. World Sustainability Series. Cham: Springer, 21–37. [CrossRef]

Watne, T., Brennan, L., Binney, W. and Parker, L. (2012) 'The use of the NEP scale as a measure of environmental attitudes'. In J. Cadogan and M. Winchester (eds), *Proceedings of the Australian and New Zealand Marketing Academy Conference – ANZMAC 2012, Adelaide, Australia, 3–5 December*. Adelaide: Australian and New Zealand Marketing Academy (ANZMAC), 1–6.

Wiseman, M. and Bogner, F.X. (2003) 'A higher-order model of ecological values and its relationship to personality'. *Personality and Individual Differences*, 34 (5), 783–94. [CrossRef]

World Bank. (2018) 'A changing world population'. October 8 Accessed 7 June 2022. https://datatopics.worldbank.org/world-development-indicators/stories/a-changing-world-population.html.

Yin, J. (1999) 'Elite opinion and media diffusion: Exploring environmental attitudes'. *The Harvard International Journal of Press Politics*, 4 (3), 62–86. [CrossRef]