

ENVIRONMENTAL BEHAVIOR: A COMPARATIVE STUDY BETWEEN BRAZILIAN AND PORTUGUESE STUDENTS

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Introduction

University students have increasing access to more diversified and different types of media, which favors the access to environmental content and information (MORIGI and KREBS, 2012; SILVEIRA and CRUZ, 2012). There is also a greater presence of environmental related subjects in undergraduate courses, either by the insertion of environmental information in more traditional classes or by the offer of more specific courses (MINTZ and TAL, 2014; REMINGTON-DOUCETTE et al., 2013; GROSS, 2013). Besides contributing to handling problems like waste generation and more efficient use of water and energy, projects developed in educational institutions also play an important didactic role with students by showing them how to deal with real environmental problems (CHANG, 2013; BARTH, 2013). The existence of environmental information systems, with easier access to technical topics and comprising general interest, also helps this situation (CÔRTEZ, 2013).

Despite the greater availability of environmental information in several media, the insertion of related contents, the offer of specific courses or the development of environmental projects in universities, we do not witness the development of a conscience regarding environmental questions, which would be reflected in the behavior of university

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students on this same topic (HARTMANN and APAOLAZA-IBÁÑEZ, 2012; LEVINE and STRUBE, 2012; MARKOWITZ *et al.*, 2012).

The present study assessed how the environmental behavior of university is structured, trying to analyze the similarities and differences between Brazilian and Portuguese students. A survey was conducted using research tools developed by Côrtes and Moretti (2013), applied to 1035 students. A specific bibliography was used to design the methodological actions (GERRING, 2012; CRESWELL, 2009), and the development of this research was initiated by a revision of the literature, as follows.

Literature Revision

For a better selection of the texts, the literature revision was divided in “beliefs, concerns, attitudes and environmental behaviors” and “multicultural and comparative studies”. For the first issue the search was focused on works that could justified the use of the chosen research tool and could help on the analyses and interpretation of the results. For the second issue the choice was for studies that could be used for comparative purposes, during the process of presentation and discussion of the results.

Beliefs, Concerns, Attitudes and Environmental Behaviors

The environmental behavior stands as a construct resulting from the hierarchic, but not necessarily linear, acting of beliefs, concerns and attitudes that people take every day (FRANZEN and VOGL, 2013; WHITMARSH, 2009). The belief is established from the assumption that something might occur, based on a rational argumentation. This is what differentiates belief from faith since the last is not reason based (JURIN and FORTNER, 2002). Although beliefs precede concerns, a belief is not always manifested with high intensity (MOYANO-DÍAZ, CORNEJO and GALLARDO, 2011). The feeling that something might happen does not imply the existence of a level of urgency or, consequently, a high level of concern (BEST, 2010; TAKÁCS-SÁNTA, 2007; GARCÍA-MIRA, REAL and ROMAY, 2005).

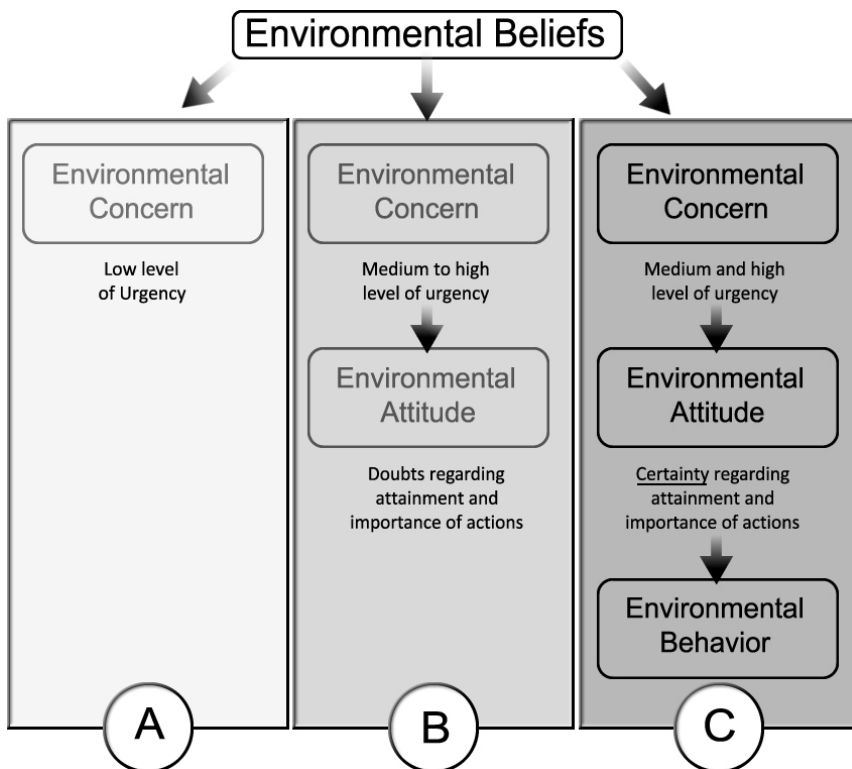
A person can believe that “*we are approaching the maximum number of people that Earth can support*” (Annex A, Assertive 1) without making it an immediate concern. The same person can claim that a possible overpopulation will not affect him since it will not happen within his lifespan. On the other hand, someone might believe that another environmental event can rise immediate concern, being reason for real uneasiness. Therefore, there are factors that can catalyze beliefs, turning them into concerns. This view has motivated several studies, since the works of forerunners like Maloney and Ward (1973), Dunlap and van Liere (1978) and Weigel and Weigel (1978).

After the 1970's, this issue was analyzed from different perspectives, with researchers trying to verify what could influence the environmental concerns. There are analysis of the political options (OLLI, GRENSTAD and WOLLEBAEK, 2001) and the role of personal values (POORTINGA, STEG and VLEK, 2004). Environmental concerns were also studied under a religious perspective (HUNTER and TONEY, 2005) as well

as multicultural analyses (DUROY, 2008). There are more recent studies which see how the concerns influence the reduction in energy consumption (OHLER and BILLGER, 2014), in citizenship development (JAGERS, MARINSSON and MATTI, 2014), in carbon emissions (HUDDART KENNEDY, KRAHN and KROGMAN, 2015), and its repercussions in pro-environmental behavior (RHEAD, ELLIOT and UPHAM, 2015).

Although a concern can be an inducer of environmental behavior, this relationship is not linear. The intention of acting occurs when there is a plausible level of certainty of its feasibility, importance and necessity. Before the effective environmental action, there is the development of a proactive environmental attitude that works as a precursor. It can be defined as a psychological disposition, an evaluative concept that is established between a positive evaluation (concern with a specific topic or problem) and a specific action (RHEAD, ELLIOT and UPHAM, 2015; LARSON *et al.*, 2015). Figure 1 summarizes that relationship, reminding that consideration must be given to the possible interference of available information, social or economic questions or an intimate forum decision that can abbreviate or elongate the process.

Figure 1. Induction to environmental behavior.



A: There is a light concern, caused by environmental beliefs

B: There is a more permanent concern, which leads to the creation of an environmental attitude

C: The certainty of the attainment or importance of the actions shapes the environmental behavior

Source: prepared by the authors.

Once a pro-environmental behavior is set, another point that deserves attention refers to the motivations of people. Amérigo *et al.* (2007) and Hansla, Gamble, Julisson and Gärling (2008) mention that the environmental motivations can be classified in three different groups: *i) selfish approach*: people who highlight the consequences of the problems and the environmental deterioration to themselves, damaging their own health or reducing their quality of life; *ii) socio- altruistic approach*: consider the consequences of the environmental degradation to human beings in general and *iii) biospheric approach*: highlight the consequences of the environmental damages to animals, plants and ecosystems. Amérigo *et al.* (2007) remember that it is possible to meet the selfish approach and socio-altruistic focus on an anthropocentric vision, and people as being the main reference. In contrast to the anthropocentrism, there is an eco-centric view that regards humans and the environment with equal weight in the relationship. This is the approach taken as reference in works produced over the last few years, as for example, Onur, Sahin and Tekkaya (2012), Soyuz (2012), Silva (2014) and Rhead, Elliot and Upham (2015).

The scale, as proposed by Cortes and Moretti (2013), used to collect data for the present study, was designed in order to evaluate different dimensions of the environmental behavior, making it possible to check how it is structured and how it is manifested (Annex A). This scale starts with the evaluation of the environmental beliefs of the respondents using some assertions of the NEP Scale (New Environmental Paradigm) from Dunlap and van Liere (1978), including the verification of the compliance of the respondents to the Human Exemptionalism Paradigm (HEP). Although it was conceived in the 1970's, the NEP scale has been used as a reference in the development of recent studies (LI and LANG, 2015; PUTRAWAN, 2015, REYES, 2015; KOVÁCS *et al.*, 2014). After the evaluation of beliefs, the research tool continues checking the environmental concerns and attitudes, outlining how the environmental behavior is established.

The scale also evaluates the consumption with environmental characteristics or appeal regarded as a point of convergence between the actions of the so-called *green marketing* and beliefs, environmental concerns and attitudes of people. Sustainable consumption is the confluence between the need or desire to consume certain products or services with environmental concerns, undergoing the influence of the media and social networks as Östman (2014) evaluates, the environmental commitment level of consumers in the visions of Magnier and Schoormans (2015) and Worsley, Wang and Burton (2015).

Comparative and Multicultural Studies

Studies have been developed through the analysis of the environmental behavior in different countries, allowing the researchers to check how beliefs, concerns, attitudes and environmental behaviors are manifested in different cultures. A study from Bechtel, Corral-Verdugo and Pinheiro (1999) compared American, Brazilian and Mexican students. It was found that, while American students conceive the development and the preservation of nature as extreme poles of the world, Brazilians take a more holistic view and they do not have a separation between nature and economic growth. Mexicans, in turn, assumed an intermediate position. Paço *et al.* (2013a, 2013b), in a research made with young Eng-

lish, German, Portuguese and Spanish consumers, found the positive influences of the environmental behavior on the purchasing process of European consumers. It was found that the level of environmental concern of the Portuguese, although being lower, does not differ much from other consumers that were surveyed (PAÇO *et al.*, 2013a; 2013b).

Paço and Raposo (2010) researching Portuguese consumers concluded that environmental concerns do not always translate into an environmentally friendly behavior or a “green consumption” (consumption of environmentally friendly products). A survey carried out by the European Commission (2013) shows that the Portuguese consumers, when compared to other Europeans, are more likely to participate in separation and waste recycling programs, which goes against the evaluation of Paço *et al.* (2013a, 2013b) on the lower environmental concern of the Portuguese.

A survey of the European Commission (2013) also shows that when purchasing home appliances, Portuguese nationals consider the efficiency of the product, if the product is environmentally friendly and if it can be recycled after use. In summary, it appears that the environmental commitment of the Portuguese exceeds the European average in relation to waste management, but it is in the average range in relation to the acquisition and use of more durable products (EUROPEAN COMMISSION, 2013).

A study conducted by Vicente-Molina, Fernández-Sáinz and Izagirre-Olaizola (2013) with Spanish, Brazilian, Mexican and American students, shows that the behavior of respondents varies according to the item analyzed. In relation to recycling, there is a highlight for the Spaniards, with the highest rate, with Americans at an intermediate level, while Brazilians and Mexicans have the lowest rate of participation. In relation to public transportation, Spain, Mexico and Brazil score similar rates, with the Americans having a very low participation (which reflects a cultural issue and organization of the physical space that privileges the individual motorized mean of transport). In relation to green shopping, the highlight is for Americans, with Brazil and Mexico at an intermediate level and Spain in a little lower position. According to the authors, these positions reflect the cultural and infrastructural factors available in each country. They recognize that while formal education fulfills an important role, its influence happens in a complex way and is not always easy to characterize (VINCENT-MOLINA, FERNANDEZ-SAINZ and IZAGIRRE-OLAIZOLA, 2013).

Tamashiro, Murari, de Oliveira and Acevedo (2013), evaluating the purchase behavior of Brazilian consumers, consider that the development of social responsibility is not a relevant element for most consumers, since about 40% of respondents would be willing to pay more for a product with an appeal or environmental concern. The researches carried out by Paço *et al.* (2013a; 2013b), The European Commission (2013), Tamashiro *et al.* (2013), Vicente-Molina, Fernández-Sáinz and Izagirre-Olaizola (2013) and Paço and Raposo (2010) show that, although people express concerns about the environment and show a tendency to present a pro-environmental behavior, its feasibility depends on the existence of an adequate infrastructure (appropriate public transportation or selective collection systems, for example), including cultural aspects as well as formal education.

Methodology

To enable the collection of data, by means of a survey, the research tool developed by Côrtes and Moretti (2013) was used and is available in Annex A. The Likert scale was also used. For the present study, 1035 students were interviewed (543 in Brazil and 492 in Portugal), as presented in Table 1. The authors decided to work with a convenience sample with undergraduate students from different courses of the universities, where of the authors come from. They also supervised the application of the printed questionnaires. The data were processed and analyzed with the SPSS (Statistical Package for Social Sciences), supported by the specifically related literature (HAIR JR. *et al.*, 2013; PALLANT, 2007).

A concern, which should be considered in this type of study, is related to the tendency of some people not to take an authentic opinion. Probably, it is hard to find people who explicitly have positions contrary to the environment, even if in their practice they have such a conduct (ARAGONÉS and AMERIGO, 1991). To identify those respondents who tend to answer just what would be considered socially desired (TAM, 2013; CHAO and LAM, 2011) ten questions from the Crowne and Marlowe scale (1960) were used to assess what is called “social desirability”. As a criterion for the selection of the answers, respondents who obtained top score to eight in a maximum of ten would not be considered in the treatment of data.

Table 1. Distribution of interviewees (number and percentage)

Country	n	%
Brazil	543	52.5
Portugal	492	47.5
Total	1035	100.0

Results

Using the scale of Crowne and Marlowe (1960) 90 participants were excluded, resulting in 945 interviews to be processed in SPSS and to carry out the analysis of the exploratory factor. During this calculation 148 questionnaires, which had some blank answer, were automatically excluded. For the 797 valid questionnaires, the Cronbach's alpha was equal to 0.782 (Table 2), considered good, as per Field (2013), demonstrating the reliability of the responses. The indexes of Kaiser-Meyer-Olkin (0.874) and the Sphericity of Bartlett (0.000) were also checked, as available in Table 2, considered very good according to the literature (HAIR Jr. *et al.*, 2013; PALLANT, 2007).

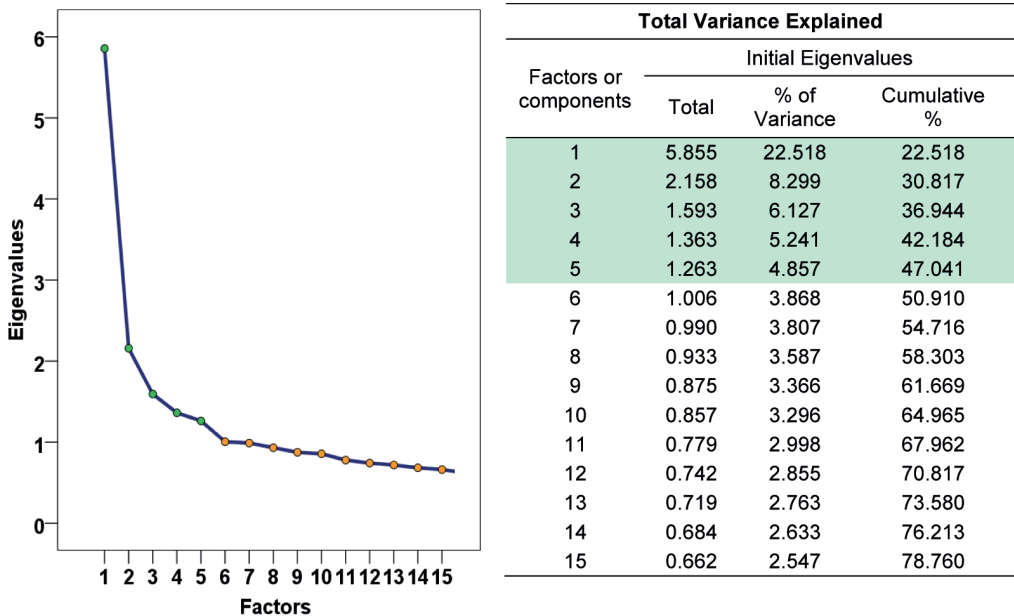
With the result of exploratory factor analysis, the authors selected the five most significant factors from the scree plot analysis and the total explained variance (Figure 2). Considering the statements that make up the selected factors, they received the following names: 1-Environmental Concern; 2-Green Consumption; 3-Environmental Attitude; 4-Economic Growth Control and 5-Anthropocentric Beliefs (Table 3). For each factor,

the scores for the Brazil and Portugal groups were checked (Table 4). Since the original adopted scale has only four options (Appendix A), the variability is numerically small and the calculation of the scores does not always show the differences between both groups. Checking Table 4, it was found that the biggest difference is in factor 2 (Green Consumption), with 4.31%, considered low for a more consistent interpretation.

Table 2. Summary of Data and Tests of Cronbach, Kaiser-Meyer-Olkin and Sphericity of Bartlett

Items	Cases	
	n	%
Total respondents	1035	100.00
Excluded (<i>social desirability</i>)	90	8.70
Total initially processed in SPSS	945	91.30
Excluded during exploratory factor analysis	148	14.30
Valid	797	77.00
Cronbach's α for the total initially processed in SPSS	0.782	
Adequacy of sample Kaiser-Meyer-Olkin	0.874	
Approx. Chi-Square	4920.125	
Test of the Sphericity of Bartlett	DF	325
Sig.		0.000

Figure 2. Scree Plot with eigenvalues and variance explained.



Note: in the factor analysis was calculated 26 factors. The chart above shows only the first 15 factors to easy viewing.

Table 3. Rotated component matrix with the considered factors

Name of Factors / Components and Related Questions	Factors /Components				
	1	2	3	4	5
1 – ENVIRONMENTAL CONCERNS					
9. The pollution of rivers and lakes can affect the quality of human beings' life.	0.731				
8. Deforestation of large forests can compromise the future of humanity.	0.665				
11. The disposal of urban waste should receive continued attention from public managers.	0.593				
7. The reduction of global warming should receive priority attention from all countries.	0.584				
15. The pollution of the oceans should deserve priority attention from all countries.	0.575				
10. Air pollution in my town is something that worries me a lot.	0.550				
2 – GREEN COMSUPTION					
23. When I buy, I prioritize products that are more easily recycled.		0.781			
26. I purchase products that do not waste resources in their packaging.		0.755			
24. Choosing a product, I prioritize the environmental aspects rather than the price/quality.		0.737			
25. Between two similar products, I prefer the one produced with recycled raw materials		0.684			
21. A certification indicating that a product was made following environmental standards helps my purchase decision.		0.497			
3 – ENVIRONMENTAL ATTITUDE					
18. I have to save water at home to take care of the environment.			0.698		
17. I must use public transportation to help the environment.			0.683		
16. I must save electricity in my house to contribute to the improvement of the environment.			0.659		
19. How ease the disposal or recycling are should always be considered when buying a product.			0.555		
20. The durability of a product reduces its environmental impact, even if it is more expensive.			0.406		
4 – ECONOMIC GROWTH CONTROL					
12. Urban growth is increasingly harmful to the environment.					
1. We are approaching the maximum number of people that Earth can support.					
20. The durability of a product reduces its environmental impact, even if it is more expensive.					
13. I'm favorable to an international tax for the countries that generate more greenhouse gases.					
2. The balance of nature is very delicate and can easily be disturbed.					
5 – ANTHROPOCENTRIC BELIEFS					
4. Humanity was created to rule the rest of nature.					0.733
3. Human beings have the right to modify the natural environment to fit their needs.					0.678
5. Humanity does not need to adapt to the natural environment because it can modify it to fit its needs.					0.639

Note: principal component method. Varimax rotation with Kaiser normalization. Rotation after six iterations.

Table 4. Score of different factors

	Environmental Concerns	Green Consumption	Environment. Attitude	Econ. Growth Control	Anthropocentric Beliefs
Brazil	3.60	2.42	3.18	3.07	1.84
Portugal	3.46	2.32	3.22	3.15	1.79
Difference Brazil and Portugal (%)	4.05	4.31	-1.24	-2.54	2.79

The results of factors suggest a good level of concern and environmental attitude, in accordance with the result of the considerations presented by Paço *et al.* (2013a, 2013b). Such result indicates that environmental concerns of the Portuguese nationals does not differ much of that expressed by the Spanish, German and English ones, a result that was also found by the European Commission (2013) and Vicente-Molina *et al.* (2013). Regarding to Brazilian students, the levels of concern and environmental attitude are similar to those of the studies by Vicente-Molina *et al.* (2013) and Bechtel *et al.* (1999)

Nevertheless, there was the need to seek other kind of treatment of the data to provide results that are more consistent and allow a better comparison of the results. To understand more clearly the situation of the groups, the Mann-Whitney test was applied to the scores of factors, starting with the hypothesis test (Table 5). In this test, a significance level (Asymp. Sig. 2-tailed) of less than 0.05 indicates the existence of differences between groups for the considered factor (PALLANT, 2007).

The Mann-Whitney test shows that for the two groups, there are differences between the factor 1 (Environmental Concern), factor 2 (Green Consumption) and factor 4 (Economic Growth Control) (Table 5). Due to this result, the classification of the Mann-Whitney Test was applied to the factors scores (Table 6). The scores obtained in each factor and in the Mann-Whitney Test (in the scores of factors) show that the two groups display similar behavior in relation to the Environmental Attitude and the Anthropocentric Beliefs.

Table 5. Mann-Whitney Test in the scores of factors – Hypothesis Test

	Environmental Concern	Green Consumption	Environment. Attitude	Econ. Growth Control	Anthropocentric Beliefs
Mann-Whitney U	83072.500	99286.000	101977.000	98571.000	102907.500
Wilcoxon W	185450.500	201664.000	216937.000	213531.000	205285.500
Z	-6.202	-2.200	-1.546	-2.381	-1.324
Asymp. Sig. (2-tailed)	0.000	0.028	0.122	0.017	0.186

Note: Grouping made by the variable Country

Table 6. Mann-Whitney Test in the scores of factors – Classification

	Country	N	Mean Rank	Difference between Brazil and Portugal (%)	Sum of Ranks
Environmental Concern	Brazil	479	518.57	26.39	248395.5
	Portugal	452	410.29		185450.5
Green Consumption	Brazil	479	484.72	8.64	232182.0
	Portugal	452	446.16		201664.0
Environment Attitude	Brazil	479	452.90	-5.62	216937.0
	Portugal	452	479.89		216909.0
Economic Growth Control	Brazil	479	445.78	-8.54	213531.0
	Portugal	452	487.42		220315.0
Anthropocentric Beliefs	Brazil	479	477.16	5.06	228560.5
	Portugal	452	454.17		205285.5

In relation to the Environmental Concern, the Mann-Whitney test showed that the two groups were concerned about environmental issues, what is confirmed by the literature (EUROPEAN COMMISSION, 2013; TAMASHIRO *et al.*, 2013; VICENTE-MOLINA *et al.*, 2013; PAÇO and RAPOSO, 2010; CARRUS *et al.*, 2008; ARAGONÉS and AMÉRIGO, 1991). Brazilian students, however, showed greater intensity on this concern (Mean Rank of Mann-Whitney = 518.57 [BR] and 410.29 [PT]), what is also reported in the literature (FRANZEN e VOGL, 2013; PAÇO *et al.*, 2013a; PAÇO *et al.*, 2013b).

Regarding the Green Consumption, there also was a greater tendency towards it by the Brazilian respondents (Mean Rank of Mann-Whitney = 484.72 [BR] and 446.16 [PT]), as seen above (Table 4; Brazil = 2.42 and Portugal = 2.32). However, the results obtained by the two groups indicate that green consumption is not much prominent in both groups. This situation is similar to what is shown in the work of Tamashiro *et al.* (2013) that identified the tendency of 40% of consumers to pay more for green products. Overall, the result is consistent with the considerations of Magnier and Schoormans (2015) on the fact that the Environmental Concern induces the Green Consumption. But it is necessary to take into consideration the remarks of Vicente-Molina *et al.* (2013), Palace *et al.* (2013a) and Palace and Fox (2010) referring to the availability of products, higher prices and available infrastructures in each country.

In relation to the Economic Growth Control, Portuguese students were more favorable than the Brazilian students were (Mean Rank of Mann-Whitney = 445.78 [BR] and 487.42 [PT]). Those results are in line with the work by Côrtes and Moretti

(2013), which identified this trend in respondents from Portugal and Spain. We need to consider that the option for Economic Growth Control is not enough to be considered as the *degrowth*, as per the concept by Georgescu-Roegen (1979) and, more recently, considered by Whitehead (2013), Martínez-Alier (2012), Kallis (2011), Schneidera *et al.* (2010) and Baykan (2007).

It is necessary to consider that the reduction of the economic growth is not an unknown subject to the environmental way of thinking. This idea began to permeate environmental thinking, with different levels of intensity, after the publication of the works of Georgescu-Roegen (1971), in which the author considers the need to reduce the consumption of energy and natural resources so that the duration of the currently available reserves could be extended. This very same issue was approached by Meadows *et al.* (1972) who also considered the need to limit the economic growth. *Degrowth*, as conceived by Georgescu-Roegen (1979), is a more radical concept when it is considered as the reversal of the economic growth and not its reduction or discontinuation (zero growth). This author believes that, even in a situation where the population and the level of consumption remain stable, in the standards of the 1970's, degrowth would not be enough to avoid a collapse.

The view expressed by the students is more related to the control of the urban growth, population control and payment of taxes by the polluter countries, which are themes mentioned in the assertions of the research tool (Annex A). Prospectively, this view is closer to the alternative conceptions of Anguelovski and Martínez-Alier (2014) which are related to the concept of environmental justice as prevalent in relation to the "market" and to the traditional economy. Buck (2013) contests this alternative approach, because it emphasizes the traditional environmentalism notion of placing limits to economic activities. It should be noted that the Portuguese students gave greater emphasis to the Economic Growth Control, despite an unemployment rate that oscillated between 12.4% (1st quarter of 2011) and 11.9% (2nd quarter 2015) reaching 17.5% in the 1st quarter of 2013 (INE, 2015). As a reference, the unemployment rate in Brazil ranged from 6.0% (2011) to 4.8% (2014), according to IBGE (2015).

The Mann-Whitney test, shown at tables 5 and 6, confirms the results of table 4, which indicated that the hypothesis of anthropocentric beliefs was rejected both by Portuguese and Brazilian students. The vision of these students is closer to the ecocentrism as defined by Amérigo *et al.* (2007) and mentioned on the papers of Onur, Sahin and Tekkaya (2012), Soyez (2012), Silva (2014) and Rhead, Elliot and Upham (2015). Furthermore, the values reported on those tables follow the tendency identified for the economic growth variable, with the Portuguese students strongly rejecting the anthropocentrism. Although this result is contrary to that of Neves and Monteiro (2014), no statistically significant differences were found between the results of the two groups of students, concerning this factor. The rejection of the anthropocentric vision by the Brazilian students, on the other hand, is in line with the work of Pinheiro *et al.* (2014).

Additionally, the analysis of the different scores and the Mann-Whitney test results allowed us to verify how the different factors mutually affected each other. The Spearman correlation coefficient was used to study the correlations between factors because

the Kolmogorov-Smirnov test for normality (table 7) indicated the scores of the factors did not follow a normal distribution. The Spearman correlation coefficient (r) ranges between 1 (total correlation) and 0 (no correlation) as shown in Table 8. Using the same procedure as Pallant (2007) and Dancey and Reidy (2006), only values above 0.4 were considered for the r of Spearman because that is the minimum reference value for the moderate correlations.

Results achieved for the correlation indicators reveal that the “Environmental Concern” works as a precedent to the “Environmental Attitude” (r of Spearman = 0.473 [BR] and 0.579 [PT]), as shown in Figure 3, and are in line with the results of other authors (RHEAD, ELLIOT and UPHAM, 2015; LARSON *et al.*, 2015; TAKÁCS-SÁNTA, 2007; GARCÍA-MIRA, REAL and ROMAY, 2005; PERUGINI and BAGOZZI, 2004; PERUGINI and BAGOZZI, 2001; UZZELL, 2000; ARAGONÉS and AMÉRIGO, 1991; WEIGEL and WEIGEL, 1978; DUNLAP and VAN LIERE, 1978). However, it should be highlighted that this correlation is more intense for the Portuguese students, even if they have expressed a lower environmental concern (Mann-Whitney mean rank = 518.57 [BR] and 410.29 [PT]). Furthermore, the environmental concern also influences the Economic Growth Control option, although with moderate correlations.

The option for Economic Growth Control also influences the Environmental Attitude (r of Spearman = 0.562 [BR] and 0.516 [PT]), as represented in Figure 3. This result comes without surprise as in the literature the association between “environmental concern” and the “reduction or control of the economic activity” is common in several conditions and contexts. This is true since the seminal papers of Georgescu-Roegen (1971) and Meadows *et al.* (1972), until the sharper approaches of Georgescu-Roegen (1979) that have influenced more recent works, like those of Whitehead (2013), Martínez-Alier (2012), Kallis (2011), Schneidera, Kallis and Martínez-Alier (2010) and Baykan (2007).

The results obtained for the Portuguese students, however, may be considered surprising because, as previously mentioned, they were obtained in a scenario of high unemployment. This result for the Portuguese students is supported by the findings of the works of Johannisova, Crabtree and Franková (2012) and O’Neill (2012), as well as in Côrtes e Moretti (2013) who had found an Iberic tendency in favour of the economic growth control. It is important to consider that Portugal and Spain have already achieved a reasonable and adequate social standard of living, whereas for Latin América economic growth is stil a way to reduce the existent social differences.

Table 7. Kolmogorov-Smirnov Test for Normality

Factors	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
Environmental Concern	0.145	931	0.000
Green Consumption	0.088	931	0.000
Environmental Attitude	0.130	931	0.000
Economic Growth Control	0.099	931	0.000
Anthropocentric Beliefs	0.125	931	0.000

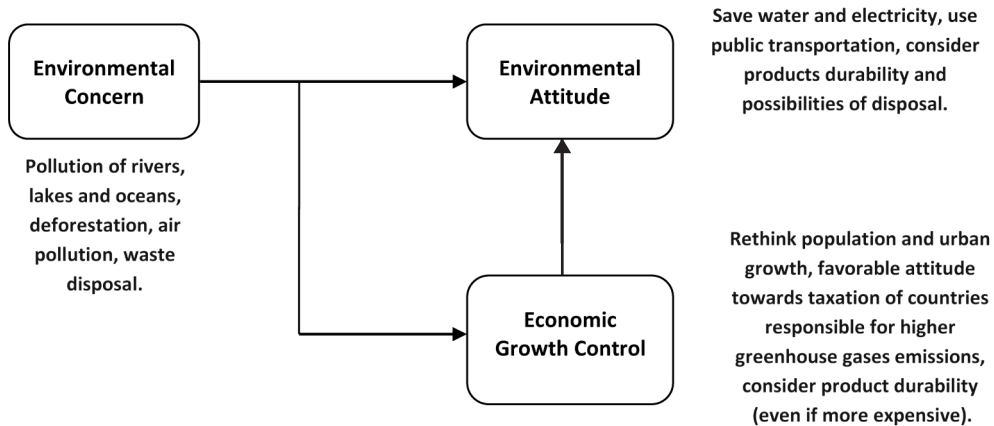
Note: ^aLilliefors Significance Correction

The correlation between Green Consumption and Environmental Attitude is small (r of Spearman = 0.395 [BR] and 0.391 [PT]) and inferior to the 0.4 limit defined for the treatment of the results obtained. Nevertheless, this factor was considered and analyzed because the values obtained for r , the Spearman correlation coefficient, were extremely close to that limit. Green consumption is thought to be, in part, an answer to a proactive Environmental Attitude, which is aligned with the observations of Tamashiro *et al.* (2013) for the Brazilian consumers, and Paço and Raposo (2010) for the Portuguese ones. These two works also refer to the existence of a partial relationship between environmental concerns and green consumption, which is also true for our study as we conclude from the analysis of the scores of the factors and of the Mann-Whitney test results.

Table 8. Spearman Correlation Coefficient (r) between factors

		Environmental Concern	Green Consumption	Environmental Attitude	Economic Growth Control	Anthropocentric Beliefs
Environmental Concern	Brasil	1.000	0.320	0.473	0.441	-0.247
	Portugal	1.000	0.304	0.579	0.467	-0.275
Green Consumption	Brasil	0.320	1.000	0.395	0.296	-0.229
	Portugal	0.304	1.000	0.391	0.325	-0.185
Environmental Attitude	Brasil	0.473	0.395	1.000	0.562	-0.247
	Portugal	0.579	0.391	1.000	0.516	-0.326
Economic Growth Control	Brasil	0.441	0.296	0.562	1.000	-0.318
	Portugal	0.467	0.325	0.516	1.000	-0.290
Anthropocentric Beliefs	Brasil	-0.247	-0.229	-0.247	-0.318	1.000
	Portugal	-0.275	-0.185	-0.326	-0.290	1.000

Figure 3. Scheme of interconnections between Environmental Concern, Environmental Attitude and Economic Growth Control factors



Source: prepared by the authors.

Conclusion

The present study analyzed how the environmental behavior of Brazilian and Portuguese University students is structured. This sample group was chosen because university students, besides having access to different media and contents including environmental information, also have contact with topics and practices related with these matters on their undergraduate courses.

The results obtained from our data and the literature revision allowed us to conclude the existence of a similar structure of behavior between the two groups that were analyzed. A clear correlation between environmental concerns and environmental attitudes was identified in our study, corroborating the general literature on this topic (BEST, 2010; TAKÁCS-SÁNTA, 2007; GARCÍA-MIRA, REAL and ROMAY, 2005; UZZELL, 2000; ARAGONÉS and AMÉRIGO, 1991) and that of Tamashiro, Murari, de Oliveira and Acevedo (2013) and Bechtel, Corral-Verdugo and Pinheiro (1999) for the Brazilians, as well as the results of Comissão Europeia (2013) and Paço *et al.* (2013a; 2013b), considering the Portuguese.

With the present construct, environmental beliefs proved to be in opposition to the anthropocentric vision (BR = 1.84 and PT = 1.79 scores for factor Anthropocentric Beliefs) although this more ecocentric vision does not significantly influence the other factors. However, it should be highlighted that even if correlations related to anthropocentrism are small in comparison to the other factors (Table 8), with the Spearman correlation coefficient (r) varying from -0.185 to -0.326, these are all negative. For the groups included in our sample, this result demonstrates that anthropocentrism goes in the opposite direction of the environmental questions, reinforcing an ecocentric vision for these groups, as it is defined in the literature (RHEAD, ELLIOT and UPHAM, 2015; SILVA, 2014; SOYEZ, 2012; ONUR, SAHIN and TEKKAYA, 2012; AMÉRIGO *et al.*,

2007). Despite being a result contrary to Neves and Monteiro (2014), as these authors identified a tendency for Portuguese responders to present a more anthropocentric behavior, our conclusions are closer to those of Pinheiro *et al.* (2014) for the Brazilian responders, as they were considered to have a tendency to implement environmental preservation actions, even when those actions express anthropocentric beliefs.

Environmental concerns also influence the Economic Growth Control option, which is reinforced by the ecocentric tendency of the subjects of our sample. This result is closer to the ideas of Anguelovski and Martínez Alier (2014) who consider that the environmental justice should prevail over the conventional economy and consumption promotion. The economic growth control is also supported in the works of Schneidera, Kallis and Martinez-Alier (2010), as they defend that a decrease in production and consumption may lead to an increase in social wellbeing. This result is valid also for the Portuguese students included in our sample, even when questioned in a period with an unemployment rate higher than 10% (INE, 2015).

In conclusion, we find a clear tendency amongst university students towards an increasing concern about the environment. However, green consumption is still not an effective practice of this group of students but it is steadily growing. Future analysis could evaluate if this difference between environmental concern and green consumption is due to purchasing power restrictions or little availability of green products, as indicated in the literature (PAÇO *et al.*, 2013a; VICENTE-MOLINA, FERNÁNDEZ-SÁINZ and IZAGIRRE-OLAIZOLA, 2013; PAÇO and RAPOSO, 2010).

In short, it seems clear that having access to environmental information (MORIGI and KREBS, 2012; SILVEIRA and CRUZ, 2012), to specific contents on the undergraduate courses (MINTZ and TAL, 2014; REMINGTON-DOUCETTE *et al.*, 2013; GROSS, 2013) and projects developed in the educational institutions (CHANG, 2013; BARTH, 2013) may contribute to increase and develop an environmental consciousness on individuals. The current study, however, does not provide evidence about the contribution of each of the aforementioned aspects and, for that reason, this is precisely a suggestion for futures works, to adapt the construct about “Environmental Behavior” to include that possibility.

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Annex A

Assertive	Dimensions
We are approaching the maximum number of people that Earth can support.	
The balance of nature is very delicate and can easily be disturbed.	
Human beings have the right to modify the natural environment to fit their needs.	Beliefs
Humanity was created to rule the rest of nature.	
Humanity does not need to adapt to the natural environment because it can modify it to fit its needs.	
In order to keep a healthy environment, we have to control the economic growth.	
The reduction of global warming should be a priority to all countries.	
Deforestation of large forests can compromise the future of humanity.	Global Concerns
Pollution of rivers and lakes can affect the quality of human beings' life.	
Air pollution in my town is something that worries me a lot.	
The disposal of urban waste should receive continued attention from public managers.	Local Concerns
Urban growth is increasingly harmful to the environment.	
I'm favorable to an international tax for the countries that generate more greenhouse gases.	
Some countries should limit their economic growth to avoid the abusive usage of natural resources.	Global Attitude
The pollution of the oceans should deserve priority attention from all countries.	
I must save electricity in my house to contribute to the improvement of the environment	
I must use public transportation to help the environment.	Local Attitude
I have to save water at home to take care of the environment.	
How ease the disposal or recycling are should always be considered when buying a product.	
The durability of a product reduces its environmental impact, even if it is more expensive	
A certification indicating that a product was made following environmental standards helps my purchase decision.	Potential Consumption
Companies should be encouraged to use recycled raw material as a way to reduce their environmental impacts.	
When I buy, I prioritize products that are more easily recycled.	
Choosing a product, I prioritize the environmental aspects rather than the price/quality.	Actual Consumption
Between two similar products, I prefer the one produced with recycled raw materials.	
I purchase products that do not waste resources in their packaging.	

Note: Responders could indicate their level of agreement in a scale from 1 to 4, 1 meaning "totally agree" and 4 "totally disagree".

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ENVIRONMENTAL BEHAVIOR: A COMPARATIVE STUDY BETWEEN BRAZILIAN AND PORTUGUESE STUDENTS

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Abstract: Although undergraduate students have great access to environmental information, it does not mean that an environmental behavior is being developed. With the use of a scale applied to 1035 university students from Brazil and Portugal, it was examined how the environmental behavior of these students is structured. Using multivariate statistical techniques, it was verified that there is a similarity in the environmental behavior of both groups, with environmental beliefs being manifested by an opposition to the anthropocentric view. The environmental attitudes have the concerns related to the environment as their predecessor. These concerns influence the option to control economic growth, which is reinforced by the ecocentric point of view of the respondents and is manifested by the perspective of a decrease in production and in consumption as well as the promotion of welfare. Although there is a tendency, the option for green consumption is not fully accomplished.

Key words: environmental attitudes, environmental behavior, green consumption, cross-cultural study

Resumo: Jovens universitários têm acesso crescente às informações ambientais, mas isso não significa que haja o desenvolvimento de um comportamento em prol do meio ambiente. Com a utilização de uma escala aplicada em 1035 estudantes universitários do Brasil e de Portugal, foi averiguado como ocorre a estruturação e manifestação do comportamento ambiental desses estudantes. Utilizando técnicas estatísticas multivariadas, verificou-se uma similaridade no comportamento ambiental de ambos os grupos, com as crenças ambientais se manifestando por uma oposição à visão antropocêntrica. As atitudes ambientais têm como antecedentes as preocupações relacionadas ao meio ambiente. Essas preocupações influem na opção pelo controle do crescimento econômico, perspectiva reforçada pela tendência mais ecocêntrica dos entrevistados e que está pautada por uma diminuição da produção, do consumo e promoção do bem-estar. Verificou-se também que a opção pelo consumo verde ainda não se realiza totalmente, embora seja verificada uma tendência favorável.

Palavras-Chave: Comportamento ambiental; Atitudes ambientais; Consumo verde; Estudio transcultural.

Resumen: Los estudiantes universitarios tienen cada vez más acceso a la información ambiental, pero eso no significa que haga el desarrollo de un comportamiento compatible. Con una escala aplicada en 1035 estudiantes universitarios de Brasil y Portugal, se examinó cómo está estructurado el comportamiento ambiental de estos estudiantes. Con el uso de técnicas estadísticas multivariantes, fue verificada una similitud en el comportamiento ambiental de los dos grupos, con las creencias ambientales si manifestando por una oposición a la visión antropocéntrica. Las actitudes ambientales tienen como antecedentes las preocupaciones relacionadas con el medio ambiente. Estas preocupaciones influyen en la opción para el control del crecimiento económico, reforzada por una tendencia ecocéntrica y se caracteriza por una perspectiva de disminución de la producción y del consumo además de la promoción del bienestar. También sí verificó que la opción por el consumo verde no se realiza plenamente, aunque se verifica una tendencia favorable.

Palabras clave: Actitudes ambientales; Comportamiento ambiental; Consumo verde; Estudio transcultural.
