

Testing the Cross-National Social Bases of Environmentalism: A Current and Comparative Analysis of Conservation Behaviors

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ABSTRACT

Despite the growing interest in cross-national comparative studies, few of them have focused specifically on analyzing the social bases of pro-environmental behaviors. This article explores socio-demographic differences in private and public environmental behaviors (PrEB and PuEB) across 30 countries. Structural Equation Modeling and multilevel analysis were applied to the 2010 International Social Survey Programme (ISSP) database. The analyses showed reliable positive relationships across-nations on both behaviors only for education. Age had the same consistent effect as education for PrEB. This pattern was also positive but less strong for gender on PrEB and for income on PuEB. Size of hometown and income had diffuse or mixed effects for PrEB, as did gender, age and size of hometown for PuEB. Nevertheless, those relationships were modified when controlling for the effect of attitudinal variables on behaviors. Additionally, the socio-demographic determinants of both behaviors varied in predictive power across nations (R^2 from 0.2 to 16). Multilevel interactions showed that the differences for gender on PrEB and for education on PuEB were stronger in more developed countries. Therefore, the social bases varied according to the type of behavior analyzed, the degree of cross-national consistency, predictive power and the level of development of the country.

Keywords: Socio-demographic factors; attitudinal factors; cross-national analysis; ISSP; conservation behavior.

RESUMO

Verificação da Base Social Transnacional do Ambientalismo: Uma Análise Comparativa e Atualizada dos Comportamentos Pró-Ecológicos

A pesar do crescente interesse pelos estudos transnacionais, quase nenhum deles avalia especificamente as bases sociais dos comportamentos pró-ecológicos. Portanto, este artigo explora as diferenças sociodemográficas quanto as condutas ecológicas privadas e públicas (CEPr e CEPu) em 30 países. Modelos de equações estruturais e multinível foram aplicados ao banco de dados da *International Social Survey Programme* (ISSP) 2010. As avaliações mostraram relações positivas consistentes ao longo dos países quanto educação em ambos os tipos de comportamento. A idade teve o mesmo efeito que a educação para CEPr. Esse padrão foi menos marcante quanto ao gênero em CEPr e quanto à renda em CEPu. O tamanho da cidade natal e a renda tiveram efeitos difusos ou mistos em CEPr, assim como o gênero, a idade e o tamanho da cidade natal em CEPu. Contudo, essas relações se vêem modificadas quando se controla o efeito das variáveis atitudinais. Além disso, o poder preditivo dos determinantes sociodemográficos varia significativamente entre nações (R^2 0.2-16). As interações multinível mostraram que as diferenças de gênero em CEPr e de educação em CEPu foram mais marcantes nos países mais desenvolvidos. Portanto as bases sociais variam segundo o tipo de conduta avaliada, o grau de consistência entre países, o poder preditivo e o nível de desenvolvimento do país.

Palavras-chave: Fatores sociodemográficos; fatores atitudinais; avaliação transnacional; ISSP; condutas pró-ecológicas.

RESUMEN

Comprobando la Base Social Transnacional del Ambientalismo: Un Análisis Comparativo y Actual Sobre Conductas Proecológicas

A pesar del creciente interés por los estudios transnacionales, casi ninguno de ellos se ha centrado específicamente en analizar las bases sociales de las conductas proecológicas. Por lo tanto, este artículo explora las diferencias sociodemográficas en cuanto a conductas ecológicas privadas y públicas (CEPr y CEPu) en 30 países. Para ello se aplicaron modelos de ecuaciones estructurales y multinivel a la base de datos del *International Social Survey Programme* (ISSP) 2010. Los análisis mostraron relaciones positivas consistentes a lo largo de los países entre educación y ambos tipos de comportamientos. La edad tuvo el mismo efecto que la educación para CEPr. Ese patrón fue menos marcado en cuanto al género en CEPr e ingresos en CEPu. El tamaño de la ciudad natal y los ingresos tuvieron efectos difusos o mixtos en CEPr, al igual que el género, la edad y el tamaño de la ciudad natal en CEPu. Sin embargo, dichas relaciones se ven modificadas cuando se controla el efecto de las variables actitudinales. Además, el poder predictivo de los determinantes sociodemográficos varía significativamente entre naciones (R^2 0.2-16). Las interacciones multinivel mostraron que las diferencias de género en CEPr y de educación en CEPu fueron más fuertes en los países más desarrollados. Por lo tanto, las bases sociales varían según el tipo de conducta analizada, el grado de consistencia entre países, el poder predictivo y el nivel de desarrollo del país.

Palabras clave: Factores sociodemográficos; factores actitudinales; análisis transnacional; ISSP; conductas proecológicas.



INTRODUCTION

Literature on environmentalism is traditionally divided into two major streams: “studies focused on socio-demographic factors associated with environmentalism and studies on values, beliefs and others social psychological constructs related to environmentalism” (Dietz, Stern, and Guagnano, 1998, p. 451). These two major streams were also applied to predict environmental behaviors cross-nationally, yielding mixed results especially for the former (Hadler and Haller, 2011; Marquart-Pyatt, 2012b). This study focuses on the first major stream.

Since the early 1970s, one of the main concerns of psycho-sociological analysis regarding the environment has been (and continues to be to a greater or lesser extent) the debate surrounding the *social bases of environmentalism* (Greenbaum, 1995). In general, these empirical studies conclude that people with greater environmentalism tend to be young urban women with a high socio-economic status and level of education, and a liberal ideology (Xiao and Dunlap, 2007). These results fit into what we call a *hard social base*.

However, some studies have not found these relationships. For example, Dietz et al. (1998) examined a large sample of the North American population and found that variables such as gender, age, race, education, political liberalism and even religious affiliation have positive relationships in some cases and negative relationships in others with different indicators of environmental concern and pro-environmental behavior. Diamantopoulos, Schlegelmilch, Sinkovics and Bohlen (2003) also highlight that the relationship between socio-demographic characteristics and environmental behaviors are complex. These authors either did not find significant relationships (e.g. marital status), found significant differences for some type of environmental behaviors but not for some others (gender, age, educational level, number of children) or did not find them in the expected direction (e.g. social class). In a more recent study, Hadler and Haller (2011) found that five of seven key socio-demographic variables (gender, age, marital status, economic activity and size of hometown) were not related to public environmental behavior in a pooled sample of 23 countries. Two others studies with Brazilian student samples found that age was positive related with different measures of pro-environmental behaviors (Pato, Ros, and Tamayo, 2005; Tamayo and Pato, 2006).

The disparity in results may be due to a large number of factors. Of these, it is important to highlight

a spatiotemporal perspective in which the social bases may be different in one context compared with another, and/or may have changed in one direction or another over time (e.g. results for the social bases of the United States versus Turkey, now or 15 years ago). It has also been reported that socio-demographic factors have a minor effect on behavior compared to psychological factors (Diamantopoulos et al., 2003), and socio-demographic dispositions may be acting indirectly through attitudes (Berger, 1997; Corral and Zaragoza, 2000). This may partially explain the mixed results found between certain demographic factors and environmental behavior.

Furthermore, it can be assumed that because of the increasing institutionalization of environmental issues, the wide dissemination of information and personal experience of environmental problems and their consequences, environmental concern may not longer be a matter reserved exclusively to a specific social group but rather a widespread issue affecting different social strata. This was the original thesis of Buttel and Flinn (1974) who claimed that environmentalism is a diffuse attitude distributed more or less randomly in the population. Based on recent data and using a model of pathways to environmental behavior across 16 nations, Marquart-Pyatt (2012b) confirmed this hypothesis after finding that gender only discriminated in four of the 16 countries analyzed, age in three, size of hometown in one, and income in none of them. In a Brazilian sample, Pato, Ros and Tamayo (2005) found that beyond age, gender, educational level, field of study and occupation did not discriminate in any of the four behavioral factors (i.e. activism, saving water and energy, urban cleaning and recycling). Brand (2002), after reviewing different studies, proposed the following hypothesis:

Taken together, the empirical results show that, in Western societies, there is no distinct demographic group that supports the cause of environmentalism. Moreover, the studies rejected the assumption that the traditional features of the socio-structure of group classification homogenized and structure environmental concerns and behaviors. (p. 210)

Therefore, these studies lean toward the hypotheses of a *diffuse social base* of environmentalism, claiming that environmental consensus is transversal and that environmental protection is a positive and desirable value regardless of class structure. However, there is also a third possibility, halfway between the two positions described previously (i.e. hard social base versus diffuse social base) that could be defined as a *soft social base*.

In the case of soft social bases, it would be accepted even today that there is a social base, but this base is not as pronounced or consistent across studies with different and diverse populations samples (Diamantopoulos et al., 2003). For example, Marquart-Pyatt (2008), when comparing 19 countries, found that of five key socio-demographic variables, gender and income showed no consistent significant effects across countries for environmental attitudes (12 and 10/19 significant effects), and age and income showed no such effects for behavioral intentions (11 and 9/19 significant effects). Similar results were reported by Hunter, Hatch and Johnson (2004) regarding the role of gender on private environmental behavior (i.e. recycling, cutting back on driving for environmental reasons, and buying organic fruit and vegetables). From a sample of 22 countries, these authors found that women were more engaged than men in only 14 countries, demonstrating with these results that some indicators may be considered as an environmental soft social base.

These results for the soft social base suggest that the relationships between socio-demographic characteristics and different facets of environmental concern may differ across populations (e.g. nations) and may be contingent upon contextual-level characteristics (e.g. the level of economic development of each nation). In fact, Nawrotzki (2012), when exploring inter-country variations in the relationship between ideology and willingness to pay (WTP), found that conservatives' support for environmental protection varies from country to country and this variation is a function of country-level characteristics. The strongest opposition of conservatives toward environmental protection was observed in developed capitalist nations with superior environmental conditions. In contrast, in less developed countries and countries characterized by poor environmental quality, conservatives are more environmentally concerned than liberals. Pampel (2013), in turn, demonstrates how socioeconomic status (SES) is associated only weakly with WTP and willingness to accept slower economic growth in lower income nations with poor environmental conditions but is associated strongly and positively in higher income nations with better environmental conditions. Similar results were found by Marquart-Pyatt (2012a) for education and three measures of environmental concern (i.e. risk perception, environmental efficacy and WTP). It should be noted that neither of the three above mentioned studies nor other studies (Franzen and Meyer, 2010; Liu and Sibley, 2012; Nawrotzki, 2012) that have examined the so-called cross-level effects (i.e. the effect of a level-2 predictor on a level-1 slope

coefficient) have focused on environmental behaviors as the outcome variable.

In addition to the review presented on the disparity of results in the social bases of environmentalism across studies, why should any socio-demographic variable be correlates of pro-environmental behavior? If we consider the *hard social base*, these empirical studies conclude that people with greater environmentalism tend to be young, urban, women, with a high socio-economic status and level of education, and a liberal ideology (Xiao and Dunlap, 2007). With regards to gender, a possible explanation for these differences can be found in the ecofeminism theories that ensure that women are able to understand and relate to the nature to a greater extent than men, because the former are givers of life and because of their "experiences of connection with nature" (Eckersley, 1995). It has also been hypothesized that cultural socialization has promoted in women a greater concern for others and for the future generations (Dietz, Kalof, & Stern, 2002). Without considering biological or cultural theories, the simplest explanation for these differences could arise from a simple measuring artifact: "... the fact that most of the relevant environmental activities are carried on at home, affects the development of an environmental concern, meanwhile when these circumstances are controlled, the attitudinal differences decrease" (Hernández & Hidalgo, 2010, p. 296).

With regards to age, Van Liere and Dunlap (1980) stated that young people are less integrated into the dominant social order, and therefore are more willing to make changes that will provide solutions to the current situation of environmental degradation. The socioeconomic status (SES) it can be defined in terms of educational level and/or income. The positive effect of SES has been explained from a greater understanding of the causes and solutions of environmental problems, and to the fact that greater economic security allows these people to worry about other issues that are not related with their basic needs (Van Liere & Dunlap, 1980).

Finally, the political ideology and the place of residence are also variables that have been associated to the social base of environmentalism. As for the first, it is established that liberals show greater awareness for the environment, both physical and social, while conservatives support in a higher degree the agendas linked to economic growth and natural resource extraction (Neumayer, 2004). As for the second, the reason given in this case is that the people who live in urban areas are more exposed to signs of environment degradation such as pollution (acoustic, atmospheric, etc.) than those living in rural areas, and also the

structural barriers to pro-environmental behaviors are less pronounced (Arcury & Christianson, 1993).

This study used the same indicators, recent data and a large number of countries to answer the following questions. What kind of social bases can be supported cross-culturally? Are we going to find a “hard”, “soft” or “diffuse” social base across nations? Will those social bases be different if other individual-level influences (i.e. environmental concern components) are controlled? May the variations in the social bases be a function of country-level characteristics? Due to the disparity of results at previous studies, it is difficult to establish any hypothesis, so we propose an exploratory study.

METHODS

Participants

To test the questions formulated above, the analyses were based mainly on individual-level data from the 2010 Environmental Module of the International Social Survey Programme (ISSP) (see Haller, Jowell, and Smith, 2009). Data from more than 38,000 individuals in 30 countries were used in the analyses presented here: Argentina, Austria, Belgium, Bulgaria, Canada, Chile, Croatia, Czech Republic, Denmark, Finland, Germany, Great Britain, Israel, Japan, Republic of Korea, Latvia, Mexico, New Zealand, Norway, Philippines, Russian Federation, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, Turkey and the United States. The sample of countries comprised mainly industrialized, higher-income nations (two-thirds of them are members of the OECD and one-third are developing nations). The standard sampling procedure consisted of a stratified, multistage random sample considering region, household and person within the household. The target population was the adult population permanently living in civilian households. Sample size was about 1,000 in most countries (i.e. representative samples, total sample mean=1413; sd=540; min.=934 (UK); max.=3594 (South Africa). To preserve sample sizes, missing data were accounted for using multiple imputation procedures, specifically the EM algorithm¹. Internal weights were applied to adjust the countries samples distributions to their population distributions.

Measures

Criterion variables: private and public environmental behaviors

Previous studies using exploratory factor analyses (EFA) of ISSP data found a two-factor structure

of environmental behavior that was similar across countries (Hadler and Haller, 2011; Hunter et al., 2004). Following those studies and after running an EFA with all the items together, two measures of environmental behavior were created using confirmatory factor analysis (CFA)². The first latent construct, private environmental behavior (PrEB), contained four items which asked survey participants how often (4=never to 1=always) they recycled, avoided buying certain products for environmental reasons, reduced energy consumption at home and saved or re-used water for environmental reasons. The second factor, public environmental behavior (PuEB), contained three dichotomous items (1=yes and 2=no) which asked survey participants if they belonged to an environmental organization, if they had signed a petition and if they had donated money during the last five years to an environmental group. Factor scores of the two scales were used for the analysis, and items were scaled so that higher scores indicated pro-environmental responses. CFAs results indicated a good fit for both scales³.

Individual-level predictor variables

The following demographic variables were included from the ISSP: gender (0=male and 1=female), age (in years), education (0=no formal qualification to 5=university degree), household income was z-standardized (because income was reported in country-specific currencies) and adjusted for household size following Franzen and Meyer (2010), and hometown size was ranked from rural (=1) to urban (=5).

The following values and environmental concern variables were included as control variables from the ISSP: Inglehart's materialism/postmaterialism values scale (0=materialistic, 1=mixed and 2=post-materialistic). A single item called every day risk perception that measures the perception that environmental problems have a direct effect on the everyday life of the respondent (1=strongly disagree to 5=strongly agree). Four latent factors that were called environmental risk perception, knowledge, efficacy, and willingness to make personal sacrifice. Factor scores of the four scales were used for the analysis, and some items are scaled so that higher scores indicate pro-environmental responses. CFAs results indicate good fit for all the latent factors⁴.

Country-level predictor variables

A synthetic measure containing economic, educational and environmental information of each country was created. This measure was called the

“Development Index” (Cronbach’s alpha=.70, and standardized factor loadings greater than 0.57). Higher values indicated more development.

Analysis

Confirmatory Factor Analyses (CFA) were applied to create the latent variables and Structural Equation Modeling (SEM) to model the relationships between socio-demographic characteristics and environmental behaviors. The relationships were tested using two different models: the first only regressed all the socio-demographic variables on both types of behaviors (PrEB and PuEB); the second was a path model in which socio-demographic characteristics influenced behaviors directly and indirectly through different facets of environmental concern (e.g. knowledge, risk perception, efficacy). To determine the types of social bases, the following criteria were established⁵: a cut-off of 75% consensus on consistent significant differences between countries for the hard social base; a cut-off of 50% consensus for the soft social base; a cut-off of 75% no significant differences for the diffuse social base; and finally a category called “mixed results” for a combination of the other categories. Finally, a multilevel analysis was performed and, in particular, a series of slopes-as-outcomes models; in addition to allowing the intercept and slopes to vary randomly across countries, these models included predictors at the contextual level to account for the variation in the individual-level coefficients. Specifically, these models are capable of including cross-level interactions, which are necessary in order to test whether potential cross-country variation in the social base-behavior relationship can be explained by country-level characteristics. The following equation shows one of the slopes-as-outcomes sub-models specified:

Individual level:

$$\text{Environmental behavior} = \beta_{0j} + \beta_{1j}(\text{gender}) + r_{ij}$$

Country level:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{development}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{development}) + u_{1j}$$

where:

γ_{10} = within-country gender-behavior slope;

γ_{11} = development_j * gender_{ij} or the moderating effect of development on the effect of gender on environmental behavior;

Variance (u_{1j}) = τ_{11} = between group variance of the slope.

RESULTS

Table 1 provides descriptive statistics for the criterion and explanatory variables used in the following analysis. Table 2 presents results for private environmental behavior (PrEB) and Table 3 for public environmental behavior (PuEB) for the pooled sample and for each of the 30 countries separately. The results revealed reliable relationships across nations on both behaviors only for education (29/31 countries significant and positive for PrEB, and 30/31 countries significant and positive for PuEB). Age had the same consistent effect for PrEB (26/31 significant and positive). Therefore, these three effects could be considered within the *hard social base*. The pattern was less strong for gender on PrEB and for income on PuEB (20/31 and 18/31 significant and positive, respectively). Therefore, these two effects could be considered within the *soft social base*. The rest of the variables had quite specific and delimited effects. Income for PrEB (22/31 not significant), and gender and size of hometown for PuEB (28 and 23/31 not significant) could be considered within the *diffuse social base*, while size of hometown for PrEB, and age for PuEB cannot be grouped into the three categories above and may thus be considered as “mixed results”.

TABLE 1
Descriptive Statistics of the used variables for the
ISSP (International Social Survey Programme)
2010 pooled sample.

Variable	Mean	SD	Min.	Max.
Outcomes				
Private environmental behavior ^a	1.59	.42	.72	2.73
Public environmental behavior ^a	.45	.08	.36	.81
Predictors				
Gender	.52	.50	.00	1.00
Age	45.24	17.43	15.00	99.00
Education	2.78	1.46	.00	5.00
Household income (z-scores)	0	1.00	-2.34	28.54
Size of hometown	3.39	1.28	1.00	5.00
Controls				
Postmaterialism	.79	.62	.00	2.00
Knowledge of env. problems ^a	2.81	.86	1.04	4.86
Everyday env. risk perception	3.23	1.08	1.00	5.00
Environmental risk perception ^a	3.13	.54	.84	4.15
Environmental efficacy ^a	2.84	.63	1.11	4.71
Willingness to make sacrifice ^a	2.71	.96	1.11	5.08
Development Index ^a	-.12	1.02	-1.95	1.30

Note: Pooled sample size: 38,543; number of countries: 30.

^a Latent factor.

TABLE 2
Regression results for the social bases of private environmental behavior, by pooled model and country

	Gender ^a			Age			Education			Income			Size Hometown			R ²
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β	
Pooled Model	.053**	.004	.063	.003**	0	.127	.032**	.002	.111	.006**	.002	.014	-.007**	.002	-.023	.027
Argentina	.051 [†]	.029	.053	.002**	.001	.083	.039**	.012	.114	.031*	.016	.064	.02	.015	.041	.031
Austria	.065*	.027	.077	.003**	.001	.127	.048**	.012	.144	-.008	.014	-.019	-.037**	.011	-.113	.046
Belgium	.017	.018	.027	.005**	.001	.286	.039**	.008	.153	-.003	.01	-.011	.018*	.009	.058	.084
Bulgaria	.038 [†]	.022	.052	.002**	.001	.114	.069**	.01	.248	0	.013	-.001	.011	.009	.042	.071
Canada	.136**	.028	.177	.004**	.001	.167	.033**	.012	.109	.041**	.014	.108	-.018	.012	-.054	.079
Chile	.045	.029	.049	.003**	.001	.119	.063**	.012	.215	.002	.017	.004	-.013	.011	-.039	.041
Taiwan (China)	.112**	.017	.152	.005**	.001	.203	.062**	.008	.248	.006	.009	.016	.031**	.008	.096	.083
Croatia	.062**	.024	.074	.003**	.001	.115	.043**	.011	.121	-.022 [†]	.013	-.053	.026**	.01	.079	.037
Czech Republic	.101**	.021	.124	.002**	.001	.104	.043**	.011	.107	.014	.012	.034	0	.009	0	.036
Denmark	.057**	.019	.08	.004**	.001	.171	.033**	.008	.115	.006	.01	.017	.006	.008	.02	.046
Finland	.147**	.022	.184	.004**	.001	.167	.043**	.008	.15	.012	.011	.03	-.002	.01	-.005	.094
Germany	.014	.02	.019	.003**	.001	.146	.02*	.008	.074	.015	.011	.04	-.014	.009	-.043	.029
Israel	.053*	.022	.067	.001	.001	.04	.041**	.009	.143	.043**	.012	.108	.003	.009	.009	.047
Japan	.056**	.02	.078	.007**	.001	.379	.002	.008	.006	-.011	.011	-.032	.025**	.01	.068	.150
Republic of Korea	.114**	.02	.139	.007**	.001	.274	.035**	.009	.126	-.043**	.011	-.106	.005	.01	.012	.081
Latvia	.03	.022	.041	.003**	.001	.121	.028**	.01	.097	-.049**	.012	-.138	.019**	.008	.084	.046
Mexico	.006	.021	.008	.004**	.001	.155	.015*	.007	.058	.007	.011	.016	.044**	.009	.126	.044
New Zealand	.096**	.022	.124	0	.001	.003	.028**	.007	.124	-.019 [†]	.012	-.05	-.004	.009	-.012	.019
Norway	.112**	.018	.163	.002**	.001	.094	.016*	.007	.06	-.001	.009	-.002	.008	.007	.032	.038
Philippines	.016	.021	.022	0	.001	.018	.031**	.007	.139	.01	.011	.03	.033**	.008	.13	.051
Russian Federation	.063**	.023	.073	.001	.001	.028	.019 [†]	.011	.05	-.036**	.012	-.086	.001	.009	.004	.015
Slovakia	.027	.024	.033	.002**	.001	.082	.064**	.012	.185	-.01	.013	-.025	-.017	.012	-.044	.031
Slovenia	.05*	.021	.07	.003**	.001	.169	.038**	.01	.139	.019 [†]	.012	.054	-.037**	.01	-.12	.044
South Africa	.032	.02	.035	0	.001	.017	.036**	.008	.117	.025*	.011	.059	.002	.007	.007	.024
Spain	.031 [†]	.017	.036	.002**	.001	.093	.067**	.008	.224	-.019 [†]	.01	-.043	.016*	.007	.046	.041
Sweden	.087**	.02	.127	.003**	.001	.151	.019**	.007	.084	-.004	.01	-.012	.015*	.008	.06	.045
Switzerland	.096**	.02	.135	.003**	.001	.153	.052**	.008	.192	-.019 [†]	.011	-.052	.009	.009	.026	.063
Turkey	.055**	.02	.068	.003**	.001	.132	.046**	.008	.165	.012	.01	.03	.004	.008	.013	.029
United Kingdom	.081**	.028	.098	.004**	.001	.162	.054**	.009	.241	-.039*	.015	-.096	.02	.016	.043	.057
United States	.07**	.025	.085	.002*	.001	.064	.036**	.012	.105	-.007	.014	-.017	.029 [†]	.016	.054	.024
Summary	20/31 significant			26/31 significant			29/31 significant			9/31 significant			12/31 significant			.015 to .15
Category ^b	Soft social base			Hard social base			Hard social base			Diffuse social base			Mixed results			

Note: B=unstandardized coefficients; SE=standard errors; β=standardized coefficients. n_{macro} = 31 (pooled sample and 30 countries); n_{micro} = 38,543.

^aMale=0; female=1.

^bHard social base: a cutoff of 75% consensus on consistent significant differences between countries; Soft social base: a cutoff of 50% consensus; Diffuse social base: a cutoff of 75% consensus of no significant differences; Mixed results: a combination of the other categories.

[†]p < .10, two-tailed.

* p < .05, two-tailed; ** p < .01, two-tailed.

TABLE 3
Regression results for the social bases of public environmental behavior, by pooled model and country

	Gender ^a			Age			Education			Income			Size Hometown			R ²
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β	
Pooled Model	.001	.001	.006	0**	0	.034	.012**	0	.216	.006**	0	.073	-.002**	0	-.029	.057
Argentina	-.004	.004	-.027	0	0	.008	.017**	.001	.372	.002	.002	.023	.002	.002	.037	.151
Austria	.003	.006	.017	0	0	.042	.018**	.003	.223	.001	.003	.013	.008**	.003	.098	.072
Belgium	0	.005	-.001	0	0	.028	.015**	.002	.198	.009**	.003	.096	.005 [†]	.003	.054	.063
Bulgaria	.001	.003	.014	0	0	-.048	.008**	.001	.231	.009**	.002	.193	.002 [†]	.001	.06	.163
Canada	-.004	.008	-.018	0	0	.026	.014**	.003	.17	.003	.004	.031	-.006 [†]	.004	-.07	.029
Chile	0	.004	.004	0	0	-.042	.012**	.002	.266	.003	.002	.046	0	.002	.003	.094
Taiwan (China)	.005	.003	.04	.001**	0	.13	.008**	.001	.188	.006**	.002	.096	0	.001	.005	.043
Croatia	.003	.004	.024	0	0	0	.011**	.002	.209	0 [†]	.002	0	.002	.001	.044	.050
Czech Republic	.006	.004	.039	0**	0	-.072	.014**	.002	.202	.006**	.002	.084	.002	.002	.033	.073
Denmark	.007	.006	.035	0	0	.007	.01**	.002	.122	.009**	.003	.088	.002	.002	.027	.032
Finland	.025**	.005	.135	0 [†]	0	-.047	.012**	.002	.17	.003	.003	.027	.003	.002	.038	.054
Germany	.008	.005	.041	0	0	-.007	.016**	.002	.235	.014**	.003	.144	-.001	.002	-.014	.100
Israel	.003	.005	.017	0*	0	-.062	.013**	.002	.218	.013**	.002	.158	-.004*	.002	-.057	.102
Japan	-.002	.003	-.018	0**	0	.133	.002 [†]	.001	.052	0	.002	.003	.004**	.002	.077	.024
Republic of Korea	.001	.003	.01	.001**	0	.137	.013**	.002	.275	.006**	.002	.083	0	.002	-.006	.069
Latvia	-.001	.003	-.008	0	0	-.01	.004**	.001	.1	.002	.002	.047	.001	.001	.026	.018
Mexico	-.003	.003	-.021	0*	0	.058	.004**	.001	.099	.005*	.002	.077	.001	.001	.025	.027
New Zealand	.012	.006	.055	0	0	-.043	.012**	.002	.179	.003	.003	.026	-.006*	.003	-.061	.043
Norway	.009 [†]	.005	.048	0	0	.006	.009**	.002	.13	0	.002	-.002	.005**	.002	.078	.030
Philippines	-.006 [†]	.004	-.048	0	0	-.023	.006**	.001	.144	.002	.002	.039	-.003*	.001	-.061	.028
Russian Federation	.002	.003	.016	0**	0	-.077	.005**	.001	.123	.002 [†]	.001	.054	-.001	.001	-.025	.032
Slovakia	-.008 [†]	.004	-.054	0	0	-.01	.014**	.002	.23	.006**	.002	.091	-.001	.002	-.01	.083
Slovenia	-.002	.004	-.012	0	0	-.02	.012**	.002	.24	.01**	.002	.148	.001	.002	.011	.113
South Africa	.004	.003	.029	0	0	-.021	.005**	.001	.102	.01**	.002	.163	.003**	.001	.062	.066
Spain	-.008**	.003	-.055	0	0	.018	.018**	.001	.346	.005**	.002	.068	0	.001	-.002	.146
Sweden	.008	.005	.045	0	0	-.005	.008**	.002	.134	.005*	.003	.057	.001	.002	.015	.028
Switzerland	.017**	.006	.071	0	0	.023	.031**	.003	.342	.007*	.003	.058	.002	.003	.02	.130
Turkey	-.001	.002	-.011	0**	0	.083	.01**	.001	.295	.004**	.001	.082	.001	.001	.023	.097
United Kingdom	-.004	.006	-.02	0*	0	.076	.019**	.002	.379	-.001	.003	-.014	.001	.003	.011	.125
United States	-.007	.006	-.035	0	0	.004	.016**	.003	.198	.016**	.003	.175	.006 [†]	.004	.05	.108
Summary	3/31 significant 2: positive; 1: negative			9/31 significant 9: positive			30/31 significant 30: positive			18/31 significant 18: positive			8/31 significant 4: positive; 4: negative			.018 to .163
Category ^a	Diffuse social base			Mixed results			Hard social base			Soft social base			Diffuse social base			

Note. B=unstandardized coefficients; SE=standard errors; β=standardized coefficients. n_{macro} = 31 (pooled sample and 30 countries); n_{micro} = 38,543.

^a Male=0; female=1.

^b Hard social base: a cutoff of 75% consensus on consistent significant differences between countries; Soft social base: a cutoff of 50% consensus; Diffuse social base: a cutoff of 75% consensus of no significant differences; Mixed results: a combination of the other categories.

[†] p < .10, two-tailed.

* p < .05, two-tailed; ** p < .01, two-tailed.

Despite the result described above, Table 4 shows a slightly different pattern for the social bases after controlling for the effect of attitudinal variables. After adding certain facets of environmental concern (e.g. knowledge, risk perception, efficacy) as control variables, six of the ten social bases detected previously changed. Four of them became “mixed results”, while gender, which was a soft social base for PrEB, became a hard social base, and size of hometown also changed for PrEB from mixed results to diffuse.

The models and the regression coefficients of each country suggest more differences than similarities in patterns and in the effect sizes of the socio-demographic variables. For example, the standardized coefficient for education and PrEB varied by a factor of 5 (from 0.05 in the Russian Federation to 0.248 in Bulgaria), and the

standardized coefficient for education and PuEB varied by a factor of 7.3 (from 0.052 in Japan to 0.379 in the UK). These variations, and all the other variables except gender for PuEB, were highly significant (see Table 5). Also, the socio-demographic determinants of both behaviors varied in predictable ways across nations, ranging from .015 to .15 of explained variance for PrEB (the Russian Federation and Japan, respectively), and from .018 to .16 of explained variance for PuEB (Latvia and Bulgaria, respectively).

Considering the standardized coefficients for the pooled sample, age and education for PrEB and education for PuEB seemed to have the strongest impact on behaviors. For example, an additional year of education or age increased PrEB by .111 and .127, respectively; and an additional year of education increased PuEB by .216.

TABLE 4

Summary of the relationships for the full model of environmental concern predicting private and public environmental behaviors

<i>Private env. behavior</i>	<i>Direct effect</i>			<i>Total effect</i>			<i>Category^a</i>
	<i>Positive</i>	<i>Negative</i>	<i>No significant</i>	<i>Positive</i>	<i>Negative</i>	<i>No significant</i>	
Social Bases							
Gender	20	–	11	27	–	4	hard social base
Age	29	–	2	27	–	4	hard social base
Education	2	7	22	12	–	19	mixed social base
Household income	2	14	15	2	9	20	mixed social base
Size of hometown	4	5	22	5	3	23	diffuse social base
Social values							
Postmaterialism	7	2	22	10	1	20	weak influence
Env. concern							
Knowledge	27	–	4	31	–	–	strong influence
Everyday risk pp.	27	–	4	29	–	2	strong influence
Env. risk pp.	30	–	1	28	–	3	strong influence
Efficacy	31	–	–	31	–	–	strong influence
Willingness	31	–	–	31	–	–	strong influence
<i>Public env. behavior</i>	<i>Direct effect</i>			<i>Total effect</i>			<i>Category^a</i>
	<i>Positive</i>	<i>Negative</i>	<i>No significant</i>	<i>Positive</i>	<i>Negative</i>	<i>No significant</i>	
Social Bases							
Gender	6	1	24	11	–	20	mixed social base
Age	9	–	22	9	4	18	mixed social base
Education	11	1	19	21	–	10	hard social base
Household income	10	–	21	12	–	19	mixed social base
Size of hometown	5	3	23	5	2	24	diffuse social base
Social values							
Postmaterialism	11	–	20	11	–	20	weak influence
Env. concern							
Knowledge	31	–	–	31	–	–	strong influence
Everyday risk pp.	14	–	17	27	–	4	strong influence
Env. risk pp.	9	–	19	20	–	11	medium-strong infl.
Efficacy	31	3	–	31	–	–	strong influence
Willingness	31	–	–	31	–	–	strong influence

Note: Total effect is the sum of direct and indirect effect. Positive and negative effects are significant at $p < .05$.

$n_{\text{macro}} = 31$ (pooled sample and 30 countries); $n_{\text{micro}} = 38,543$.

^a Categories come from the Total effects and from the following criteria: Hard social base: a cutoff of 75% consensus on consistent significant differences between countries; Soft social base: a cutoff of 50% consensus; Diffuse social base: a cutoff of 75% consensus of no significant differences; Mixed results: a combination of the other categories.

TABLE 5
Cross-level interactions of social bases-behavior slopes with development index

<i>Slopes as outcomes model</i>	<i>Private behavior</i>		<i>Public behavior</i>	
	<i>B</i>	<i>(SE)</i>	<i>B</i>	<i>(SE)</i>
Gender-behavior slope	.0625***	(.006)	-.0003	(.001)
Gender × development index	.0194**	(.006)	.0022	(.001)
Age-behavior slope	.0022***	(.000)	-.0002***	(.000)
Age × development index	.0006 [†]	(.000)	.0000	(.000)
Education-behavior slope	.0279***	(.004)	.0131***	(.001)
Education × development index	-.002	(.004)	.0025*	(.001)
Household Income-behavior slope	.0118*	(.005)	.0107***	(.001)
Household Income × development index	-.0015	(.005)	.0008	(.001)
Size of hometown-behavior slope	.0111**	(.004)	.0042***	(.001)
Size of hometown × development index	-.0070 [†]	(.004)	.0005	(.001)

Note: Unstandardized coefficients. Individual-level independent variables are group mean centered and entered only one at a time as covariates. REML estimation, $n_{\text{macro}} = 30$, $n_{\text{micro}} = 38,543$.
[†] $p < .10$, two-tailed; * $p < .05$, two-tailed; ** $p < .01$, two-tailed; *** $p < .001$, two-tailed.

Finally, from the slopes-as-outcomes multilevel models, we examined why the association between socio-demographic characteristics and behaviors was stronger in some countries than in others. Table 5 shows all the significant cross-level interactions detected. Specifically, we found that three of five possible interactions were significant for PrEB, and one of five for PuEB. Gender on PrEB and education on PuEB were positive and significant at $p < .05$ (two-tailed test), while age and size of hometown for PrEB were positive and negative, respectively, at $p < .10$ (two-tailed test). These results indicate that the extent of economic, educational and environmental development in a country dampens the effect of size of hometown for PrEB, and enhance the positive effect of several socio-demographic variables on both types of environmental behaviors.

DISCUSSION AND CONCLUSIONS

The results suggest that across the 30 ISSP nations studied, the relationship between socio-demographic characteristics and environmental behaviors are complex. It was found that all the different social bases (hard, soft, diffuse, or mixed) are today present across cultures. These results emphasize the idea that theories highlighting or defending only one type of social base should develop their insights more carefully.

This study shows how the diversity of the social bases is largely due to a number of specific reasons. First, social bases vary considerably according to the type of behavior analyzed. With the exception of education, all the other socio-demographic variables

showed a specific and differential social base depending on whether it was a private or a public environmental behavior. For example, income has a diffuse social base for PrEB but a soft social base for PuEB. Therefore, the social bases seem to be behavior-specific. Secondly, after the effect of attitudinal variables was added and controlled, the pattern of social bases changed substantially. Therefore, socio-demographic factors may play a minor role in behavior compared to psychological factors (Diamantopoulos et al., 2003), and this would also make the social bases more unstable. Lastly, in some cases the social bases are contingent upon, and could be related to, country-level characteristics. In this study, it was found that the higher the level of development of a country, the stronger or weaker the association between the socio-demographic variables and environmental behaviors.

In addition to the reasons discussed above, the apparently contradictory results highlight the need for similar and unified theoretical and methodological frameworks in order to establish cumulative and reliable evidence regarding the cross-cultural social bases of environmentalism. It should also be noted that despite the growing interest in cross-cultural studies (for a review, see Milfont, 2012), few of them have focused specifically on analyzing the social bases of pro-environmental behaviors, focusing instead on the other major stream in literature, i.e. the analysis of the effect of attitudinal variables.

In addition to the theoretical and methodological contributions of this research, the results allow us to formulate some practical implications. If we consider that environmental behaviors depends on *both*

external and internal factors -and the interaction of the two-, successful interventions must consider them *simultaneously* (i.e. reducing contextual barriers and enhancing personal attributes and disposition). Social scientists and policy makers who emphasize internal processes advocate interventions such as education and persuasion as the best way to change undesirable behavior and motivate desirable ones. Scientists and policy makers who emphasize external factors advocate interventions such as regulations or taxes to change behavior. Whichever group succeeds in gaining influence, the policies fall short because they neglect the critical insights provided by the other perspective (Guagnano, Stern and Dietz, 1995; Thøgersen, 2005).

Besides the contributions of this work, a number of limitations are worth highlighting. First, although the study focused on a cross-national comparison, the sample of countries analyzed here consisted mainly of industrialized, higher income nations; hence, the generalizability of the findings reported herein is problematic. Second, the study is limited due to its cross-sectional design, making the demonstration of causality problematic. These two limitations could be partially resolved in future research using other databases (e.g. World Value Survey for a larger number of countries, ISSP waves 1993, 2000 and 2010 for longitudinal designs). Third, there is some evidence that individual-level predictors (i.e. socio-demographic and psychosocial) have differential influences depending of the nature and type of behavior analyzed (Berenguer and Corraliza, 2000; Hidalgo et al., 2011). Therefore, future studies should consider analyzing each specific behavior separately to be able to discriminate potential differences between them. Fourth, another limitation is the exclusive use of self-reported behaviors, since people tend to magnify their environmental protection efforts without reflecting necessarily the reality. For example, Corral (1997) demonstrated how a comparison between reported and observed measures of reuse/recycling revealed low correlations between them and, Chao and Lam (2011) study showed that the frequency of five types of self-reported environmental behaviors were significantly higher than those measures by observation. Beside the use of observation techniques, future cross-cultural research should start using more accurate measures such as official metrics and statistics (e.g. metered household water/energy data).

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Notas:

- ¹ We imputed missing values using a procedure in SPSS 20, which utilizes the EM algorithm to estimate the means, standard deviations, and correlations of the variables in the dataset. This procedure was implemented for each of the twenty countries separately; inferences were thus made using only data from that particular country (i.e. data from Spain were used only in the creation of the imputed dataset for Spain). We identified a core set of variables beyond the variables of interest in our analyses for use in the imputations which were available in all countries in order to maximize available information in replacing missing data. The imputation procedure available in SPSS allows for the specification of a range of possible values, thus ensuring that missing data are replaced with reasonable estimates based on the EM algorithm and within specified boundaries. Also the EM algorithm generates five parallel data sets, and then utilized the imputed data in analyses presented here, verifying estimates across the imputed data. A comparison of descriptive statistics (i.e. means, standard deviations, and ranges) for all variables and all countries (not shown) establishes data sets with imputed values similar to the original data.
- ² Notice that the response format of the items may be "forcing" the two-factor structure described here.
- ³ For the sample of all countries pooled, standardized factor loadings range from 0.42 to 0.76 for private behavior, and 0.48 to 0.70 for public behavior (all significant, $p < .001$). Overall model fit statistics are very good (private: $\chi^2(2) = 305596$, $p = .000$, GFI .996, NFI .990, RMSEA .063; public: $\chi^2(13) = 1484$, $p = .000$, GFI .989, NFI .967, RMSEA .054). Because a three items model is exactly identified within a CFA, results for public environmental behavior come from a single CFA that include a correlation between both types of behavior. The total sample Cronbach's alpha for PrEB is .72 and .56 for PuEB. Also we conducted country-by-country CFAs finding support for the structure proposed (more information is available upon request).
- ⁴ For the sample of all countries pooled, standardized factor loadings range from 0.57 to 0.71 for risk perception; 0.74 to 0.92 for environmental knowledge; 0.50 to 0.65 for efficacy, and 0.67 to 0.85 for willingness to make personal sacrifice (all significant, $p < .001$). Overall model fit statistics are good for these measures (risk perception: $\chi^2(8) = 47140$, $p = .000$, GFI .986, NFI .974, RMSEA .075; knowledge: $\chi^2(18) = 1857$, $p = .000$, GFI .989, NFI .979, RMSEA .051; efficacy and willingness: $\chi^2(8) = 677$, $p = .000$, GFI .994, NFI .989, RMSEA .047). Because a two items model is unidentified within a CFA, results for environmental knowledge come from a single CFA that include a correlation with risk perception, and because a three items model is exactly identified within a CFA, results for efficacy and willingness come from a single CFA that include a correlation between them. The total sample Cronbach's alpha for risk perception is .81, for knowledge is .81, for efficacy is .59 and for willingness is .83. Also we conducted country-by-country CFAs finding support for the structures proposed (more information is available upon request).
- ⁵ The categorization criterion used, and in particular the cut-off with the chosen percentages, were arbitrary. We did not find any study in the literature that establishes cut-off for the different types of social bases proposed here. Therefore, these represent a novel contribution introduced by the authors.

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