

## Global Convergence and National Disparities in the Structure of Environmental Attitudes and Their Linkage to Pro-Environmental Behaviours

HUI-JU KUO

*Institute of Sociology*

*Academia Sinica*

*128 Sec. 2, Academia Rd., Nankang, Taipei 115, Taiwan*

*Email: hjkuo@sinica.edu.tw*

YANG-CHIH FU

*Institute of Sociology*

*Academia Sinica*

*128 Sec. 2, Academia Rd., Nankang, Taipei 115, Taiwan*

*Email: fuyc@sinica.edu.tw*

### ABSTRACT

Although similar environmental issues are present across the globe, residents from different countries may vary in the extent to which they are concerned about and act upon such issues. Drawing on data from the 2010 Environment module of the International Social Survey Programme, this study tests the structural comparability of environmental attitudes across 32 countries and examines how pro-environmental behaviours are linked to relevant attitudes. A confirmatory factor analysis from structural equation modelling helps identify three consistent latent constructs of environmental attitudes: willingness to sacrifice, biospheric orientation, and environmental skepticism. Further regression analyses reveal that the linkages between pro-environmental behaviours and the constructs of environmental attitudes converge in some countries, but are less consistent in others. The findings help pinpoint signs of global convergence and national disparities, which merit more extensive analyses amid the recent surge in the availability of diverse empirical data from around the world.

### KEYWORDS

Structural equivalence of environmental attitudes, pro-environmental behaviour, confirmatory factor analysis, International Social Survey Programme

## INTRODUCTION

Concerns about environmental problems have emerged in recent decades as a critical social issue on both national and international agendas. As the same development patterns have caused similar environmental problems across much of the globe, more recent studies have started to inquire into whether and how similar pro-environmental attitudes and behaviours have also emerged across various regions and nations (Hadler and Haller, 2011).

Although some environmental issues may be universal, nations and regions might differ in the extent to which residents are concerned about such issues. More importantly, how environmental attitudes or perceptions are structured may also differ from society to society (Gifford and Nilsson, 2014). In contrast to the dualistic view of human relations with the environment common in some Western countries, for example, Asian and Latin American people tend to have a more holistic view of nature and growth (Aoyagi-Usui et al., 2003; Corral-Verdugo and Armendáriz, 2000). In other words, structural disparities in environmental values, concerns, and attitudes may exist among countries and regions, which may further complicate efforts to explain pro-environmental behaviours.

Using a global survey data set from the 2010 Environment III Module of the International Social Survey Programme (ISSP), we first examine the structure of environmental attitudes across 32 countries. We then investigate how pro-environmental behaviours are linked to

relevant attitudes and how such linkages indicate any universal patterns or disparities. Such comparative analyses serve to advance environmental studies in three ways. First, the study helps explain how environmental concerns are structured cross-nationally. While previous findings (Schultz, 2000, 2001) have provided useful frameworks for identifying the structure of environmental concern based mostly on data from certain Western countries, the current study tests the structural equivalence across countries in East Asia and South America.

Second, although the literature has shown overall patterns of a clear attitude-behaviour linkage, our comparative analyses help identify whether and how such patterns converge or differ across national contexts. Third, parallel data help us identify the composition of environmental concerns by means of measurement modelling, which highlights the advantage of using compatible measurements to examine how the attitude-behaviour linkage differs across nations. In sum, the aim of the current study is to better understand how the linkage between pro-environmental attitudes and behaviours has emerged in a (dis)similar way cross-nationally to advance conceptual and methodological contributions to the existing literature amid the recent surge of more diverse empirical data from around the world.

## THE STRUCTURE OF ENVIRONMENTAL ATTITUDES

To explore how the attitude-behaviour link works in environmental studies, it would help to first identify the unique structure of environmental attitudes. Environmental attitudes, a

general term referring to ‘beliefs, affect, and behavioural intentions a person holds regarding environmentally related activities or issues’ (Schultz et al., 2004: 31), represent a broader concept than ‘environmental concern’ or ‘the degree to which people are aware of problems regarding the environment’ (Dunlap and Jones, 2002: 485). Often used interchangeably with environmental concern, attitudes about environmental issues essentially reflect certain social value orientations (McIntyre and Milfont, 2016).

One dimension of such value orientations, as Stern and Dietz (1994) argued, manifests egoistic, social-altruistic, and biospheric tendencies. In this tripartite classification of environmental attitudes, the expression of environmental concern originates from the relative significance an individual places on the self, other human beings, and other species and ecological systems. Although initial limited data failed to support the third, biospheric, value orientation (Stern and Dietz, 1994), this conceptual framework laid out an underlying structure for developing a systematic method to investigate how people differ in expressing environmental concern.

Later studies tended to verify the structure of environmental attitudes. For example, some of the studies in both the United States and Europe showed clearer distinctions among egoistic, altruistic, and biospheric environmental concern (Schultz, 2000, 2001). In general, the types of environmental concern people developed were linked to the degree to which they viewed themselves as part of the natural environment. Other studies conducted in the United

States have shown distinct dimensions (pro-environment, less-growth, and pro-animal) of pro-environmental attitude (Uyeki and Holland, 2000).

#### CROSS-NATIONAL COMPARABILITY OF ENVIRONMENTAL ATTITUDES

Empirical studies from non-Western societies, however, have offered somewhat different evidence. For example, studies in both Brazil and Mexico revealed a tri-factorial structure of value orientations (natural balance, limits to growth, and humans above nature) that differed markedly from the bi-factorial structure (natural balance and human above nature) in the United States (Bechtel et al., 1999). Another study also identified how the structure of environmental attitudes in Asian countries differs from that in Western countries (Aoyagi-Usui et al., 2003). More specifically, while pro-environmental attitudes in the Netherlands and the United States are associated with altruistic values, such attitudes are linked to both traditional and altruistic values in Japan, Thailand, and the Philippines. In other words, an environmental way of thinking tends to conform to traditional Asian values, which emphasize that humans are united with nature, not in opposition to it.

More recent studies have further revealed similarities and differences across countries or regions in such measures as environmental concern (Xiao and Dunlap, 2007), environmental values (Boeve-de Pauw and Van Petegem, 2011), and environmental trust (Marquart-Pyatt, 2016). Based on ISSP data, survey research on the contents and drivers of environmental

attitudes has indicated that Central and Eastern European countries (Marquart-Pyatt, 2012), post-Communist societies (Chaisty and Whitefield, 2015), and less developed countries (LDCs) (Çarkoğlu and Kentmen-Çin, 2015) exhibit unique qualities regarding how people view and act in relation to the environment. People in former socialist states and less developed countries, for example, may display heightened concerns about environmental threats and lower willingness to make economic sacrifices to accommodate environmental concerns. Nevertheless, scant literature has examined the structural similarities or disparities of environmental attitudes by expanding the pool of nations to contain different societies.

To ensure that the measurements on environmental attitudes are comparable, it is essential to test empirically how the latent structure and the indicators correlate across national contexts. Because environmental attitudes may lead to corresponding behaviours, one major issue in past decades has focused on how to better understand the attitudinal and social bases that underlie pro-environmental behaviours.

## LINK BETWEEN ENVIRONMENTAL ATTITUDES AND PRO-ENVIRONMENTAL BEHAVIOURS

Pro-environmental behaviours tend to yield beneficial impacts on the environment. As environmental problems are widespread throughout the world and are usually the consequences of people's everyday behaviours, it is critical to examine the factors and social

bases that determine pro-environmental behaviours. To understand how such pro-environmental behaviours vary, one of the approaches has been to link each behaviour to its potential attitudinal bases, or the clusters of attitudes that tend to associate with certain behavioural patterns (Marquart-Pyatt, 2011; Oreg and Katz-Gerro, 2006; Braitto et al., 2017).

Most researchers have viewed the attitude-behaviour linkage as deriving from an argument about how people behave altruistically. Social norms, for example, may lead people to perceive that they have a moral obligation to take responsibility for a particular behaviour (Schwartz, 1977). When evaluating the relationship between environmental concern and behaviours, then, a causal chain that links values, beliefs, and personal norms could be the best explanatory framework to predict pro-environmental behaviours (Stern, 2000). In particular, altruistic values would be the main factor in activating pro-environmental norms and actions, and egoistic values would have negative effects.

Among the attitudinal bases, researchers have examined a pair of similar terms and measurements: ecocentric versus anthropocentric attitudes toward environment-friendly activities (Thompson and Barton, 1994). While ecocentric and anthropocentric attitudes both had positive effects on environmental-oriented behaviours, the motives behind these attitudes were distinguishable. Those who supported environmental issues for ecocentric reasons, in particular, felt that nature should be preserved because it is a spiritual or transcendental unity, while human beings are just a part of nature (de Wit, 2015). Such a belief alone can

contribute to actions to protect the environment, regardless of the economic implications of conservation. Ecocentric attitudes resemble biospheric concerns, because they stress how human beings are connected to the ecosystem.

In contrast, for those who support pro-environmental activities for anthropocentric reasons, the motive for environmental protection emphasizes how to benefit humans and promote their health and quality of life. Because anthropocentric beliefs focus on human welfare and outcomes, they are comparable to egoistic and altruistic values in value-basis theory (Stern and Dietz, 1994), or may have an altruistic component (Hernandez et al., 2012).

Although these empirical studies have adopted somewhat different dimensions of value structures (egoistic, altruistic, and biospheric versus anthropocentric and ecocentric attitudes), they have followed very similar theoretical arguments to those discussed above. Overall, research has shown that pro-environmental behaviours are associated with a person's immediate self-interest and altruistic orientations. The literature has tended to support that pro-environmental behaviours occur in response to moral norms that are activated in individuals who hold more ecocentric or altruistic attitudes.

The current study examines whether and how such attitude-behaviour linkages converge or differ across national contexts. More specifically, our research questions are: Are people who express higher levels of moral obligation toward others and the ecosystem more likely to



protect the environment? Are people who judge environmental issues based on self-interest less likely to engage in pro-environmental behaviours?

To ensure that the measures on environmental attitudes are comparable, our unique contribution to the literature is to examine a hypothesized model to test empirically how the latent concept and the indicators of environmental attitudes correlate across nations and different social groups.

## DATA AND METHODS

We drew upon data from the 2010 Environment III module of the International Social Survey Programme (ISSP Research Group, 2012). Compared to other international surveys that also address environmental issues, such as the World Values Survey, this particular ISSP module contains nationally representative samples with individual-level data on a variety of questions concerning environmental values, attitudes, and behaviours. The comprehensive nature of this dataset facilitates comparative analyses on the structure of environmental attitudes and their linkage to pro-environmental behaviours. The valid sample comprises 36,637 cases from 32 countries (Table 1). Our analytical strategy involves two stages of factorial analyses that help reveal the latent constructs of environmental attitudes.

*Exploratory factor analysis of environmental attitudes: Stage-1 analysis*

To examine the structure of environmental attitudes, we first used an exploratory factor analysis (EFA) to identify latent variables from the interrelations among observed variables for the full sample of 32 countries. With a small number of factors, the EFA can help uncover the succinct latent dimensions of environmental attitude, even though we did not specify a prior model design based on relevant theories. The observed nine attitudinal questions (Table 1) measured how respondents responded to various statements regarding the links between humans and the environment, all on a five-point scale (from 1 = strongly disagree or very unwilling to 5 = strongly agree or very willing).

The EFA, based on the Kaiser-Guttman criterion and scree plots of eigenvalues, helped identify three distinct factors (Table 2). The first factor represents the attitudinal dimension about *willingness to sacrifice*, which refers to respondents' tendency to express various trade-offs for the sake of the environment. The second factor refers to *environmental skepticism*, in which respondents display distrustful attitudes toward environmental risks, and tend to judge environmental issues based on self-interest. The third factor indicates *biospheric orientation* attitudes, which helped distinguish those who perceive threats from environmental problems and tend to judge environmental issues based on costs or benefits to ecosystems or the biosphere.

Although such a convergent structure of environmental attitudes emerged cross-nationally, the factor structures in Norway, the Philippines, Sweden and Turkey differed from those of all other nations. The findings actually identified a two-factor structure in Norway, the Philippines, and Sweden and a three-factor structure with different indicator matrices in Turkey. To test and confirm the structural comparability of environmental attitudes cross-nationally, we proceed with the second-stage analyses of the full sample of 32 countries.

*Confirmatory factor analysis of environmental attitudes: Stage-2 analysis*

Because there are structural issues worth further analyses, we then followed with a confirmatory factor analysis (CFA) from structural equation modelling (SEM) as our second-stage analyses to confirm a hypothesized model of latent constructs and examined whether the data fit these latent constructs across 32 countries. As an extension of measurement models, the CFA accounts for both random and non-random measurement errors in survey items to generate consistent and stable estimates of the latent traits in structural models (Bollen, 1989). According to the latent structure derived from the EFA, we could specify how each latent construct consists of different indicators (see Figure 1).

Based on our review of relevant literature, we assumed theoretical covariance among the three latent constructs: *willingness to sacrifice*, *biospheric orientation*, and *environmental skepticism*. To better test errors and improve model fit in the measurement, we further added

six correlated error terms among the nine observed indicators. This confirmatory factor analysis meets such assumptions as having a general normal distribution and an adequate sample size, without perfect multicollinearity.

For the model fit statistics, we included two indexes to determine the goodness of fit. The incremental fit index (IFI) and the Tucker-Lewis index (TLI), which measure the proportional reduction in  $\chi^2$  values from the baseline to the hypothesized model, while adjusting for the degrees of freedom, are alternative indices commonly used to estimate goodness of fit. For both fit statistics, which range from 0 to 1, values above .95 indicate an excellent fit and values greater than .90 are considered a good fit. Furthermore, the root mean squared error of approximation (RMSEA) measures the degree of mismatch between the observed and implied covariance matrix. Typically, values below .05 suggest a very good fit.

### *Dependent variables*

Pro-environment behaviours in different realms may bring about somewhat different impacts in terms of their eventual effects and consequences. To focus on activities that people are more likely to engage in to show their environmental concern, we analyse those environmental behaviours involving active participation in household-oriented actions.

Five measures in the 2010 ISSP module indicated how often respondents (a) made a special effort to sort glass, tins, plastic, or newspapers, and so on, for recycling<sup>1</sup>; (b) cut back on driving a car for environmental reasons; (c) reduced the energy or fuel used at home for environmental reasons; (d) saved or re-used water for environmental reasons; and (e) avoided buying certain products for environmental reasons. We changed the order to a scale from 1 (never) to 4 (always) for each item and used the means from the five questions as the dependent variable. Compared to other approaches, we used the mean score to keep as many valid cases as possible so as to avoid significant bias (more explanations in the footnotes)<sup>2</sup>.

### *Independent variables*

The major independent variables represent three types of environmental attitudes: *willingness to sacrifice*, *environmental skepticism*, and *biospheric orientation*. We used the product of

---

<sup>1</sup> In cases that a recycling program was not available where the respondent lived, or when the respondent did not or could not drive a car (i.e., when the content of the question was not applicable), we used the mean score from the applicable questions instead of treating them as missing data (Hadler and Haller, 2011). Due to the large proportions of non-applicable cases (up to 21% for the item on driving a car), this treatment enabled us to keep as many valid cases as possible so as to avoid significant bias.

<sup>2</sup> We also tried two imputation methods, both of which turned out to be less preferable. With mean imputation, the cases with substitution values would have accounted for about 7% of the sample size in North America, 10% in Western Europe, 18% in Northern Europe and Southern Europe, 22% in East Asia, 43% in Eastern Europe, and 50% in Latin America, which would have biased the analysis. Another multiple imputation method would be to use Bayesian regression to estimate these missing cells, but the coefficients of variation were too large (> 0.5), indicating that the imputation was not reliable. For all these reasons, we have presented the results without such adjustments.

factor coefficients multiplied by standardized values of the observed variables to construct attitudinal index scores for each respondent. Based on multiple attitudinal measures, using these substantive attitudinal indices as independent variables helped avoid the problem of using a single criterion that relies on any specific distribution of the data.

To account for possible variations due to individual background, we controlled for the following sociodemographic variables: gender (1 = female, 0 = male), age (15 to 98), education (from 0 to 20 years of schooling), and the degree of urbanization of residence (1 = a farm or home in the country, or in a country village; 2 = a town or a small city; 3 = the suburbs or outskirts of a big city; 4 = a big city).

## RESULTS

As a whole, respondents from the 32 countries shared some pro-environmental behaviours while differing in others (Table 1). In all countries, except for Russia, Turkey, South Africa, and those in Latin America, for example, the most popular pro-environmental behaviour turned out to be recycling, with up to 90% of residents in Western Europe often or always making a special effort. In contrast, cutting back on driving fell to the bottom of the list across all these countries. While residents in countries in Northern Europe and North America engaged more frequently in reducing energy or fuel use than in saving water for

environmental reasons, people in East Asian countries reported engaging in more water conservation than power conservation.

Unlike their convergence in pro-environmental behaviours, residents in these major regions tended to diverge on environmental attitudes (Table 1). While the top concern about the environment in countries which belong to Western, Northern, and Southern Europe was that the earth cannot continue to support population growth at its present rate, other issues seemed to be more pressing for people in other regions. East Asians, for example, were generally most concerned that environmental problems have a direct effect on their lives. They were also the most likely to be willing to pay higher prices and taxes, and to accept cuts in their standard of living. Respondents in countries in both Eastern Europe and Latin America, in contrast, tended to be most concerned that almost everything humans do in modern life harms the environment.

*Constructing the latent structure of attitudes from the confirmatory factor analysis*

With these initial signs of regional differences in environmental attitudes, it would be more revealing to compare the underlying structures of such attitudes among different countries. To clarify the latent relationships among environmental concerns, we conducted CFAs across 32 countries to generate consistent estimates in structural models, as shown in Figure 1. The core idea of the latent variable approach is that for measurements to be equivalent,

respondents from different countries need to attach the same meaning to the latent construct as a whole.

The configural invariance served to confirm the identical patterns between the observed and latent variables across different countries. In other words, the structural equivalence ensured that respondents from different countries conceptualized environmental attitudes and their scale items in the same way and that the relations between the underlying constructs were similar across these countries.

Although the EFAs identified a common three-factor structure in our first-stage analyses, the structural non-equivalence essentially revealed disparities in the attitudinal latent constructs. The CFA results shown in Table 3 yielded information about configural invariance across such nations as Austria, Belgium, Britain, Canada, Chile, Denmark, Finland, France, Japan, Latvia, New Zealand, Norway, Sweden, Switzerland, Taiwan, and the United States, mainly those in Western Europe, Northern Europe, and North America.

Among all other countries, the CFA solution did not converge, implying that the structural measures were not equivalent for such countries as Argentina, Bulgaria, Croatia, Czech Republic, Germany, Israel, Lithuania, Mexico, Philippines, Russia, Slovak Republic, Slovenia, South Africa, South Korea, Spain, and Turkey. These disparities likely resulted from strict definitions of parameter matrices, latent components, or the location of fixed, free, and constrained parameters involved in the modelling.



Overall, relevant statistics indicated very good fit of the model to the data across these 16 countries only (Table 3). While the significance  $\chi^2$  tests rejected the null hypothesis that the implied model covariance adequately reproduced the observed covariance, the excessive power that came from large sample sizes made the  $\chi^2$  tests restrictive. For the fit statistics of both the incremental fit index (IFI) and the Tucker-Lewis index (TLI), values above .95 for Belgium, France, Switzerland, Finland, Latvia, Norway, Sweden, United States and Chile indicated an excellent fit. For the RMSEA, values below .05 for Belgium, Switzerland, Latvia, Norway, Sweden, Chile and Taiwan suggested a very good fit.

The component fit further reveals the model parameter estimates (Table 3). The standardized factor loadings represent how the observed variables change, in standard deviation units, for each standard deviation unit change in the latent factor. In general, all factor loadings for environmental concern latent constructs were significant, thus confirming that the observed variables in the hypothesized model were valid measures of the three latent constructs.

The results also indicated that covariance between latent factors were similar in relative magnitude across 16 countries. For example, while both *willingness to sacrifice* and *biospheric orientation* correlated negatively with *environmental skepticism*, the covariance between *willingness to sacrifice* and *environmental skepticism* was higher in magnitude. The

theoretical covariance between *biospheric orientation* and *environmental skepticism*, however, remained nonsignificant in Belgium, Latvia, Chile, Japan, and Taiwan.

Based on such structural equivalence on environmental attitudes, we focused on these 16 countries for further, more detailed analyses. Using the three latent constructs as independent variables, we ran multiple regressions to explore which attitudinal and sociodemographic factors better explained the variance in environmental behaviours (the outcome variable) and to examine possible national disparities in the attitude-behaviour linkage.

#### *Linking environmental attitudes and pro-environmental behaviours*

Among the attitudinal latent constructs, both *willingness to sacrifice* and *biospheric orientation* yielded strong positive effect on pro-environmental behaviours across countries (Table 4). When respondents expressed higher levels of moral obligation and were more willing to sacrifice themselves to protect the environment, they were more likely to do recycling, cut back on driving, reduce energy use, save water, or avoid buying certain products for environmental reasons. Most of the regression coefficients turned out to be statistically significant at the .001 level, particularly in Austria, Switzerland, Latvia, Great Britain, Chile, Taiwan, and New Zealand.

Overall, the biospheric environmental attitude also correlated positively with pro-environmental activities. Those who see the environment from a more holistic perspective,

for example, were indeed more likely to take part in pro-environmental behaviours. Such a close linkage was more common in European and North American countries than in others. In other words, while most countries in Europe and North America converged in close and significant associations between environmental-friendly attitudes and pro-environmental behaviours, the degrees of these associations tended to differ across countries within and between regions.

Such national disparities became more obvious in the linkage between the skeptical attitude and pro-environmental behaviours. As expected, *environmental skepticism* was negatively associated with pro-environmental behaviours: People are less likely to take part in pro-environmental actions if they do not believe in environmental risks and judge environmental issues based on their self-interests. In some nations across Europe, particularly Belgium, Switzerland, Latvia, and Norway, such a skeptical view tended to yield significantly negative effects on pro-environmental behaviours. In other countries, however, environmental skepticism seemed to be less relevant to pro-environmental behaviours. There was a positive non-significant association in Sweden and Canada, for example. In other words, countries within and across regions vary in whether having a skeptical view of environmental risks might prevent one from engaging in household-level or everyday activities that are supposedly good for the environment.

For the controlled variables, sociodemographic factors also varied in how they related to pro-environmental activities across these 16 countries. Education, for example, did not have consistent influences across the countries. While better-educated residents were more likely to do environmental-friendly activities in Chile and Taiwan, the education-behaviour linkage was negative in France and Japan. Urban residence also seemed to play an inconsistent role in explaining environmental behaviours. While urban effects emerged in Belgium, Japan, and Taiwan, a significant and negative effect appeared in Austria, thus adding another key sociodemographic effect that differed markedly among countries.

## DISCUSSION AND CONCLUSIONS

When exploring how people around the world deal with pressing environmental issues, it becomes essential, even if difficult, to take both global convergence and disparities among nations into account. In the current study, in particular, the advantage of using compatible measurements regarding environmental attitudes enabled us to evaluate their linkage to pro-environmental behaviours more precisely.

Overall, the current study showed national differences, along with some converging patterns. To clarify how one can compare the structures of environmental attitudes, this study employed two stages of factorial analyses to examine the composition of environmental concerns and investigated how pro-environmental behaviours may be linked to corresponding

attitudes cross-nationally. Based on the latest wave of ISSP data from 32 countries, the exploratory factor analysis identified three distinct factors, *willingness to sacrifice*, *biospheric orientation*, and *environmental scepticism*.

We then conducted confirmatory factor analyses from structural equation modelling as our second-stage analyses, to confirm the structural comparability of such latent constructs. Although the findings revealed clear configural invariance across 16 countries, mostly in Western Europe, Northern Europe, and North America, the structure of such environmental attitudes turned out to be unique in countries in Southern Europe, Eastern Europe, and West Asia. The results, therefore, not only partially replicated findings from previous research that identified distinct dimensions of pro-environmental attitudes (Schultz, 2000, 2001), but also demonstrated that national disparities exist in the structures of environmental attitudes.

In non-Western countries, moreover, our findings about the nonsignificant covariance between the latent constructs in our structural models challenged existing theories that propose a negative association between environmental skepticism and biospheric attitudes. In other words, those who display distrustful or self-interest attitudes toward environmental issues might not necessarily be unaware of how human beings are connected to the ecosystem or the biosphere, particularly in non-Western societies. Our analyses of the attitudinal structure across national contexts highlight the complexity of how values and environmental attitudes evolve in people's lives. Such a converging pattern and uncommon national

disparities in the attitudinal structure may broaden efforts to further explore environmental issues and suggest that cultures may vary in the ways that people think about and act in regard to the environment (Sarigöllü, 2009).

The underlying attitudinal structure also helps make it possible to develop research perspectives that aim to explain how behavioural intentions and actions for protecting the environment can be traced to value orientations (Stern et al., 1999; Stern et al., 1995). Our regression analyses further revealed somewhat consistent associations between environmental attitudes and pro-environmental behaviours. In general, most environmental attitudes were linked to pro-environmental behaviours in the household realm. Such patterns appeared particularly significant and coherent in West European countries, but less consistent in countries in Northern Europe and North America. Our cross-national analyses, moreover, suggest that some attitudes may lead to different outcomes in different national contexts.

As the literature has suggested, pro-environmental behaviours can be guided by the interplay of prosocial and self-interest orientations. In general, the more strongly individuals subscribe to a prosocial orientation, the more likely they will engage in environmental-friendly activities. Such associations tend to be widespread, because our findings indicated that individuals' attitudes on trade-offs between environment and economy lead to pro-environmental behaviours.

As public concern over the seriousness of environmental problems is widespread, people are becoming more willing to protect the environment while making economic sacrifices. The underlying motives of this prosocial orientation, however, come from different beliefs regarding human-environment relations.

Our findings about how biospheric concerns lead to pro-environmental behaviours add to the literature regarding the linkage between environmental attitudes and behaviours (de Groot and Steg, 2008; Katz-Gerro et al., 2017). Such ecocentric attitudes, in particular, have played a significant role in explaining how people differ in expressing environmental concerns and how different concerns may lead to pro-environmental behaviours. In addition to contributing to the current literature, thus, our study has some valuable policy implications. To increase the likelihood of acting upon biospheric concerns, for example, decision makers could design policies or interventions encouraging people to participate in nature-based tourism (Lee and Jan, 2015). By giving citizens more opportunities or incentives to nurture or strengthen their biospheric attitudes through recreation experiences, such policies would go a long way toward promoting pro-environmental behaviours at the societal level.

Overall, our findings about structural disparities in environmental attitudes generally confirmed previous findings in the literature, which have suggested that concerns about human-nature relations would vary across societies and social backgrounds (Hunter et al., 2010). How people perceive the environment, for example, usually depends on how they

interpret environmental risks and uncertainties, which in turn come from their shared experiences and cultural values.

This current study diverges from prior works in constructing structural models of measurements to generate consistent and stable estimates of the latent traits of environmental attitudes cross-nationally. Such a comparative tool enabled us to evaluate the attitude-behaviour linkage across nations more precisely and convincingly. To explain national disparities in the structure of environmental attitudes and the attitude-behaviour linkage in future studies, researchers could further explore other possible factors, such as people's knowledge about environmental problems (Dunlap, 1998) and cultural differences in exposure to green ideas (Ester et al., 2004).

Although the various national disparities this study has unravelled may seem sporadic, they indicate areas that merit further exploration. Future studies would benefit by overcoming several limitations of the current paper. Conceptually, neither the framework nor the empirical data of our study deal with issues regarding destructive environmental behaviours, such as how and why people get involved in behaviours harmful to the environment, and what kinds of psychological and social circumstances may correspond to related behavioural changes. Exploring pressing research issues from such alternative viewpoints should further enrich our knowledge about environmental issues across even wider-ranging regions.



Empirically, the data derived from the 2010 ISSP survey cover 32 mostly well-developed countries. Compared to earlier studies that relied on only about one half of this many countries (Hadler and Haller, 2011), the current paper has expanded the pool of comparisons by incorporating more surveys from Eastern Europe, Latin America, and East Asia. In terms of the proportions of both the number of countries and population sizes, nonetheless, our coverage remains low, and the findings of our study should not be overgeneralized. To better understand how residents in the vast majority of other regions and societies perceive environmental issues and whether and how they behave accordingly, some unknown questions need further exploration amid the recent surge in the availability of more diverse empirical data from around the world.

#### References

- Aoyagi-Usui, M., H. Vinken and A. Kuribayashi. 2003. 'Pro-environmental attitudes and behaviors: An international comparison'. *Human Ecology Review* **10**: 23-31.
- Bechtel, R.B., V. Corral-Verdugo and J.Q. Pinheiro. 1999. 'Environmental belief systems: United States, Brazil, and Mexico'. *Journal of Cross-Cultural Psychology* **30**: 122-128. doi: 10.1177/0022022199030001008.
- Boeve-de Pauw, J. and P. Van Petegem. 2011. 'A cross-cultural study of environmental values and their effect on the environmental behavior of children'. *Environment and Behavior* **45**: 551-583. doi: 10.1177/0013916511429819.
- Braitto, M.T., K. Böck, C. Flint, A. Muhar, S. Muhar and M. Penker. 2017. 'Human-nature relationships and linkages to environmental behaviour'. *Environmental Values* **26**: 365-389. doi: 10.3197/096327117X14913285800706.
- Çarkoğlu, A., and Ç. Kentmen-Çin. 2015. 'Economic development, environmental justice, and pro-environmental behavior.' *Environmental Politics* **24**:575-597. doi: 10.1080/09644016.2015.1023574.

- Chaisty, P., and S. Whitefield. 2015. 'Attitudes towards the environment: Are post-Communist societies (still) different?' *Environmental Politics* **24**:598-616. doi: 10.1080/09644016.2015.1023575.
- Corral-Verdugo, V. and L.I. Armendáriz. 2000. 'The "new environmental paradigm" in a mexican community'. *The Journal of Environmental Education* **31**: 25-31. doi: 10.1080/00958960009598642.
- de Groot, J.I.M. and L. Steg. 2008. 'Value orientations to explain beliefs related to environmental significant behavior: How to measure egoistic, altruistic, and biospheric value orientations'. *Environment and Behavior* **40**: 330-354. doi: 10.1177/0013916506297831.
- de Wit, S. 2015. *Global Warning. An Ethnography of the Encounter between Global and Local Climate-Change Discourses in the Bamenda Grassfields, Cameroon*. Cameroon: Langaa RPCIG.
- Dunlap, R.E. 1998. 'Lay perceptions of global risk. Public views of global warming in cross-national context'. *International Sociology* **13**: 473-498. doi:10.1177/026858098013004004.
- Dunlap, R.E. and R. Jones. 2002. 'Environmental concern: Conceptual and measurement issues'. In R. Dunlap and W. Michelson (ed), *Handbook of Environmental Sociology*, pp.482-524. Westport, CT: Greenwood Press.
- Ester, P., S. Simões and H. Vinken. 2004. 'Cultural change and environmentalism: A cross-national approach of mass publics and decision makers'. *Ambiente & Sociedade* **7**: 45-66.
- Gifford, R. and A. Nilsson. 2014. 'Personal and social factors that influence pro-environmental concern and behaviour: A review'. *International Journal of Psychology* **49**: 141-157. doi: 10.1002/ijop.12034.
- Hadler, M. and M. Haller. 2011. 'Global activism and nationally driven recycling: The influence of world society and national contexts on public and private environmental behavior'. *International Sociology* **26**: 315-345.
- Hernandez, B., E. Suarez, V. Corral-Verdugo and S. Hess. 2012. 'The relationship between social and environmental interdependence as an explanation of proenvironmental behavior'. *Human Ecology Review* **19**: 1-9.
- Hunter, L.M., S. Strife and W. Twine. 2010. 'Environmental perceptions of rural south african residents: The complex nature of environmental concern'. *Society & Natural Resources* **23**: 525-541. doi: 10.1080/08941920903357782.
- ISSP Research Group. 2012. International Social Survey Programme: Environment III - ISSP 2010. GESIS Data Archive, Cologne. ZA5500 Data file Version 2.0.0. doi:10.4232/1.11418

- Katz-Gerro, T., I. Greenspan, F. Handy and H.Y. Lee. 2017. 'The relationship between value types and environmental behaviour in four countries: Universalism, benevolence, conformity and biospheric values revisited'. *Environmental Values* **26**: 223-249. doi: 10.3197/096327117X14847335385599.
- Lee, T.H. and F.H. Jan. 2015. 'The effects of recreation experience, environmental attitude, and biospheric value on the environmentally responsible behavior of nature-based tourists'. *Environmental Management* **56**: 193-208. doi: 10.1007/s00267-015-0488-y.
- Marquart-Pyatt, S.T. 2011. 'Explaining environmental activism across countries'. *Society & Natural Resources* **25**: 683-699. doi: 10.1080/08941920.2011.625073.
- Marquart-Pyatt, S.T. 2012. 'Environmental concerns in cross-national context: How do mass publics in Central and Eastern Europe compare with other regions of the world?'. *Czech Sociological Review* **48**:441-466.
- Marquart-Pyatt, S.T. 2016. 'Environmental trust: A cross-region and cross-country study'. *Society & Natural Resources* **29**: 1032-1048. doi: 10.1080/08941920.2016.1164265.
- McIntyre, A. and T.L. Milfont. 2016. 'Who cares? Measuring environmental attitudes'. In R. Gifford (ed), *Research Methods for Environmental Psychology*, pp.93-114. Wiley.
- Oreg, S. and T. Katz-Gerro. 2006. 'Predicting proenvironmental behavior cross-nationally: Values, the theory of planned behavior, and value-belief-norm theory'. *Environment and Behavior* **38**: 462-483. doi: 10.1177/0013916505286012.
- Sarigöllü, E. 2009. 'A cross-country exploration of environmental attitudes'. *Environment and Behavior* **41**: 365-386. doi: 10.1177/0013916507313920.
- Schultz, P.W. 2000. 'Empathizing with nature: The effects of perspective taking on concern for environmental issues'. *Journal of Social Issues* **56**: 391-406.
- Schultz, P.W. 2001. 'The structure of environmental concern: Concern for self, other people, and the biosphere'. *Journal of Environmental Psychology* **21**: 327-339. doi: 10.1006/jevp.2001.0227.
- Schultz, P.W, C. Shriver, J.J. Tabanico and A.M. Khazian. 2004. 'Implicit connections with nature'. *Journal of Environmental Psychology* **24**: 31-42. doi: 10.1016/S0272-4944(03)00022-7.
- Schwartz, S.H. 1977. 'Normative influences on altruism'. In B. Leonard (ed), *Advances in Experimental Social Psychology*, pp.221-279. Academic Press.
- Stern, P.C. 2000. 'Toward a coherent theory of environmentally significant behavior'. *Journal of Social Issues* **56**: 407-424. doi: 10.1111/0022-4537.00175.
- Stern, P.C. and T. Dietz. 1994. 'The value basis of environmental concern'. *Journal of Social Issues* **50**: 65-84.
- Stern, P.C., T. Dietz and G.A. Guagnano. 1995. 'The new ecological paradigm in social-psychological context'. *Environment and Behavior* **27**: 723-743. doi:

10.1177/0013916595276001.

- Stern, P.C., T. Dietz, T. Abel, G.A. Guagnano and L. Kalof. 1999. 'A value-belief-norm theory of support for social movements: The case of environmentalism'. *Human Ecology Review* **6**: 81-97.
- Thompson, S.C.G. and M.A. Barton. 1994. 'Ecocentric and anthropocentric attitudes toward the environment'. *Journal of Environmental Psychology* **14**: 149-157. doi: 10.1016/S0272-4944(05)80168-9.
- Uyeki, E.S. and L.J. Holland. 2000. 'Diffusion of pro-environment attitudes'. *American Behavioral Scientist* **43**: 646-662.
- Xiao, C. and R.E. Dunlap. 2007. 'Validating a comprehensive model of environmental concern cross-nationally: A U.S.-Canadian comparison'. *Social Science Quarterly* **88**: 471-493. doi: 10.1111/j.1540-6237.2007.00467.x.

Table 1. Descriptive statistics of environmental behavior and attitude by region and by country

	Environmental behaviors					Environmental attitudes								
	Recycling	Cut back on driving	Reduce energy or fuel use	Save water	Avoid buying certain products	Worry too much about the env.	Difficult to do much about the env.	Env. threats are exaggerated	Modern life harms the env.	Earth cannot support pop. growth	Env. problems have effects on my life	Willing to pay higher prices	Willing to pay higher taxes	Willing to cut in standard of living
All countries	69	24	43	40	33	39	36	33	53	56	47	32	24	32
Western Europe (N=5,799)	96	35	58	55	48	38	28	32	48	61	39	37	23	42
Austria*	93	35	47	44	49	31	31	30	46	54	36	31	18	48
Belgium*	98	28	65	52	29	38	25	29	36	63	31	33	21	31
France*	96	35	65	66	59	51	30	37	53	62	51	30	16	33
Germany	95	35	54	56	43	31	36	31	52	64	32	37	22	39
Switzerland*	96	40	55	46	49	27	18	30	49	61	36	57	40	64
Northern Europe (N=6,179)	79	20	43	30	30	36	30	33	47	59	28	29	21	30
Denmark*	87	20	52	46	38	29	29	28	49	66	26	45	37	40
Finland*	90	24	54	42	37	44	19	26	61	78	28	27	19	38
Latvia*	41	13	18	17	30	51	40	45	41	31	37	10	8	7
Lithuania	42	9	40	35	32	44	58	32	51	36	39	13	12	10
Norway*	87	21	45	17	21	28	21	38	32	65	20	37	23	38
Sweden*	91	21	44	17	28	22	19	24	48	60	24	32	24	42
Britain*	89	23	41	34	29	45	33	39	51	68	30	27	23	21
Southern Europe (N=3,906)	72	18	42	46	30	43	31	30	58	62	51	23	17	28
Croatia	47	18	28	34	25	40	36	26	45	36	33	12	9	15
Slovenia	88	21	50	37	30	46	33	27	48	67	48	28	18	33
Spain	76	17	44	56	32	43	27	33	68	73	60	27	20	31
North America	76	25	50	33	38	37	26	31	50	56	50	45	32	36

(N=2,049)														
Canada*	93	32	61	39	46	28	18	25	49	61	53	43	31	37
United States*	64	19	43	28	32	43	31	36	50	53	48	47	34	35

Table 1. Descriptive statistics of environmental behavior and attitude by region and by country (Cont'd)

	Environmental behaviors					Environmental attitudes								
	Recy- cling	Cut back on driving	Reduce energy or fuel use	Save water	Avoid buying certain products	Worry too much about the env.	Difficult to do much about the env.	Env. threats are exagge- rated	Modern life harms the env.	Earth cannot support pop. growth	Env. problems have effects on my life	Willing to pay higher prices	Willing to pay higher taxes	Willing to cut in standard of living
Eastern Europe (N=3,890)	53	18	33	30	25	38	52	32	52	39	40	19	14	19
Bulgaria	37	9	17	16	27	42	63	27	59	42	54	25	18	14
Czech Republic	73	21	41	47	22	39	45	39	43	42	31	16	12	14
Russia	16	16	29	23	31	38	57	29	54	31	48	17	13	23
Slovak Republic	73	19	42	32	20	34	46	30	55	45	30	20	14	25
Latin America (N=3,545)	38	30	45	45	33	36	43	29	70	61	64	31	26	32
Argentina	42	26	55	56	40	32	46	29	72	58	64	24	18	25
Chile*	25	23	36	28	25	33	44	23	64	48	56	32	26	27
Mexico	46	36	46	52	35	43	40	35	74	73	70	36	32	43
East Asia (N=5,662)	82	25	46	49	38	35	32	41	54	54	65	48	35	43
Japan*	89	23	49	49	44	20	23	19	31	52	40	40	23	28
Philippines	58	30	38	56	35	58	51	62	48	53	65	29	28	40
South Korea	88	24	47	42	31	22	41	31	51	42	58	59	50	43
Taiwan*	86	26	46	49	40	39	19	48	72	64	83	53	35	54
West Asia (N=2,187)	39	20	30	41	30	41	36	26	43	45	49	28	23	24
Israel	48	10	15	31	20	40	35	26	44	44	56	32	22	32

Turkey	31	29	40	47	36	41	37	27	42	46	43	25	23	18
Others (N=3,420)														
New Zealand*	90	21	42	29	32	40	21	38	51	70	38	39	24	33
South Africa	19	12	22	29	17	55	61	38	56	59	58	30	25	26

*Note:* Combined percentages of always and often for pro-environmental behaviors. Combined percentages of strongly agree and agree for attitudes.

\* denotes countries selected in Tables 3-4 because they present structural equivalence of environmental attitudes in the second-stage analyses.

	Austria			Belgium			France			Germany		
	Willingness to sacrifice	Skepticism	Biospheric	Willingness to sacrifice	Skepticism	Biospheric	Willingness to sacrifice	Skepticism	Biospheric	Willingness to sacrifice	Skepticism	Biospheric
Worry too much about the env.	-.199	.685	-.048	-.249	.673	-.032	-.266	.713	.076	-.142	.743	.130
Difficult to do much about the env.	.050	.735	.159	-.096	.812	.058	-.034	.715	.192	-.212	.624	.319
Env threats are exaggerated	-.151	.742	-.265	-.048	.778	-.031	-.178	.763	-.147	-.096	.730	-.238
Modern life harms the env.	-.073	-.056	.754	-.035	.089	.797	-.019	-.095	.764	-.012	.053	.796
Earth cannot support pop. growth	.136	.086	.700	.150	-.033	.747	.056	.124	.757	.062	.018	.711
Env problems have effects on my life	.298	-.287	.462	.302	-.228	.303	.133	-.432	.303	.087	-.354	.330
Willing to pay higher prices	.842	-.156	.037	.877	-.151	.037	.864	-.149	.019	.876	-.118	.006
Willing to pay higher taxes	.843	.084	.067	.885	-.102	.007	.882	-.129	.016	.872	-.082	.036
Willing to cuts in standard of living	.676	-.267	.121	.720	-.123	.160	.779	-.226	.062	.788	-.279	.071
Variance explained by factor (%)	22.83	19.50	15.45	25.12	20.29	14.64	25.07	21.14	14.65	23.50	17.24	15.11
	Switzerland			Denmark			Finland			Latvia		
	Willingness to sacrifice	Skepticism	Biospheric	Willingness to sacrifice	Skepticism	Biospheric	Willingness to sacrifice	Skepticism	Biospheric	Willingness to sacrifice	Skepticism	Biospheric
Worry too much about the env.	-.196	.661	.012	-.103	.773	-.006	-.290	.674	-.049	-.041	.737	.116
Difficult to do much about the env.	-.031	.724	.099	-.131	.694	.203	-.076	.791	.130	-.129	.465	.518
Env threats are exaggerated	-.230	.619	-.329	-.283	.699	-.106	-.217	.667	-.273	-.091	.695	-.190
Modern life harms the env.	.003	-.092	.762	.100	.093	.762	.118	-.088	.787	.057	-.004	.681
Earth cannot support pop. growth	.061	.171	.693	.034	-.001	.681	.085	.012	.764	.062	-.218	.646
Env problems have effects on my life	.047	-.323	.405	.115	-.389	.379	.173	-.445	.407	.170	-.458	.317
Willing to pay higher prices	.883	-.124	.002	.860	-.163	.058	.881	-.178	.132	.876	-.153	.070
Willing to pay higher taxes	.864	-.076	.012	.864	-.156	.070	.895	-.151	.094	.918	-.089	.055
Willing to cuts in standard of living	.700	-.211	.125	.789	-.209	.116	.728	-.306	.149	.852	-.072	.004
Variance explained by factor (%)	23.50	17.24	15.11	24.91	20.24	14.01	25.50	20.87	16.79	26.64	17.06	14.52
	Lithuania			Norway		Sweden		Britain				
	Willingness to sacrifice	Skepticism	Biospheric	1	2	1	2	Willingness to sacrifice	Skepticism	Biospheric		
Worry too much about the env.	-.120	.718	.251	-.679	-.025	-.683	-.003	-.296	.732	.011		
Difficult to do much about the env.	-.106	.263	.282	-.436	.384	-.537	.340	-.109	.755	.230		
Env threats are exaggerated	-.124	.798	-.039	-.715	-.225	-.662	-.174	-.268	.726	-.223		
Modern life harms the env.	-.043	.159	.724	.161	.738	.228	.719	-.037	-.009	.784		
Earth cannot support pop. growth	.071	.093	.678	.159	.571	.156	.685	.159	.022	.618		
Env problems have effects on my life	-.066	-.441	.589	.377	.453	.452	.277	.114	-.472	.405		
Willing to pay higher prices	.883	-.156	-.055	.836	.234	.755	.210	.880	-.210	.125		
Willing to pay higher taxes	.912	-.150	.002	.796	.226	.751	.242	.892	-.206	.048		
Willing to cuts in standard of living	.851	-.024	-.022	.790	.276	.730	.253	.827	-.248	.078		
Variance explained by factor (%)	26.52	16.64	16.43	35.60	15.06	33.94	14.38	27.38	22.29	14.31		

Table 2. Exploratory factor analysis of environmental attitudes across 32 countries



Forthcoming in Environmental Values. ©2019 the White Horse Press

	Croatia			Slovenia			Spain			Canada		
	Willing-ness to sacrifice	Skepticism	Biospheric	Willing-ness to sacrifice	Skepticism	Biospheric	Willing-ness to sacrifice	Skepticism	Biospheric	Willing-ness to sacrifice	Skepticism	Biospheric
Worry too much about the env.	-.120	.680	.123	-.149	.747	.178	-.101	.705	.005	-.361	.629	-.093
Difficult to do much about the env.	-.109	.670	.168	.007	.742	.053	-.072	.727	.091	-.029	.724	.268
Env threats are exaggerated	-.076	.709	-.224	.008	.598	-.286	-.116	.617	-.328	-.286	.630	-.269
Modern life harms the env.	-.065	.169	.736	-.125	.227	.691	.014	.128	.778	-.001	-.103	.780
Earth cannot support pop. growth	.076	.023	.617	.120	-.012	.677	.005	-.039	.664	.116	.002	.750
Env problems have effects on my life	.106	-.418	.520	-.040	-.347	.537	.107	-.337	.519	.049	-.646	.120
Willing to pay higher prices	.911	-.118	.080	.912	-.041	-.006	.880	-.078	.057	.862	-.167	.054
Willing to pay higher taxes	.917	-.078	-.018	.876	-.074	.033	.903	-.057	.018	.891	-.066	.002
Willing to cuts in standard of living	.853	-.173	.052	.823	-.006	-.037	.807	-.191	.047	.742	-.237	.123
Variance explained by factor (%)	27.25	18.55	14.40	25.89	18.28	14.92	25.37	17.60	15.98	25.73	20.36	15.05
	United States			Bulgaria			Czech Republic			Russia		
	Willing-ness to sacrifice	Skepticism	Biospheric	Willing-ness to sacrifice	Skepticism	Biospheric	Willing-ness to sacrifice	Skepticism	Biospheric	Willing-ness to sacrifice	Skepticism	Biospheric
Worry too much about the env.	-.267	.737	-.031	-.065	.654	.155	-.171	.678	.118	.042	.555	.317
Difficult to do much about the env.	-.040	.741	.139	-.115	.579	.012	-.197	.593	.278	-.252	.269	.417
Env threats are exaggerated	-.271	.600	-.264	.033	.728	-.225	-.062	.720	-.179	-.049	.735	.085
Modern life harms the env.	.114	.122	.716	.007	-.017	.782	-.052	-.089	.737	-.068	-.073	.723
Earth cannot support pop. growth	.129	-.004	.698	.051	.203	.705	-.006	.180	.665	.205	.060	.644
Env problems have effects on my life	.033	-.365	.554	.119	-.314	.563	.188	-.418	.375	.076	-.620	.320
Willing to pay higher prices	.853	-.151	.144	.921	-.083	.099	.895	-.173	-.002	.888	.057	-.032
Willing to pay higher taxes	.875	-.134	.128	.917	-.089	.076	.903	-.152	-.019	.909	.038	-.014
Willing to cuts in standard of living	.787	-.218	.081	.861	-.049	.005	.847	-.174	-.002	.762	-.234	.085
Variance explained by factor (%)	25.44	18.76	16.02	27.39	16.12	16.84	27.18	18.10	13.88	25.73	15.27	14.76

	Japan			Philippines		South Korea			Taiwan		
	Willingness to sacrifice	Skepticism	Biospheric	1	2	Willingness to sacrifice	Skepticism	Biospheric	Willingness to sacrifice	Skepticism	Biospheric
Worry too much about the env.	-.024	.713	.016	.108	.562	.121	.622	.161	-.036	.639	.224
Difficult to do much about the env.	-.216	.686	.102	.194	.311	-.292	.539	.120	-.121	.596	-.021
Env threats are exaggerated	-.059	.773	-.118	.028	.608	-.061	.737	-.233	-.037	.670	-.143
Modern life harms the env.	-.027	.082	.776	.089	.659	.011	.027	.726	-.014	.077	.758
Earth cannot support pop. growth	.179	.028	.647	.117	.627	.026	.099	.710	.114	.082	.660
Env problems have effects on my life	.151	-.354	.468	.043	.605	.320	-.138	.354	.085	-.153	.540
Willing to pay higher prices	.816	-.150	.121	.852	.112	.844	-.117	.043	.855	-.045	.047
Willing to pay higher taxes	.865	-.128	.078	.880	.107	.858	-.078	-.016	.866	-.024	.046
Willing to cuts in standard of living	.801	-.052	.102	.749	.138	.718	.071	.119	.458	-.300	.159
Variance explained by factor (%)	24.02	19.46	14.40	23.25	21.95	24.13	14.18	14.09	19.19	14.89	15.58

Table 2. Exploratory factor analysis of environmental attitudes across 32 countries (Cont'd)

Table 2. Exploratory factor analysis of environmental attitudes across 32 countries (Cont'd)

	Slovak Republic			Argentina			Chile			Mexico		
	Willingness to sacrifice	Skepticism	Biospheric	Willingness to sacrifice	Skepticism	Biospheric	Willingness to sacrifice	Skepticism	Biospheric	Willingness to sacrifice	Skepticism	Biospheric
Worry too much about the env.	-.124	.652	.236	-.051	.631	.172	.045	.616	.012	.051	.738	.055
Difficult to do much about the env.	-.118	.717	.202	-.062	.683	.071	-.043	.707	.085	.056	.783	-.078
Env threats are exaggerated	-.098	.748	-.100	-.055	.682	-.218	-.169	.596	-.158	-.154	.698	.001
Modern life harms the env.	-.079	.085	.662	.030	.062	.734	.014	-.021	.735	.154	.085	.654
Earth cannot support pop. growth	.000	.062	.735	.072	.267	.564	.111	.221	.676	-.048	.028	.701
Env problems have effects on my life	.150	-.459	.363	-.042	-.276	.611	.015	-.288	.579	-.011	-.124	.647
Willing to pay higher prices	.919	-.067	-.028	.876	-.076	.069	.872	-.038	.059	.869	-.013	.007
Willing to pay higher taxes	.908	-.085	-.019	.907	-.055	-.024	.893	-.005	.016	.878	.011	-.017
Willing to cuts in standard of living	.712	-.374	-.032	.866	-.050	.027	.853	-.121	.080	.767	-.044	.103
Variance explained by factor (%)	24.92	20.80	13.55	26.19	16.59	14.63	25.89	15.36	15.28	24.11	18.56	15.08

	Israel			Turkey				New Zealand			South Africa		
	Willing- ness to sacrifice	Skepticism	Biospheric	1	2	3	4	Willing- ness to sacrifice	Skepticism	Biospheric	Willing- ness to sacrifice	Skepticism	Biospheric
Worry too much about the env.	-.087	.599	.077	.028	.202	.766	-.195	-.251	.725	-.118	.006	.631	.247
Difficult to do much about the env.	-.266	.687	-.125	-.079	.833	.076	.026	-.014	.773	.338	-.263	.588	-.017
Env threats are exaggerated	-.118	.655	-.417	.048	.780	.267	-.018	-.269	.633	-.352	.076	.729	-.190
Modern life harms the env.	.073	.576	.383	-.082	.118	.787	.187	.018	-.094	.764	.031	.180	.727
Earth cannot support pop. growth	.000	.133	.720	.006	-.067	.006	.703	.143	-.010	.691	-.030	-.026	.620
Env problems have effects on my life	.181	-.142	.578	.013	.080	-.003	.776	.183	-.377	.262	.136	-.097	.580
Willing to pay higher prices	.866	-.094	.094	.894	-.037	-.042	-.004	.844	-.193	.141	.916	-.061	.048
Willing to pay higher taxes	.878	-.075	.013	.911	-.013	-.040	.011	.876	-.141	.046	.920	-.024	.037
Willing to cuts in standard of living	.742	-.176	.173	.885	-.011	-.001	-.001	.774	-.207	.105	.865	-.077	.080
Variance explained by factor (%)	24.48	18.60	13.71	26.96	14.65	13.66	13.00	25.21	19.73	15.72	28.11	14.75	15.09

Table 3. Model fit statistics and parameter estimates for environmental attitude latent variables by country

	Model fit statistics					Standardized factor loadings									Covariance between latent factors		
	N	X <sup>2</sup> (df=18) <i>p</i>	IFI	TLI	RMS EA	Willingness to Sacrifice			Biospheric orientation			Environmental skepticism			Sacrifice & Biospheric	Biospheric & Skepticism	Sacrifice & Skepticism
						λ <sub>11</sub>	λ <sub>21</sub>	λ <sub>31</sub>	λ <sub>42</sub>	λ <sub>52</sub>	λ <sub>62</sub>	λ <sub>73</sub>	λ <sub>83</sub>	λ <sub>93</sub>			
Austria	851	64.02 .000	.963	.924	.055	.662	.430	.721	.253	.316	.678	.585	.231	.709	.113	-.108	-.313
Belgium	962	37.70 .004	.989	.978	.034	.752	.708	.674	.107	.496	.720	.700	.504	.469	.037†	-.021†	-.323
France	1,830	106.85 .000	.975	.951	.052	.724	.709	.775	.155	-.019†	.657	.717	.472	.698	.051	-.064	-.412
Switzerland	1,111	42.97 .001	.985	.969	.035	.693	.626	.727	.382	.220	.490	.478	.330	.685	.095	-.107	-.201
Denmark	981	80.63 .000	.967	.932	.060	.736	.758	.786	.236	.179	.491	.554	.496	.792	.111	-.075	-.277
Finland	1,001	64.40 .000	.981	.962	.051	.754	.725	.785	.422	.304	.594	.607	.426	.671	.232	-.222	-.404
Latvia	721	46.26 .000	.980	.960	.047	.871	.734	.693	.190	.507	.831	.436	.225	.644	.054†	-.044†	-.182
Norway	1,089	56.42 .000	.985	.969	.044	.826	.774	.807	.303	.245	.496	.642	.307	.740	.168	-.127	-.479
Sweden	899	50.37 .000	.982	.964	.045	.655	.656	.753	.302	.212	.450	.678	.446	.710	.176	-.149	-.358
Britain	783	79.27 .000	.972	.944	.066	.837	.825	.823	.173	.261	.637	.687	.458	.767	.076	-.071	-.463
Canada	863	67.07 .000	.972	.943	.056	.741	.605	.747	.222	.224	.463	.696	.385	.715	.133	-.151	-.450
United States	1,186	76.17 .000	.976	.951	.052	.785	.772	.733	.314	.404	.492	.649	.337	.686	.172	-.123	-.451
Chile	1,217	45.18 .000	.986	.971	.035	.736	.525	.845	.343	.279	.533	.189	.298	.643	.058	-.015†	-.047
Japan	960	71.85 .000	.964	.928	.056	.776	.757	.640	.168	.458	.695	.517	.785	.683	.052	-.022†	-.152
Taiwan	2,101	92.67 .000	.953	.905	.044	.474	.438	.503	.430	.650	.401	.350	.454	.451	.077	.003†	-.113
New Zealand	1,022	84.27 .000	.969	.937	.060	.808	.695	.707	.338	.368	.437	.630	.220	.743	.209	-.179	-.427

Note: All parameter estimates are significant except †  $p > .05$ .  $\lambda_{11}$ ,  $\lambda_{42}$ ,  $\lambda_{73}$  are scaling indicators for each latent factor.

Table 4. Multiple regressions of pro-environmental behavior by country

	Austria	Belgium	France	Switzerland	Denmark	Finland	Latvia	Norway
Willingness to sacrifice (index)	0.245*** (0.057)	0.101** (0.033)	0.089** (0.031)	0.154*** (0.041)	-0.028 (0.053)	0.145** (0.054)	0.143*** (0.036)	0.027 (0.050)
Biospheric orientation (index)	0.605** (0.180)	0.630** (0.186)	0.524*** (0.078)	0.122 (0.103)	1.476*** (0.197)	0.660*** (0.35)	-0.153 (0.163)	0.510** (0.152)
Environmental skepticism (index)	-0.008 (0.072)	-0.098** (0.038)	-0.064 (0.065)	-0.177* (0.088)	-0.077 (0.050)	-0.012 (0.092)	-0.247** (0.087)	-0.226** (0.069)
Female	0.083* (0.041)	0.076** (0.028)	0.104*** (0.025)	0.120*** (0.032)	0.049 (0.033)	0.185*** (0.036)	0.063 (0.048)	0.109** (0.032)
Age	0.006*** (0.001)	0.008*** (0.001)	0.005*** (0.001)	0.007*** (0.001)	0.006*** (0.001)	0.007*** (0.001)	0.006*** (0.001)	0.004*** (0.001)
Education	0.005 (0.008)	-0.006 (0.005)	-0.009* (0.004)	0.001 (0.006)	-0.003 (0.004)	-0.003 (0.006)	-0.001 (0.009)	-0.001 (0.005)
Urban	-0.048** (0.018)	0.046** (0.014)	0.001 (0.012)	0.018 (0.016)	0.001 (0.015)	-0.019 (0.018)	0.009 (0.019)	-0.010 (0.013)
(Constant)	2.392*** (0.111)	2.274*** (0.098)	2.601*** (0.087)	2.267*** (0.102)	2.223*** (0.088)	2.205*** (0.107)	1.562*** (0.139)	2.078*** (0.098)
<i>adjR</i> <sup>2</sup>	0.159	0.194	0.145	0.139	0.236	0.317	0.084	0.216
	Sweden	Britain	Canada	United States	Chile	Japan	Taiwan	New Zealand
Willingness to sacrifice (index)	-0.100 (0.133)	0.169*** (0.042)	0.025 (0.057)	0.125** (0.046)	0.185*** (0.036)	0.115** (0.035)	0.512*** (0.065)	0.177*** (0.048)
Biospheric orientation (index)	1.652*** (0.413)	1.758*** (0.270)	2.075*** (0.488)	0.774*** (0.135)	0.195 (0.113)	0.548** (0.167)	0.043 (0.053)	0.501* (0.198)
Environmental skepticism (index)	0.141 (0.073)	0.019 (0.067)	0.184 (0.113)	-0.071 (0.055)	-0.146 (0.214)	-0.114* (0.046)	-0.007 (0.080)	0.008 (0.083)
Female	0.124*** (0.033)	0.154*** (0.041)	0.139*** (0.039)	0.091* (0.036)	0.075 (0.044)	0.141*** (0.036)	0.195*** (0.025)	0.128*** (0.036)
Age	0.008*** (0.001)	0.005*** (0.001)	0.003* (0.001)	0.004*** (0.001)	0.006*** (0.001)	0.011*** (0.001)	0.008*** (0.001)	0.001 (0.001)
Education	-0.002 (0.006)	0.002 (0.008)	-0.006 (0.007)	0.010 (0.006)	0.028*** (0.006)	-0.028*** (0.008)	0.016*** (0.004)	0.005 (0.006)
Urban	0.024 (0.014)	0.024 (0.023)	0.004 (0.020)	0.041 (0.024)	0.017 (0.018)	0.048* (0.020)	0.049*** (0.012)	0.014 (0.018)
(Constant)	1.862*** (0.108)	2.019*** (0.146)	2.520*** (0.153)	1.704*** (0.127)	1.283*** (0.111)	2.283*** (0.137)	1.731*** (0.076)	2.172*** (0.124)
<i>adjR</i> <sup>2</sup>	0.270	0.253	0.191	0.184	0.075	0.243	0.164	0.166

Note: Table entries are unstandardized coefficients, with standard errors in parentheses. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

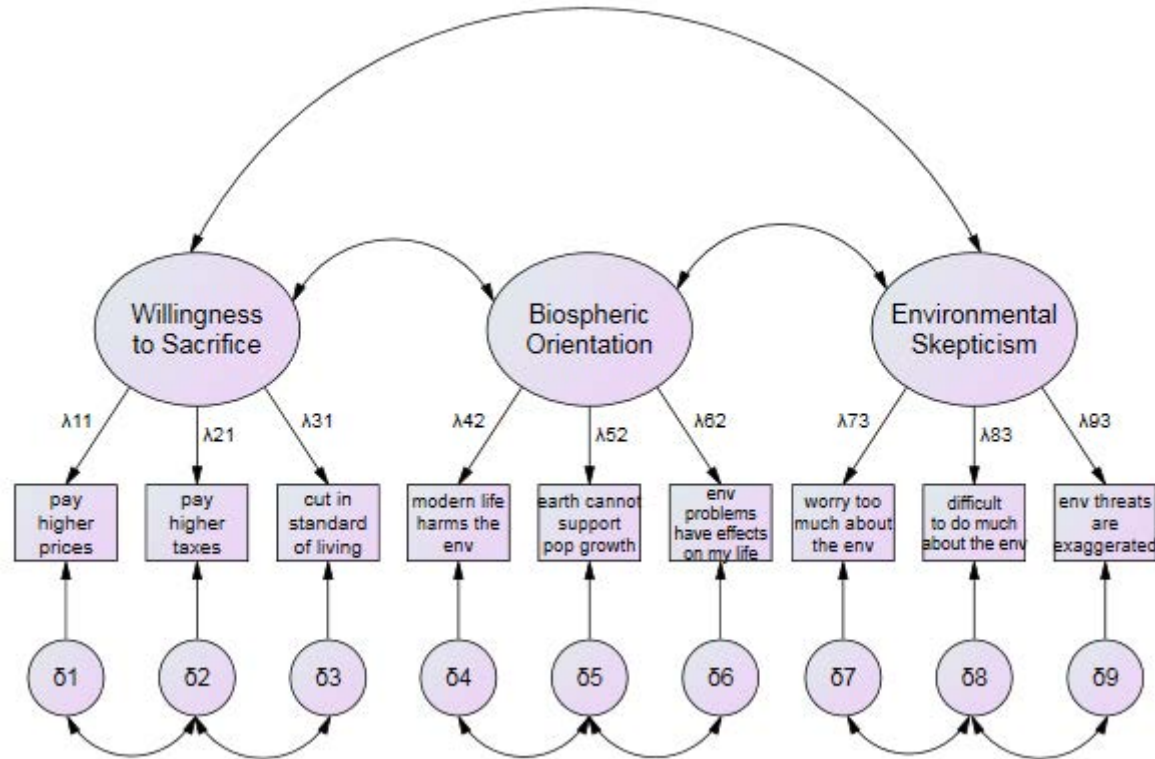


Figure 1. A measurement model of environmental attitudes.