Global Environmental Concern:

A cross-national, structural and multilevel model

By

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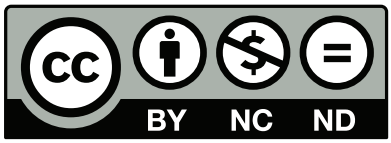

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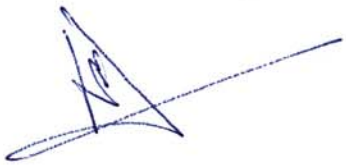

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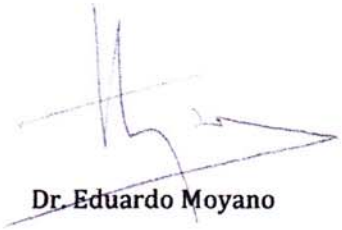

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Abstract

Although cross-cultural research on environmental concern is an area of growing interest, researchers have not developed an adequate understanding of the processes influencing the formation of this construct, the relative explanatory power of individual-level and contextual-level factors, and the extent to which similarities or differences can be noted across countries to in this respect. In this dissertation we address these issues in a cross-national study that uncovers similarities and differences within and between countries in environmental concern and behavior.

We use data that includes representative samples of thirty countries (i.e. ISSP 2010 Environment Module), and apply structural equation modeling and multilevel analysis to test a series of different models.

At the individual level our results point out considerable cross-national similarities in how the affective, cognitive and dispositional environmental concern dimensions translate into environmental behavior, and less cross-cultural similarities for sociodemographic characteristics and for postmaterialist values. At the national level we found mixed results regarding the influence of a series of economic, educational and environmental factors. However, countries with higher levels of development tend to display more pro-environmental behaviors.

From the multilevel analysis we found that a substantial proportion of the national-level variance in environmental behavior is explained by individual-level variables. These results demonstrate how compositional effects are outshining the relative influence of national level factors; this could be explaining the contradictory results found in previous literature about competing national level predictors. Finally, besides the direct effects that national level factors have on environmental behavior, we found that as a country becomes more developed the attitude-behavior correspondence

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is stronger. These results suggest that in more developed countries the internal/external barriers that make it harder to match people's intentions to behavior are less pronounced, thus making it easier to translate a set of environmental attitudes into real actions. In addition, this moderation effect may be explaining the mixed results found in the literature about the lack of correspondence between attitudes and behavior.

This dissertation contributes to the growing literature on environmentalism pointing out the necessity of simultaneously assessing the effects of both individual- and contextual-level forces affecting environmental concern and behavior across nations.

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Introduction

Climate change, biodiversity loss, and water scarcity are recognized as some of the most important problems that the world is facing (United Nations Development Programme, 2011). The origin of many of these environmental problems can and should be related to patterns of human behavior (e.g. lifestyle) and the prevailing social organization (e.g. overpopulation in urban areas) (Dietz, Ostrom, & Stern, 2003). Also, since the early 1980s, the scientific community has begun to recognize that many environmental problems have behavioural solutions (Cone & Hayes, 1980; Vlek, 2000). Of all the solutions rooted in human behavior, the study of attitudes and the processes of changing environmental attitudes have sparked the greatest number of studies and research (Giuliani & Scopelliti, 2009; Hess, Suárez, & Hernández, 2003).

Within these areas, one of the concepts that have generated the most interest is that of *environmental concern* (also often referred to as environmentalism or environmental consciousness). Research into environmental concern is traditionally divided into two major streams: “studies focused on sociodemographic factors associated with environmentalism and studies on values, beliefs and others social psychological constructs related to environmentalism” (Dietz, Stern, & Guagnano, 1998, p. 451).

However, these two major streams have received important criticisms and extensions over the years. Between the most prominent, some scholars had argued that a fuller theory of environmentalism must attend to consider and integrate the *contextual factors* (e.g. economic, cultural, environmental) that influence beliefs and behaviors as well as other individual level variables (Franzen & Meyer, 2010; Leiserowitz, Kates, & Parris, 2005). In this regard, individual´s environmentalism levels will depends not only on their sociodemographic background, knowledge, attitudes and values, but also on the

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social context in which they live. Whereas assertions about the importance of context abound, comparatively less is known about how contextual factors affect the expression of environmental concern (Marquart-Pyatt, 2012a).

In addition, environmental problems have become global and as Milfont (2012a) stresses, tackling them will require "a cooperative effort from decision-maker worldwide, but their decisions to cooperate with or defect from any such wider effort will be made according to the values and behavioural patterns dominant in each national culture" (p.182). However, these arguments have not been combined into a model specifying multiple paths to environmental behaviors and empirically assessed across nations individually (Marquart-Pyatt, 2012b).

Other limitations in the field are highlighted by Xiao and Dunlap (2007) when they state: "despite decades of research the environmental concern literature remains highly fragmented and disorganized, … . Many studies are atheoretical and/or fail to use established measures. Such studies often yield inconsistent results that are difficult to compare, hindering the accumulation of knowledge" (p. 472).

This dissertation seeks to uncover these issues, relying fundamentally on a comparative framework and data from thirty countries to accomplish this task. Theoretically, we investigate sociodemographic, social structural, and psychological sources of environmental concern in order to establish whether there are similarities or differences across nations with regard to within country sources of variation. Following probably one of the most influential work, we define environmental concern broadly as "… the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or willingness to contribute personally to their solution" (Dunlap & Jones, 2002, p. 485). As a reflection of its broad conceptualization in the literature, we consider four different dimensions of environmental concern:

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affective, cognitive, dispositional and active (Jiménez & Lafuente, 2010). Relying on theories of the social bases, values and norm orientations, and rational action, we formulate and test a series of hypotheses that predict similarities across countries with regard to the expression of environmental concern (i.e. how it can be measured), yet differences in the socio-psychological forces influencing it. We then address the issue of pathways to environmental concern, expressed through the active dimension (i.e. environmental behaviors). After investigating these relationships at the individual-level and uncovering within country sources of variation, we explore contextual factors as influences on environmental behaviors net to the individual-level forces driving environmental concern. Finally, a series of cross-level interactions examine whether the strength of the association between sociodemographic/environmental attitudes and environmental behaviors are similar across nations, and to which extent economic, educational and environmental conditions help predict these relationships.

Beyond theoretical difficulties apparent in cross-national studies, methodological limitations of existing research further impedes our understanding of the psycho-social forces underlying environmental concern. Thus, a major task of our dissertation is to address these issues by using appropriate methodological techniques and a comparative framework, which contributes to our understanding of cross-national similarities and differences in the sources and consequences related to environmental concern. We use structural equation modeling (i.e. confirmatory factor analysis and path model analysis) in uncovering similarities and differences in the effects of individual-level influences in a sample of thirty countries. Also we use hierarchical linear modeling techniques to examine how contextual variables lead to country differences in environmental behaviors and how contextual variables explain the random effects of the individual-level variables on environmental behaviors.

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The dissertation is organized as follows. In Part I we present the theoretical foundations of environmental concern with a special focus on cross-cultural research, and in Part II we report the cross-cultural empirical studies. Chapter One consists of a review of research and theory on the environmental concern literature. The goal of this chapter is to present a framework that seeks to organize the "highly fragmented" construct of environmental concern. The definition, structure, organization, and measurement are discussed and reviewed. In Chapter Two we begin by reviewing research that attempts to predict or explain environmental concern (with a special focus on environmental behaviors) across cultures. Here we make a distinction between individual (level-1) and country (level-2) factors. At the end of this chapter we review the existing work that combines both levels of analysis using multilevel modeling. Along those lines and based on limitations of previous research, we present in each section a series of objectives, hypotheses and/or research questions.

In Part II, Chapter Three restructures the objectives described in chapter One and Two proposing three main goals to be tested empirically: a) establish functional equivalence of environmental concern measures; b) explain within-country variation on environmental behaviors with individual-level influences; and c) explain between-country variation on environmental behaviors with individual- and country-level influences. Also, in order to be easily visualized, Chapter Three recapitulate all the hypotheses formulated so far. Chapter Four introduces the methodology used, while Chapter Five presents the results and Chapter Six the conclusions derived from the three main goals of the dissertation. Finally, Chapter Seven presents a summary of research findings and discussion of limitations and suggestions for additional research to further improve our understanding of the nature and sources of environmental concern across cultures.

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Part I

Cross-cultural research of environmental concern

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1. Definition and dimensionality of environmental concern

Several theoretical schema have been proposed around the concept of environmental concern[1] (Berenguer & Corraliza, 2000; Bohlen, Schlegelmilch, & Diamantopoulos, 1993; Fransson & Gärling, 1999; Gray, 1985; Guber, 2003; Jiménez & Lafuente, 2010; Milfont & Duckitt, 2010). In line with Routhe, Jones and Feldman (2005), we believe that Dunlap and Jones (2002) have proposed one of the most complete conceptual frameworks in this respect. These authors define environmental concern as "… the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or willingness to contribute personally to their solution" (p. 485). It is grounded, therefore, in "a multidimensional definition of environmental concern oriented towards behavior in which, as well as considering different types of pro-environmental behaviors, other psychological factors are included that are regularly associated with them: beliefs, values, attitudes, knowledge, etc." (Jiménez & Lafuente, 2010, p. 732).

Returning to the original work of Dunlap and Jones (2002), and following the theory of facets, these authors break down the term environmental concern into its two component, the "environmental" part and the "concern" part to propose a more detailed analysis of each. The "environmental" component refers to the substantive nature of environmental concern, i.e. the heterogeneity of environmental issues and problems, while the "concern" component refers to the universe of expression of concern for the environment, i.e. how that environmental concern is registered in the responses of the subjects.

[1]Also often referred to as environmentalism or environmental consciousness. In our dissertation we opt to use them as interchangeable terms.

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There are many potential ways of conceptualizing the "environmental" component. One is creating facets as biophysical characteristics: atmosphere (air), hydrosphere (water), lithosphere (land), flora (plants) and fauna (animals). Another way to organize environmental issues can be through a generality-specificity continuum: pollution vs. air pollution vs. acid rain. Other proposals would be through spatio-temporal aspects: global problems, national, regional or local, and/or problems of the past, present or future. In turn, these elements can be combined with each other, which further complicate the classification, giving to the substantive component of environmental concern a wide variety and capacity of content. This inherent complexity of the environmental component helps to account for the vast diversity in existing measures of environmental concern. As we will see further, such instruments vary considerably not only in content, but also in their ability to cover the universe of substantive topics that constitute the environmental component.

In relation to the conceptualization of the “concern” component, there are two major research approaches. The first, known as the *policy approach*, considers elements of environmental concern that are of interest to political managers without necessarily being guided by strong or exhaustive theoretical frameworks. This approach, therefore, involves *ad hoc* opinion studies with a markedly applied orientation (Dunlap & Scarce, 1991). In these studies, scales are developed either in terms of substantive environmental issues rather on a priori theoretical approach (i.e. subjectively constructed measures), or the scales are constructed *ex post facto*, based on results from factor analysis (i.e. methodologically derived measures).

The second approach, known as the *theoretical approach*, typically conceptualizes the concern component in terms of the classical tripartite conceptualization of "attitude" as consisting of affective, cognitive, and dispositional

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dimensions (Gray, 1985). Ester (1981), for instance, argues that the concept of environmental concern is equivalent to "environmental attitude" and consists of cognitions, affects, and behavioral dispositions toward the natural environment. Other theorists include overt actions as conative responses, but classify them separately from behavioral intentions since the classical notion of attitude includes predispositions to behavior rather than behavior itself (Ajzen & Fishbein, 1980). As proposed by Dunlap and Jones (2002), we include behavior in our conceptualization of environmental concern because we believe that such concern can often be inferred from a person's overt actions, and also because behavior (both observed and self-reported) has often been treated as an indicator of environmental concern in empirical studies (Jiménez & Lafuente, 2010; Milfont & Duckitt, 2010; Pisano & Hidalgo, 2013; Xiao & Dunlap, 2007).

Generally speaking, the cognitive expression of environmental concern is usually treated as the beliefs and knowledge an individual has about the nature of an environmental problem, its assumed causes, and possible solutions (Gray, 1985). The cognitive expression of concern can vary from the minimum of knowledge needed to be aware of a specific problem or issue to broad beliefs about the biosphere and humans' relationship to it. The affective expression of concern involves an emotive and evaluative element which is synonymous with a more restricted conceptualization of attitude (Ajzen & Fishbein, 1980). In fact, indicators that tap affective expressions of environmental concern are often referred to simply as environmental attitudes (e.g., Kaiser, Wölfing, & Fuhrer, 1999). These attitudinal indicators tap personal feelings or evaluations (good-bad, like-dislike, etc.) about environmental conditions or issues (acid rain, ozone depletion, recycling, etc.). They can range from attitudes toward very specific problems or issues, such as toxic wastes or recycling, to very broad ones like

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environmental problems or protection. The dispositional expressions of concern reflect a readiness to perform, or a commitment to support, a variety of actions that can potentially impact environmental quality. Finally, the active expression of concern represents the actual or reported actions taken by individuals and their behavioral expressions of support (or nonsupport) for environmental policies, programs, and organizations.

Guided by the theoretical approach Jiménez and Lafuente (2010), among others scholars have proposed measuring environmental concern facets in accordance with the four dimensions previously mentioned: 1) *affective*: encompassing risk perception and feelings of awareness about the state of the environment, and the level of attachment to values favorable to environmental protection; 2) *cognitive*: grouping knowledge related to the understanding and definition of ecological problems, the possession of intelligible schema regarding their possible solutions and responsibilities, as well as informative interest about this issue; 3) *dispositional*: referring to the attitude and willingness to act according to ecological criteria and to accept public actions aimed at protecting the environment, and; 4) *active*: including individual behaviors in relation with the environment and behaviors pertaining to collective environmental defense actions.

Despite the use of the theoretical approach and the dimensionality described above, there are an extraordinary number of different environmental concern measures, with at least 700 that have been used (Dunlap & Jones, 2002). Stern (1992) has described this as an “anarchy of measurement” (p. 279). In an attempt to organize the field, Dunlap and Jones (2002) have proposed a useful four-fold typology of environmental measures based on environmental issues (e.g. water pollution, population growth) and expression of concern (i.e. beliefs, attitudes, intentions, and behaviors related to environmental issues). The combination of them provided the

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following types of measures: 1) Multiple-topic, multiple-expression instruments that focus on both multiple environmental issues and multiple expressions of concern; 2) Multiple-topic, single-expression instruments that focus on multiple environmental issues and a single expression of concern; 3) Single-topic, multiple-expression instruments that focus on a single environmental issue and multiple expressions of concern; and 4) Single-topic, single-expression instruments that focus on a single environmental issue and a single expression of concern.

Also, few empirical studies from the theoretical approach have managed to integrate the four dimensions of environmental concern, or most of them, into a single appropriate summary measure (Milfont & Duckitt, 2010; Pisano & Hidalgo, 2013; Xiao & Dunlap, 2007) which has led, among other things, to a questioning of the dimensionality of environmental concern through four solidly interconnected dimensions forming a second-order factor (Schaffrin, 2011). Two of these dimensions are specially questioned: the cognitive one and the active one.

One important issue is the exclusion of knowledge as a cognitive attribute of the concept definition. Bord, O'Connor, & Fisher (2000) state that accurate knowledge about consequences of, for example, global warming is a precondition in order to be actively engaged in the mitigation of climate change. In contrast, accurate knowledge is not necessary in order to stimulate general concern. Some studies find knowledge to be a very distinct aspect from environmental concern since it significantly explains environmental behaviors, but not beliefs or attitudes (Bord et al., 2000; Dietz, Dan, & Shwom, 2007). Moreover, knowledge might serve as an additional link between environmental concern and environmental behaviors: someone who is very much concerned about the environment in general will be more active if the person knows what to do in order to, for example, reduce carbon emissions in the context of climate

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change (Fransson & Gärling, 1999). We would expect that individuals with higher levels in environmental concern also search for more information on causes and consequences of climate change. In contrast, we would not expect that someone who is well informed about traffic pollution and its consequences for global warming, but who is not directly affected by negative consequences of rising temperatures, necessarily change his/her attitudes about driving a car. Information on both evidence for and rejections of the existence of global warming is nowadays easily accessible and highly salient in the media. Knowledge about environmental problems therefore only partly reflects environmental concern and rather serves as an indicator for individuals' media consumption or general interest in science.

The second important issue concerns individual behaviors. Often, correlational measures indicate only a moderate relationship between environmental attitudes and environmental behaviors which is discussed by a high number of studies[2] (Best & Kneip, 2011; Diekmann & Preisendörfer, 1998; Newton & Meyer, 2013; Quandt & Ohr, 2004). Further analyses point to the distinction between environmental behaviors and behavior intention (Takacs-Santa, 2007). A very important argument for not considering behavior as an attribute of the overall concept of environmental concern is that it does not fulfill the characteristics of a general concern, but is rather a consequence. As we argued above, other factors such as knowledge or financial resources influence whether people are able to transfer their environmental concern into

[2]As we will point out later, it is important to distinguished different types of behaviors according to their level of involvement or cost associated with its realization (Hidalgo, Hernández, Lambistos, & Pisano, 2011). This categorization may help explain the high variability in correlations detected between attitudes and behaviors.

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actual behavior. Low income households reduce energy consumption in order to save money regardless of individual concern for the environment (Bladh & Krantz, 2008; Keirstead, 2007). In the same vein, it is most likely that individual actors are highly committed to the environment but fail to act accordingly due to the lack of knowledge about adequate behavior.

Despite these arguments, other studies succeeded in integrating the cognitive dimension (Bohlen et al., 1993; Jiménez & Lafuente, 2010; Pisano & Hidalgo, 2013) and the active dimension (Milfont & Duckitt, 2010; Pisano & Hidalgo, 2013; Xiao & Dunlap, 2007) as key components of environmental concern. For example, Pisano and Hidalgo (2013) with a representative sample of the South of Spain proposed a summary measure of environmental concern that included the four dimensions through eight facets, and where two of them belong to the cognitive dimension (i.e. self-perceived information about environmental issues, and knowledge about specific environmental topics) and three of them to the active dimension (i.e. recycling, purchasing behavior and political actions). Xiao and Dunlap (2007) applying second-order CFA found that six key facets of environmental concern (including one facet of environmental behaviors) have moderate to high factor loading on the underlying construct suggesting that even among the general public, attitudes toward environmental issues are relatively well organized into a broad and coherent sense of “concern for the environment”. These results were confirmed in two national samples of the U.S. and Canada increasing the validity of the comprehensive conceptualization of environmental concern. For its part, Milfont and Duckitt (2010) have presented what they called the Environmental Attitudes Inventory (EAI). This is a reliable and valid measure of environmental concern that takes into consideration three of the four dimensions. The EAI has twelve

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specific scales that capture the main facets measured by previous research, which perform on a single higher order factor (i.e. Generalized Environmental Attitudes).

In addition to the dimensionality of environmental concern through the four dimensions discussed above, numerous papers have examined the causal relationships between them. In this regard, The Theory of Planned Behavior (TPB) (Ajzen, 1991) and the Value-belief-norm (VBN) Theory of environmentalism (Stern, 2000) are the two most widely used theoretical models.

The Theory of Planned Behavior (Ajzen, 1991) stems from the idea that behavior is determined directly by the intention to take the action. This intention in turn is determined by the attitude toward the behavior, the subjective norm and the perceived behavioral control. In addition, social background characteristics influence attitudes and beliefs about the consequences of patterns of action and therefore do not directly influence action (i.e. the path is indirect through the psychosocial variables). This model has been applied to the analysis and prediction of many social behaviors, including environmental behaviors. The results of these investigations agree in affirming the crucial role of intention and efficacy in predicting these behaviors. However, other studies suggests that the inclusion of other variables such as the level of environmental knowledge, values, locus of control and the degree of personal responsibility would improve the predictive power of the model (Bamberg & Möser, 2007; Klöckner, 2013; Stern, 2000).

Two final attributes of the work of Ajzen and Fishbein (1980) warrant brief mention as they apply to our dissertation research. The issue of compatibility has significant relevance for cross-national research models like those employed in this study. Compatibility refers to the issue of specificity and generality, where compliance between the levels has both theoretical and methodological implications. For path

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model analysis, ensuring correspondence between attitudes, intentions, and actions can produce better predictive power both in terms of general attitudes influencing general behaviors (through similarly broad intentions), and statistically through strengthening the correlations between the measures. As the authors suggest:

> Measuring attitudes and behaviors at compatible levels of generality increase the likelihood that the same set of salient beliefs will be activated (i.e., that expressions of attitude and performance of behavior will be guided by the same set of considerations), and it is for this reason that strong correlations are observed. (Ajzen & Fishbein, 1980, p.387)

In thinking about this issue as it relates specifically to our dissertation topic, the level of specificity has important theoretical and methodological implications. Where levels of measurement do not correspond, the relationship between attitudes and behaviors may not be noted empirically as strong. My interest in comparative research thus spurs a focus on generality.

A second aspect of Ajzen and Fishbein's (1980) framework underscores this key theoretical issue empirically. That is, in addition to the methodological principle of compatibility noted above, aggregation, a second methodological principle, is also important to address. Aggregation reflects how measuring clusters of attitudes and actions can provide a more adequate representation of those expressed by individuals. In brief, methodologically, composite measures depict attitudinal constructs with greater accuracy because problems connected with single-items (i.e. survey questions) are minimized when combined in a scale. This axiom also has implications for the strength of the relationship between attitudes and behaviors, typically increasing the correlation (Ajzen & Fishbein, 1980). In considering general attitudinal and behavioral

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predispositions, and especially when placed in the larger context that includes social background characteristics, these methodological principles should be noted.

The Value-Belief-Norm Theory of environmentalism posits that the sources of environmental behaviors are in clusters of values, worldviews, beliefs and norms. VBN theory proposes cognitive, attitudinal, and social factors promoting environmental actions, articulating central roles for values and moral norms. Briefly, environmental behaviors result from a chain of influences including personal environmental values, beliefs including an ecological worldview, awareness of consequences, and assuming personal responsibility, and personal norms linked with environmentally significant behaviors, respectively (Stern, 2000). The causal sequence thus starts from more abstract and deep core values and beliefs ending in secondary beliefs and norms that are considered more concrete and superficial (García, 2008). Like the TPB, the VBN has received empirical support and extensions in many other investigations (Aguilar-Luzón, García-Martínez, Calvo-Salguero, & Salinas, 2012; Hansla, Gamble, Juliusson, & Garling, 2008; Henry & Dietz, 2012).

Considering the work and models discussed so far, we can draw theoretical and empirical relationships between the four dimensions of environmental concern. It appears that the affective dimension (i.e. values and risk perception) precedes the dispositional dimension (i.e. efficacy and willingness), being the latter the more direct determinant of the active dimension (i.e private and public environmental behaviors). The cognitive dimension deserves special mention (i.e. knowledge and information) as it is not explicitly operationalized in the TPB or the VBN. Other studies suggest that the cognitive dimension influences the active dimension indirectly through the affective and the dispositional dimensions (Bord et al., 2000; Kaiser & Fuhrer, 2003; Kaiser, Ranney, Hartig, & Bowler, 1999; Milfont, 2012b).

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For example Milfont (2012b) using a panel data of three waves over a one-year period with a representative sample from New Zealand, demonstrated how concern mediates the influence of knowledge on personal efficacy. In particular, knowing more about global warming and climate change increases overall concern about the risks of these issues, and this increased concern leads to greater perceived efficacy and responsibility to help solving these issues. Meanwhile, Bord et al. (2000) in a survey of 1,218 Americans found out that, after controlling for risk perceptions and general environmental beliefs, the key determinant of behavioral intentions to address global warming was a correct understanding of the causes of global warming. Knowing what causes climate change, and what does not, was the most powerful predictor of both stated intentions to take voluntary actions and to vote on hypothetical referenda to enact new government policies to reduce greenhouse gas emissions. Kaiser et al. (1999) also found that declarative knowledge on ecological behavior was fully mediated by intention.

The goal of this first chapter was to present a framework that seeks to organize the "highly fragmented" environmental concern literature (Xiao & Dunlap, 2007). The definition, structure, organization, and measurement were discussed and reviewed above. In the following chapter we will review the major streams that have been proposed to predict environmental concern and behavior across cultures, but before that we present the objectives, hypotheses or research questions from this first chapter.

1.1. Objectives, hypotheses or research questions

Though numerous studies have been published in the last decades examining environmental concern, few are truly comparable in seeking to establish cross-national comparisons. To our knowledge, very few published research to date has incorporated a

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latent variable approach that considers clusters of knowledge, attitudes, behavioral intentions, and behaviors as indicative of environmental concern, *and* considers a substantial range of countries (i.e. more than five). Widely ranging views of what constitutes environmental concern, combined with the inconclusive findings to date regarding its proximate sources, suggest that a latent variable approach offers an important contribution to the current state of the literature. Concern for the environment is an abstract notion, quite possibly eluding direct measurement with, for instance, a single survey response item on a questionnaire. A response of strong disagreement to the statement, "There are more important things to do in life than protect the environment", for example, does not provide a comprehensive assessment of a person's latent level of environmental concern. By allowing for the consideration of multiple indicators, latent variables show the common, underlying thread of a series of survey responses.

For comparative research, and particularly for *establishing functional equivalence of measurement*, assessing within and between country variations is important (Przeworski & Teune, 2001). Also, issues of reliability and validity are especially important for cross-national studies (Vijver, Hemert, & Poortinga, 2008). It is important to assess whether the survey items are similar enough in content to be categorized conceptually as a particular phenomenon, in this case, environmental concern. Confirmatory factor analysis (CFA) provides a framework within which it is possible to establish construct validity prior to comparing populations. It is essential to establish within (emic)- and between (etic)-country validity of the indicators, because this permits a differentiation between culture-specific and universal properties of values and behaviors. Emic validity could be established by obtaining good psychometric properties within each country individually, while etic validity could be established by

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obtaining high correlations between the common/pooled model and each country-specific model (McArthur, 2007).

Relying on existing theoretical frameworks and empirical research highlighted earlier, the *first goal* of our research is to establish functional equivalence of environmental concern measures across nations. We do so by using the *theoretical approach* that conceptualizes and operationalizes environmental concern in accordance with attitudinal theories that distinguish between affective, cognitive, dispositional and behavioral elements in the relationship between the subject and the environment. Those four dimensions focus on both multiple environmental issues and multiple expressions of concern (i.e. multiple-topic, multiple-expression instrument). This operationalization represents a comprehensive assessment of environmental concern and a good opportunity to test the assumption that the scales measure the same psychological construct across countries.

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2. Explaining environmental concern and environmental behavior across cultures

There is an increasing interest in understanding and measuring environmental concern across countries (Milfont, 2012a). However, cross-cultural differences in environmental behaviors have been studied less frequently (Hadler & Wohlkönig, 2012). In the next three sections we briefly review several cross-cultural studies focused on predicting different facets of environmental concern with a special emphasis on environmental behaviors, distinguishing those conducted at the individual level of analysis and those conducted at the national level[3]. Studies using multilevel analysis that incorporate both individual- and country-level variables are reviewed in the third section.

2.1. Individual-level influences

The individual-level literature on environmentalism is traditionally divided into two major streams: "studies focused on sociodemographic factors associated with environmentalism and studies on values, beliefs and others social psychological constructs related to environmentalism" (Dietz et al., 1998, p. 451). These two different orientations were also applied to predict environmental concern cross-nationally finding mixed results especially for the former (Hadler & Haller, 2011; Marquart-Pyatt, 2012a). In the following two subsections we will review both main streams.

[3] Studies using individual-level analysis focus on cross-cultural comparisons of individual average scores on particular measures, with individual responses as the unit of analysis. Studies using nationl-level analysis have national culture as the unit of analysis and focus on country-level aggregate scores for cross-cultural comparisons (Milfont, 2012).

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2.1.1. Social bases

Since the early 1970s, one of the main interests of psycho-sociological analyses 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). This refers to the existence of certain social segments in which, in a more or less permanent way, there is a greater sensitivity or awareness of environmental issues. As pointed out by Gómez Benito, Noya, & Paniagua (1999) the definition has been reached through analysis of the economic, social, political and cultural characteristics of subjects that display certain pro-environmental attitudes and behavior. In general, these empirical studies conclude that age, gender, education, place of residence, socioeconomic status and political ideology are variables that are more or less consistently linked to variables such as concern with environmental quality, perception of the severity of the consequences of environmental problems and the willingness to carry out or support actions to resolve them (Fransson & Gärling, 1999; Greenbaum, 1995; Pisano & Hidalgo, 2013; Shen & Saijo, 2008; Van Liere & Dunlap, 1980). Specifically, people with a greater environmental concern tend to be women, young, urban, with a high socioeconomic status and level of education, and a liberal ideology (Xiao & Dunlap (2007). These results fit into what we will call later *hard social base.*

However, some studies have not found these relationships. For example, Dietz et al. (1998), examining a large sample of the North American population, found that variables such as gender, age, race, education, political liberalism and even religious affiliation have positive relationships in some cases and negative in others with different indicators of environmental concern and pro-environmental behaviors. Diamantopoulos, Schlegelmilch, Sinkovics, & Bohlen (2003) also point out that the relationship between sociodemographic characteristics and different measures of environmental concern are

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complex. These authors either do not find significant relationships or do not find them in the expected direction. Shen and Saijo (2008) conclude that, contrary to the majority of prior studies, age displays a positive relationship with environmental concern, women display a lower level of environmentalism than men, and other sociodemographic variables such as socioeconomic status and household size are irrelevant as segmentation variables. In a more recent study, Hadler and Haller (2011) found that five of seven key sociodemographic variables were not related to public environmental behavior (PuEB) in a pooled sample of 23 countries.

The disparity in results is due to a large number of factors. The inconsistencies found can be explained due to the different way that environmental concern is conceptualized and measured (Klineberg, McKeever, & Rothenbach, 1998; Van Liere & Dunlap, 1981), to the heterogeneity and sample representativeness (Samdahl & Robertson, 1989), and to the disparity in the statistical analysis applied (Greenbaum, 1995; Xiao & McCright, 2007).

It is also important to highlight the spatio-temporal perspective where the social bases may be different in a context compared to another, and/or may have been changing in one direction or another over time (e.g. results of the social bases of United States versus Turkey, now or 15 years ago). Furthermore, it was found that sociodemographic factors have a minor effect on behavior compared to attitudinal factors (Diamantopoulos et al., 2003), and sociodemographic dispositions may be acting indirectly through attitudes (Berger, 1997; Corral & Zaragoza, 2000). This may partially explain the mixed results found between some demographic factors and environmental behaviors.

Furthermore, it can be assumed that because of the increasing institutionalization of environmental issues, the wide dissemination of information and personal experience

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towards environmental problems and their consequences, environmental concern may not be longer a matter reserved to a particular social group but instead may be a widespread issue among different social strata. It is the original thesis of Buttel and Flinn (1974) who claim that environmentalism is a diffuse attitude distributed more or less randomly in the population. With recent data and through a model of pathways to environmental behaviors across 16 nations Marquart-Pyatt (2012a) confirms these hypotheses by finding that sex discriminates only in four of the 16 countries analyzed, age in three, the size of hometown in one, and income in none of them. Brand (2002) after a review of different studies claims:

> 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 works lean toward the hypothesis of a *diffuse social base* of environmentalism, claiming that environmental consensus is transversal and that environmental protection is set to a positive and desirable value regardless of the class structure. However, there is also a third possibility that is located halfway between the two positions previously shown (hard social base versus diffuse social base) that could be called *soft social base*.

In the case of the soft social base, it would be accepted even today that there is a social base, but this base is not as pronounced or consistent across studies that have used different and diverse populations samples (Diamantopoulos et al., 2003). For example, Marquart-Pyatt (2008) comparing 19 countries found that of five key socio-demographic variables, gender and income were showing no consistent significant

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effects across countries for environmental attitudes (12 and 10/19 significant effects), and age and income for behavioral intentions (11 and 9/19 significant effects). Similar results were found by Hunter, Hatch, and Johnson (2004) regarding the role of gender on private environmental behavior (PrEB). From a sample of 22 countries, they found that women were more engaged than men only in 14 countries, demonstrating with these results that some indicators may be considered as an environmental soft social base.

These results of the soft social base suggest that the relationships between sociodemographic characteristics and different facets of environmental concern may differ across populations (e.g. nations) and may be contingent of contextual-level characteristics (e.g. the level of economic development of each nation). In fact, Nawrotzki (2012) exploring inter-country variations in the relationship between ideology and willingness to pay (WTP) finds that conservatives' support for the environmental protection varies by 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 better environmental conditions. On the other hand, in less developed countries, and countries characterized by poor environmental quality, conservatives are more environmentally concerned than liberals. Pampel (2013), in turn demonstrates how the 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 are found by Marquart-Pyatt (2012b) 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 studies cited above nor other studies (Franzen &

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Meyer, 2010; Liu & Sibley, 2012; Marquart-Pyatt, 2012b; 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.

All these apparently conflicting data and positions (hard, soft or diffuse social base) do not invalidate but rather reinforce the importance of continuing to research and provide data about the breadth or scope of environmentalism and its possible sociodemographic determinants. Therefore, in the following paragraphs we will review in further detail those sociodemographic variables that have generated a greater volume of research related to environmental concern and environmental behaviors.

With regards to gender, the studies have shown controversial results. On the one hand, some studies have found that women are usually less worried about environment compared to men (Arbuthnot & Lingg, 1975; MacDonald & Hara, 1994; Shen & Saijo, 2008), or rather the opposite (Hunter, Hatch, & Johnson, 2004; Mohai, 1992; Schahn & Holzer, 1990; Xiao & Dunlap, 2007), or even no effect was found (Arcury & Christianson, 1993; Wiidegren, 1998).

However, Zelezny, Chua and Aldrich (2000) after a review of work done between 1988 and 1998 concluded that during this decade, women showed greater levels of environmental awareness and environmental behaviors. In studies conducted by these authors, "females reported stronger environmental attitudes and behaviors than men across ages and countries" (p. 453). Thus, overall, women appear to behave in a more responsible way toward the environment than men.

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

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"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 (Davidson & Freudenburg, 1996; 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, a number of studies support the fact that the youth have more favorable attitudes and beliefs towards the environment than older people (Hines et al., 1987; Inglehart, 1991; Van Liere & Dunlap, 1980). Van Liere and Dunlap (1980) attribute this to the fact 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.

However, more recent studies have found a positive correlation between age and environmental attitude (Shen & Saijo, 2008; Wiernik, Ones, & Dilchert, 2013) or at least curvilinear (Echavarren, 2009; Gómez Benito et al., 1999) which suggests that the trend may be changing. Echavarren (2009) reported that the younger cohorts are not characterized by particularly high environmental values, although those who were over 65 years appear to be the most skeptical regarding the environment and generally the most reluctant to behave in a pro-environmental way. According to Inglehart (1991), the youth is considered the generation of postmaterialistic values change. Díez Nicolás (2007) offers an explanation to this anormality by pointing out that in recent years advanced countries are suffering a decline in their postmaterialist values as a reaction to

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the local and international situation of uncertainty and general crisis, being the group most affected by this situation.

Meanwhile, Grønhøj y Thøgersen (2009) simultaneously analyzed the attitudes of parents and their adolescent children towards specific environmental behaviors. The results showed that parents had more positive attitudes toward handling waste and curtailing electricity use than their children, while there were no differences in attitudes towards purchasing environmentally friendly products. Also, these more favorable attitudes toward recycling help to explain why adults recycle more than young people (Domina & Koch, 2002). In addition, although not necessarily guided by environmental values, older people report savings behavior more than the other cohorts (Echavarren, 2009), and in terms of sustainable mobility it is known that older people do their daily commuting on foot or by public transport more often (Lafuente & Moyano, 2011). These data again demonstrate the complex relationships that exist between sociodemographic variables (in this case age) and different indicators of environmental concern.

The socioeconomic status (SES) is another relevant variable in the social base. It can be defined in terms of educational level and/or income. In general terms, both variables are positively related with environmental concern (Diamantopoulos et al., 2003; Van Liere & Dunlap, 1981). Although there are contradictory results, when these two variables are examined together or in mediational terms, results confirm that people with more education and higher incomes are more oriented toward environmental protection (Arcury & Christianson, 1993; Corral, 2010; Shen & Saijo, 2008). Recently, Marquart-Pyatt (2012a) shows how through a model of pathways to public environmental behavior (PuEB) across 16 nations, educational level was the only

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sociodemographic variable showing consistent significant effects across countries (13/16 positive and significant).

The positive effect of the socioeconomic status 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 (Scott & Willits, 1994; Van Liere & Dunlap, 1980). However, when the positive effect of income is analyzed in terms of lifestyle and broader consumption habits, the relationship that emerges could be the opposite:

> … unfortunately, people who earn more also use greater amounts of electricity (Gatersleben, Steg, & Vlek, 2002), residential water (Corral, Bechtel, & Fraijo-Sing, 2003), and drive more private cars (Hunecke, Haustein, Grischkat, & Böhler, 2007) so the income, at the same time that is associated with certain pro-environmental action, it is also a determinant of consumerism and environmental degradation in other areas. (Corral, 2010, p. 232)

Finally, the place of residence and the political ideology are also variables that have been associated to the social base of environmentalism. As for the first, people that live in urban areas appear to be more pro-environmental compared to those that live in rural areas (Arcury & Christianson, 1990; Howell & Laska, 1992). 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.). However, when studies are performed with representative or large samples and used a wide range of environmental concern facets, the differences are usually small (in both directions) or not significant (Arcury & Christianson, 1993; Berenguer, Corraliza, & Martín, 2005; Kennedy, Beckley, McFarlane, & Nadeau, 2009; Xiao & Dunlap, 2007).

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In terms of political orientation, numerous studies have found more environmental concern among liberal than in the conservative group (Daneshvary, Daneshvary, & Schwer, 1998; Hine & Gifford, 1991; Van Liere & Dunlap, 1981). 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).

Summing up, it could be maintained that the question of sociodemographic correlates of environmental quality is an open-ended issue since the results aimed at understanding the social bases of environmental concern have not been conclusive. Some studies have declined to a hard social base, while others have provided data to establish a soft or diffuse social base. It appears that the level of education has been the variables that generated more consensus across the studies reviewed while the place of residence the least. We reviewed some of the reasons of these contradictory results putting in evidence the need for a unified theoretical framework that makes possible to establish cumulative and reliable evidence. It was also noted that in addition to the direct effect of the social bases on environmental behaviors, the relationship may be indirect through dispositional or situational factors. Therefore there could be an additional and significant contribution of sociodemographic variables on conservation behaviors mediated by psychosocial or contextual factors.

2.1.1.1. Objectives, hypotheses or research questions

Through the discussion in the previous subsection we evidence that the debate about the cross-cultural social bases of environmentalism continues permanently open and no “satisfactory” conclusions have been established. Also, we point out that the disparity in results was due to a large number of reasons.

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In this work we proposed to address some of those reasons by applying a multilevel cross-cultural perspective that use the same survey (i.e. indicators), a large number of countries, recent data, representative samples, and more proper methodological techniques. By considering these elements we reduced the bias found in previous literature and we are able to test the following research questions:

- *Question 1:* What kind of social bases can be supported cross-culturally? Are we going to find a "hard", a "soft" or a "diffuse" social base across nations?
- *Question 2:* Are the social bases going to be different if we control for other individual-level influences (i.e. environmental concern facets)?
- *Question 3:* Can the variation in the social bases be a function of country-level characteristics?

Question one is exploratory given the fact that few previous studies have compared a large number of countries and, if they did, very few of them have focused on environmental behaviors as the outcome variable. Two exceptions in this regard are the works of Hunter, Hatch and Johnson (2004) y Marquart-Pyatt (2012a). Hunter et al. (2004) analyzed the role of gender on PrEB from a sample of 22 countries of the ISSP 1993. They found that women were more engaged than men in 14 countries, demonstrating with this result that gender may be considered as an environmental soft social base. However, Marquart-Pyatt (2012a), analyzing PuEB from a sample of 16 countries of the ISSP 2000, found that sex discriminates only in four of the 16 countries analyzed. On the other hand, education was the only sociodemographic variable showing consistent significant effects across countries (13/16 positive and significant),

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while age was significant only in three nations, size of hometown in one, and income in none of them.

As for the second question and assuming that the sociodemographic factors have a minor effect on behavior compared to attitudinal factors (Diamantopoulos et al., 2003) and sociodemographic dispositions may be acting indirectly through attitudes (Berger, 1997; Corral & Zaragoza, 2000), we would expected that the social bases of environmental behaviors are going to be less pronounced once we control for the effect of others individual-level influences (e.g. environmental attitudes). So far cross-cultural research has not formally tested different path models that evaluate how much the social bases will be affected by the inclusion of attitudinal variables. We propose to analyze the cross-cultural direct effect of sociodemographic variables on environmental behaviors and the indirect effects of the social bases throughout the inclusion of attitudinal variables. The total effect from those models will be later on compared from those used to answer the first question posited above.

The discussion presented so far lead us to the following hypotheses:

- *Hypothesis 1:* the effects of the sociodemographic variables on environmental behaviors will differ across countries. That is, gender, age, education, household income, and size of hometown may be positively, negatively or not significant associated with both PrEB and PuEB depending of the country analyzed (i.e. *Question 1*).
- *Hypothesis 2:* the effects of the sociodemographic variables on environmental behaviors will be less pronounced across countries once we control for the effect of the psychosocial variables (i.e. *Question 2*).

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As the first question, the third one could be also considered as exploratory. From the review presented above we might assume that the relationships between sociodemographic characteristics and environmental behaviors differ across populations (e.g. nations) and that variation may be contingent of contextual-level characteristics (e.g. the level of economic development of each nation). Multilevel analysis allows the estimation of cross-level interactions (i.e. the effect of a level-2 predictor on a level-1 slope coefficient) and this strategy began to be used in environmental cross-cultural studies (Franzen & Meyer, 2010; Liu & Sibley, 2012; Marquart-Pyatt, 2012a; Nawrotzki, 2012) but once again none of these studies use environmental behaviors as the outcome variable. With our work we proposed to examine for the first time in the literature whether the strength of the association between sociodemographic characteristics and environmental behaviors are similar across contexts, and the extent to which economic, educational and environmental conditions help predict these relationships.

2.1.2. Psychosocial factors

In psychology and in particular in environmental psychology, a number of psychosocial factors have been proposed that would affect the performance of environmental behaviors (Bamberg & Möser, 2007; Corral, 2010; Klöckner, 2013). According to our proposal of a multidimensional and behavior-oriented definition of environmental concern, in this subsection we will review those facets or indicators that make up the four dimensions of environmental concern (see Chapter 1), with special emphasis on all the psychosocial variables that have been empirically used in this dissertation. Finally, we review studies that have used various facets of environmental

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concern to predict environmental behaviors across cultures as well as some limitations found in the literature.

As for the *affective dimension*, several studies have considered environmental awareness as a descriptive parameter of the level of environmental concern and as a predictor of environmental behavior (Berenguer & Corraliza, 2000). However, the use of this facet as a single indicator of the affective dimension can be questioned for at least two reasons (Jiménez & Lafuente, 2010).

First, several studies have shown that environmental awareness can be based on direct personal experience of the environment, without the need to share the symbolic representations of the global problems that the scale refers to (Gooch, 1995). Second, the degree of awareness is highly influenced by the greater or lesser dissemination of environmental issues in the media and political agendas, thus this awareness being a reflection of a socially desirable answers in the public opinion, that are not necessarily related to other positive attitudes and behaviors towards the environment (Scott & Willits, 1994). Given the above, environmental awareness would be better appreciated when people express their opinions on specific environmental issues that are close to their personal experiences (Jiménez & Lafuente, 2010).

The perception and/or exposure to risks and environmental harm can be considered a good alternative indicator within the affective dimension that would allow to diminish the two aforementioned biases when measuring environmental awareness in the abstract and general way. It has been shown in numerous studies how experiencing risks or harm related to environmental degradation promotes environmental awareness and induces environmental behaviors, while generating a greater perception of risk and other attitudes related to the environment (Corral, 2010).

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Drori and Yuchtman-Yaar (2002) in Israel and Palestine found that environmental perceptions coincided with actual environmental risks in the areas investigated. People living in high-risk areas also expressed higher levels of awareness for the environment. Brody, Zahran, Vedlitz and Grover (2008) measured the actual degree of physical risks associated with climate change (e.g. sea level rise and increased temperatures, forest fires, etc.) in various areas of the United States. The authors found that such objective data were significantly correlated with the perceived personal risk that people in those areas reported. Chen et al. (2012) with a representative sample of urban citizens in China showed how experiencing environmental harm positively influenced pro-environmental behaviors both directly and indirectly through the mediation of environmental attitudes.

These results and others support the growing body of research suggesting that pro-environmental attitudes and behaviors can be a response to environmental degradation (Chen et al., 2012; Dunlap & York, 2008). Specifically, negative experiences involving environmental harm may help individuals recognize the value associated with protecting the environment, which subsequently can be translated into behaviors aimed at avoiding or reducing such harm in the future (Whitmarsh, 2008).

The affective dimension also includes within its facets the level of attachment to values favorable to environmental protection. There are numerous ways of conceptualizing those values (Steg & De Groot, 2012). A proposal in this regard is that of the American political scientist Ronald Inglehart. He has developed a model to explain the development of modern societies that also addresses mass attitudes towards environmental problems. Based on data from the World Values Survey, which comprises representative national surveys from many countries, Inglehart (1977) argues that the increasing affluence and security achieved by industrial societies, especially

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after World War II, has resulted in a shift from materialist values (e.g. personal and national security, economic well-being) to postmaterialist values (e.g. quality of life, self-expression). He argues that this shift in values, led by economic prosperity and political security, has resulted in societies becoming more environmentally concerned. Despite some evidence against it (Mostafa, 2011; Plombon, 2011) numerous studies that have applied the postmaterialist thesis to environmental research, showed that the links between postmaterialist values and environmental protection are stronger than those between materialist values and environmental protection (Gillham, 2008; Inglehart & Baker, 2000; Inglehart, 1995; Olofsson & Öhman, 2006; Oreg & Katz-Gerro, 2006).

On the *dispositional dimension*, the literature highlights the key role played by self-efficacy and behavioral intention as the principal mediating variables between values/beliefs and behaviors (Bamberg & Möser, 2007; Hines et al., 1987; Klöckner, 2013). The feeling of self-efficacy or perceived behavioral control refers to the set of judgments that people make about their capacity for individual action (or about what one can contribute to solve the problem). Possessing a high sense of self-efficacy is essential in rational calculations associated with decisions to develop pro-environmental behavior patterns (Oreg & Katz-Gerro, 2006; Tabernero & Hernández, 2010; Vining & Ebreo, 2002).

On the other hand, the intention to act has been considered, in almost all predictive models, as the closer variable in the causal chain of environmentalism, because it is considered that the behavior is a direct function of the intention to take the action (Bamberg & Möser, 2007; Hines et al., 1987; Klöckner, 2013). In fact, Klöckner (2013) through a meta-analysis reported that from eight independent variables,

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behavioral intention showed the highest correlation with environmental behavior (r = .55), and it was the most powerful predictor (beta = .38) in 26 studies analyzed.

Behavioral intention has been operationalized with a high degree of specificity (e.g. the intention to use less the car predicts car use), or with a high degree of generality (e.g. the intention to accept cuts in the standard of living to protect the environment predicts sustainable mobility behaviors). Within this second option, the scale of willingness-to-sacrifice (WTS) and/or willingness-to-pay (WTP) have been probably the most used, finding a high relationship of them with different types of behaviors (Marquart-Pyatt, 2012b; Oreg & Katz-Gerro, 2006; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). WTS is typically measured with the following three items: "I am willing to pay much higher prices to protect the environment", "I am willing to accept cuts in standard of living to protect the environment", and "I am willing to pay much higher taxes to protect the environment".

To complete the analysis of the dimensionality of environmental concern we should take into account two considerations: the importance of information and available knowledge (*cognitive dimension*) and the nature of the behavior (*active dimension*).

Environmental knowledge refers to the amount and quality of information available to an individual about its environment and the problems related thereto. These knowledge's are fundamental to activate personal norms that guide behavior, and in the process of internalization of values and environmental beliefs (Stern, 2000). Moreover, as Laurian (2003) shows, the information that people have about environmental issues in their community is essential to generate public involvement in the resolution of these problems. Meinhold and Malkus (2005), on the other hand, show that environmental

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knowledge moderates the relationship between attitudes and environmental behaviors, which make it as an indirect determinant of pro-environmental actions.

Environmental knowledge is also considered a precursor of environmental skill acquisition since a person can not develop problem-solving skills without knowing about them or without being informed on how to deal effectively, which is demonstrated among others by Corral (1996) and Day (2004). Despite the educational efforts undertaken, environmental knowledge levels have remained low in almost every corner of the planet (Pooley & O'Connor, 2000). However, the level of environmental knowledge is not distributed uniformly, being higher in experts than in ordinary people, journalists and politicians (Sundblad, Biel, & Gärling, 2009).

At the same time, we can expect different attitudes and levels of knowledge depending on the nature of the behavior. Related to the latter, there are many ways in which behaviors have been classified. Based on exploratory and confirmatory factor analysis with a large number of different environmental behaviors, numerous investigations have found and proposed a taxonomy that distinguishes between behaviors of the private sphere and the public sphere (Castro, 2002; Hadler & Haller, 2011; Hunter et al., 2004; Pisano & Hidalgo, 2013). The first factor would contain behaviors like buying eco-friendly products, save water or energy at home/workplace, recycling, etc., and the second factor would contain behaviors as signing against actions that harm the environment, give time/money to an environmental organization/conservation campaigns, etc.

In addition, it is important to distinguish different types of behaviors according to their level of involvement or cost associated with its realization (Hidalgo, Hernández, Lambistos, & Pisano, 2011). This categorization allows differentiating pro-environmental behaviors that a majority of individuals most frequently engage in from

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lower-frequency performed behaviors. Thus, environmental behaviors possess a high range of involvement because they include behaviors such as paper, glass or packages recycling -which apparently imply a lower personal commitment- as much as behaviors such as participating in an ecologist association or collecting signatures for conservationist purposes, which imply a deeper personal commitment. The diverse responses would differ in what we could call levels of involvement within the more general ecological behavior.

In the same vein, Stern (2000) establishes that the more difficult and hard a pro-environmental behavior is, the less its dependency on attitudinal factors and the more its dependency on contextual variables. This would make individuals showing environmental awareness to be involved in pro-environmental behaviors in a differential way: engaging more in those easier to perform (Pelletier, Green-Demers, & Menard, 1997). Therefore, this type of classification is useful as it helps to explain the lack of consistency and/or generalization of pro-environmental behaviors that refer numerous authors (Ebreo & Vining, 2001; Thøgersen & Ölander, 2003).

All the facets of environmental concern previously mentioned have been used to predict environmental behaviors across nations. However, few cross-cultural studies have used facets of the four dimensions in the same model, or have analyzed a large number of countries. Also, few of them have used the different facets of environmental concern into a model specifying multiple paths to environmental behaviors and empirically assessed across nations individually. Another limitation on the cross-cultural literature is the almost total absence of the cognitive dimension in the models of environmentalism. We will next look at some cross-cultural studies that have attempted to overcome some of those limitations.

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For example, Oreg and Katz-Gerro (2006) using a pooled sample of 27 countries demonstrate that a series of values (i.e. Schwartz's harmony values and Inglehart's postmaterialist values), attitudes and intentions were significantly and positively associated with both PrEB and PuEB. They also conducted a country-by-country analysis finding support for the model cross-nationally. Their model posited that values precede environmental attitudes, which precede intention (i.e., willingness to sacrifice for the environment), which in turn precede behaviors. The full model can be depicted as: values → environmental awareness/perceived threat → willingness to sacrifice for the environment → PrEB/PuEB, and perceived behavioural control → willingness to sacrifice → PrEB/PuEB. Overall, the mediating model was also supported.

A similar work was conducted by Marquart-Pyatt (2012a). She tested a model of pathways to public environmental behavior (PuEB) across 16 nations using structural equation modeling. The model was proposed articulating individual resources (i.e. social bases), knowledge, awareness of consequences (i.e. risk perception), attitudes, willingness to contribute and efficacy as factors influencing environmental behavior. The mediating effect of willingness to make environmental contributions was investigated in detail based on expectations from prior studies. Results from analysis of International Social Survey Program data were broadly supportive of the model across 16 countries individually, as education, awareness of consequences, and attitudes combined affect environmental behavior. Knowledge was found to be a significant predictor only in three countries. Moreover, mediating tests demonstrate a prominent but not exclusive role of willingness to contribute in promoting behavior across nations.

Pirani and Secondi (2011) using a pooled sample of 27 European Union member countries found that most of the attitudes and opinions towards the environment net to a measure of environmental knowledge were positively affecting a series of eight

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different PrEBs. Hadler and Haller (2011) with a pooled sample of 23 countries found similar paths for PuEB. However, contrary to the result of public behavior, they found that knowledge and postmaterialist values did not have a significant effect for PrEB behavior.

Also, Inglehart´s postmaterialist thesis was reconfirmed across culture by others (Gillham, 2008; Olofsson & Öhman, 2006; Oreg & Katz-Gerro, 2006). For example, Gillham (2008) with data from 12 European Union nations found that people with materialist and with mixed values were less involved in environmental public behavior than postmaterialist. In concrete, materialists were 56 percent less likely involved than postmaterialists, and those with mixed values were 30.5 percent less likely involved than the posmaterialists, all things being equal. These relationships were statistically significant, thus differing values appear to impact the likelihood of participation in public behaviors.

The review presented so far allows us to conclude that there are several psychosocial factors related to environmental behaviors, and that they had received empirical support in independent studies as well as in comparative studies across nations. Despite certain limitations noted above, we can conclude that there are consistent cross-cultural findings showing that environmental behavior is positively related to: postmaterialist values, negative assessment of environmental quality, environmental knowledge, environmental self-efficacy, and willingness to make sacrifice.

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2.1.2.1. Objectives, hypotheses or research questions

All the aforementioned psychosocial factors have been tested in predicting environmental behavior from a cross-cultural point of view. However, few of these studies have used indicators of the four dimensions of environmental concern in the same model (e.g. absence fo the cognitive dimension or underrepresentation of the active dimension), or have not used the different facets of environmental concern into a model specifying multiple paths to environmental behaviors and empirically assessed across nations individually. This dissertation seeks to uncover these issues. Theoretically, we proposed to investigate how sociodemographic and psychosocial factors affect environmental behaviors in order to establish whether there are similarities or differences across nations with regard to within country sources of variation.

The discussion presented in chapter 1 and in subsection 2.1.2. suggest the following individual-level hypotheses:

- *Hypothesis 3:* the effects of the psychosocial variables on environmental behaviors will not differ across countries. That is, postmaterialist values, risk perception, knowledge, efficacy and intention will be positively associated with both PrEB and PuEB in all the countries (all with effects of other individual-level variables being controlled).
- *Hypothesis 4:* the affective and cognitive dimensions will fully affect the active dimension through the dispositional dimension. That is, efficacy and willingness to make sacrifice positively and fully mediate the positive relationship between risk perception/postmaterialism/knowledge and PrEB/PuEB.

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- *Hypothesis 5:* efficacy will partially affect environmental behaviors through willingness to make sacrifice (i.e. intention). That is, willingness to make sacrifice positively and partially mediates the positive relationship between efficacy and PrEB/PuEB.

2.2. Country-level influences

Besides the two major streams of individual-level influences on environmental concern and behavior discussed above, Dietz et al. (1998) also suggested that "a fuller theory of environmentalism must attend to *contextual effects* [emphasis added] that influence beliefs and values as well as individual level variables" (p. 466), so individuals' environmental behaviors depends not only on their knowledge, attitudes, and values but also on the social context in which they live. In recent years, many competing societal-macro level explanations were proposed to describe cross-cultural differences in preferences over specific facets of environmental concern. Between the most prominent, socioeconomic development, societal and cultural characteristics and actual environmental conditions were highlighted as important contextual factors influencing environmental attitudes and behavior.

In this section we will review those macro-level factors following the proposal of García (2008) that grouped them into three broad categories: on the one hand, societies develop and have greater environmental concern because they are increasingly more rich (i.e. socio-economic development theories), or rather because they are more wise (i.e. educational development theories), or because they suffer more and more the negative consequences of environmental problems (i.e. environmental degradation theories). However, as will be noted latter several of these processes are interrelated making it difficult to know the individual scope of each of the proposed theories.

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Furthermore, research has yielded mixed results about the influence of the contextual factors affecting different facets of environmental concern (Dalton, 2005; Duroy, 2008).

The first category or explanation argues that environmental concern is part of the growing interest for a better quality of life: people begin to be interested in the conservation of the environment when they have covered their material needs. Probably the most influential theory of this line of thought has been the one of the American political scientist Ronald Inglehart known as postmaterialism: "the satisfaction of physiological needs leads to a greater emphasis on non-physiological or postmaterialist goals" (Inglehart, 1991, p. 140). Inglehart's theory of value change draws upon Maslow's theory of a hierarchy of human needs and Mannheim's theory of generations in arguing that within the wealthy, industrialized nations those generations that have reached adulthood during post-World War II affluence have experienced a major shift in their basic values. Specifically, he combines a Maslowian-derived "scarcity hypothesis" that holds that individuals place the most emphasis on "those things in short supply" with a Mannheimian-derived "socialization hypothesis" that holds that "one's basic values reflect the conditions that prevailed during one's pre–adult years" (Inglehart, 1990, p. 68).

Among the needs or postmaterialistic values, Inglehart has included the concern for the historical heritage, the importance of ideas and freedom of speech or the desire for a less impersonal society. This set of postmaterialistic values primarily oriented toward self-realization and quality of life, would be opposed to the needs and materialistic values, such as a strong army and police force, or economic growth as the first priority.

Inglehart and his colleagues have gathered a large amount of empirical data that reveal the presence of postmaterialist views in different countries. They also argue that

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the growing prevalence of postmaterialist values within the wealthy nations resulting from a generational cohort replacement is the primary factor that has stimulated the emergence of progressive social movements such as the peace, feminist, and environmental movements along with a host of other fundamental social changes (Inglehart & Baker, 2000; Inglehart, 1995). This process of value change and the relationship with environmental concern and behavior at the national level was also confirmed by other researchers (Dalton, 2005; Gelissen, 2007; Oreg & Katz-Gerro, 2006).

For example, Oreg and Katz-Gerro (2006) analyzed data from the 2000 International Social Survey Programme across 27 countries and using structural equation modeling to test a mediating model of the influence of values on ecological behavior. They found that Inglehart´s postmaterialist values were positively related to environmental concern in the pooled sample and in most of the country-by-country analyses. Dalton (2005), using data from the 1999-2002 wave of the World Values Survey found that the strongest predictor of group membership was the national mean score on postmaterialist values, and that was the only statistically significant variable in the model. The other variables that might explain membership rates –affluence, press freedom scores and environmental conditions- were insignificant in the multivariate model.

There is a second approach within the socio-economic development theories, which it is known as the prosperity or affluence hypothesis (Diekmann & Franzen, 1999). Following the arguments typically advanced in environmental economics (e.g. Field & Field, 2013), the prosperity hypothesis assumes that the quality of the environment is not only a public good but also a demand which rises with income. Furthermore, it is assumed that individuals face a trade-off between consumption of

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goods and the quality of the environment. As income increases, budget constraints shift upwards, which allows both for an increase in consumption in general and a higher investment in environmental quality. Thus, as a population becomes wealthier, the demand for higher environmental quality should rise, which, in the aggregate, should result in a positive correlation between a country's wealth and its level of environmental concern (Franzen & Meyer, 2010). These expectations were supported by others (Duroy, 2008; Franzen & Vogl, 2013; Franzen, 2003; Pirani & Secondi, 2011).

For example, Franzen and Vogl (2013) analyzed the development of environmental concern by using the three waves from the environment modules of the International Social Survey Programme (1993/2000/2010). Among others, they explored the longitudinal aspect of the data at the macro level in order to uncover the causal relation between countries' wealth and environmental concern. The results show that environmental concern was closely correlated with the wealth of the nations. Although they found that environmental concern decreased in almost all nations slightly during the last two decades, the decline was lower in countries with improving economic conditions suggesting that economic growth helps to maintain higher levels of environmental concern. Duroy (2008) also found that GDP per capita plays an important role in explaining cross-cultural differences in preferences over specific environmental actions. He concluded that overall the evidence included in the paper lends qualified support to the affluence hypothesis.

A second set of theories claim that we know or have come to know more than we knew about the delicate state of the environment and that makes our concern increase. The production and dissemination of scientific knowledge and the special role therein of the ecology and environmental organizations, makes it so every day more people are aware of the high human impact on the natural systems of the planet, and the

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need to do something to control and reduce it. In the words of well-known representatives of this point of view:

> … the never-ending emergence of *new scientific evidence* [emphasis added] concerning the deleterious impacts of human activities on environmental quality and the subsequent threats these pose to the welfare of humans (and other species) will generate continual pressure for adoption of a more ecological worldview. (Dunlap, Van Liere, Mertig, & Jones, 2000, p. 439)

The American sociologist Riley Dunlap and his colleagues have worked in this line for three decades, developing in a number of academic papers the idea of a "new ecological paradigm" (Dunlap & Van Liere, 1978; Dunlap et al., 2000; Dunlap & Van Liere, 2008). They maintained that the world view characteristic of the industrial era, based on the belief in human exceptionalism (i.e. the human capacity to separate from nature and dominate it), is being displaced by a new central vision or paradigm, which basic principles are the acceptance of the finitude of the planet and the interconnection between human beings and other living things. According to these authors, this new paradigm is explained as an effect of the dissemination of scientific information on the state of ecosystems, so the new environmental paradigm would be a “popular version of ecology as a science” (Garcia, 2008, p. 36). We learn more, we are becoming wiser and, consequently, our concern increase.

While theoretically derived propositions about such relationships have a deep history in comparative sociology, they -with few exceptions- remain untested at the aggregate or national level. Between these few exceptions, Duroy (2008) found positive and significant correlations between three of five environmental behaviors and a measure of higher education (i.e. enrollment in tertiary education) in a pooled sample of 35 countries. However, none of those relationships remained significant in the

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multivariate regressions. The same results were found by Franzen and Meyer (2010) where using a multilevel random intercept model, the country's educational level was not significantly linked to environmental concern.

Another way to relate environmental information circulating in a society with the acquisition of environmental attitudes and behaviors is through the relative presence of environmental non-governmental organizations (ENGOs). Although very few studies have investigated this relationship, the results in this case have been more conclusive. Givens and Jorgenson (2013) multilevel results of environmental concern in 37 nations indicate that the presence of environmental international non-governmental organizations (EINGOs) increase the likelihood of national-level environmental concern (net of other national-level factors and individual-level characteristics), and further EINGOs had the strongest effect on the outcome variable. Regarding environmental behaviors, Hadler and Haller (2011) also found that international non-governmental organizations (INGOs) have a significant impact on public and PrEBs, while international governmental organizations (IGOs) significantly affected PrEB behavior.

In addition to the previous results where the societal level of information and education have not been tested extensively and have obtained conflicting results, theories of socio-economic development have also been questioned. The conventional wisdom[4] was challenged by results of Gallup's 24-nation "Health of the Planet" (HOP) survey conducted in 1992, as the HOP found highly inconsistent and often negative correlations between national affluence and environmental concern (Dunlap & Mertig,

[4] Conventional wisdom has long held that widespread citizen awareness of environmental problems and support for environmental protection were phenomena limited to wealthy, highly industrialized, and primarily Northern-hemisphere nations.

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1995; Dunlap & Mertig, 1997). In a more recent article Dunlap and York (2008) compare results from three waves of the "World Values Survey" (WVS) to those of the HOP. The WVS results generally replicate those of the HOP, as in all three waves different measures of environmental concern correlates inconsistently with national affluence. In particular, of the three dimensions of environmental concern used in the first wave, two -willingness to make economic sacrifices on behalf of environmental protection and approval of the Ecology Movement- were negatively related to national affluence, whereas only perceived seriousness of environmental problems was positively related. They identified four dimensions in the second wave, and two of them -willingness to make economic sacrifices and confidence in the green/ecology movement- were unrelated to national affluence, whereas the two self-reported behavioral dimensions -green consumerism and environmental activism- were positively related. For the third wave, an index of willingness to make economic sacrifices identical to that used in the first wave was again negatively related to national affluence (although significantly only with log GDP per capita), while an item measuring confidence in the Environmental Movement was unrelated to affluence. From the viewpoint of these authors and others (Fairbrother, 2013; Knight & Messer, 2012; Mostafa, 2011) the overall results suggest that citizen concern for the environment is not always related to national affluence, nor to affluence-based postmaterialist values.

The two approaches discussed above agree on one thing: both believe that certain cultural events (i.e. the dissemination of scientific information, the emergence of new values) are the causes leading to the spread of behaviors consistent with them. An alternative approach, which takes as its starting point the analysis of concrete collective experiences, presents the mechanism rather the opposite: the conditions under which

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life takes place causes actions and behaviors that end up connecting with certain ideas or values (Garcia, 2008). People who suffer the effects of environmental degradation are increasingly large and the negative impacts are more frequent. In these cases, a third path suggests that we care about the environment because we are victims, because we suffer the effects of degradation. Although environmental problems are widespread throughout the world, the Global South and low-income and minority communities from the Global North are disproportionately more affected by environmental degradation leading them, regardless of values or wealth, to express greater concern and develop grass-root environmental movements (Escobar, 2006; Martinez-Alier, 2003; Pellow & Brulle, 2005).

Also, Arcury and Christianson (1990) comparing responses of statewide samples of Kentucky residents to the NEP Scale in 1984 and 1988 (the latter following a severe summer drought) found an increase in pro-NEP responses, but the increase was significant only in counties that had experienced water use restrictions. This led the authors to conclude that "critical environmental experience can accelerate change in environmental worldview." (p. 404). Chen et al. (2012) with a representative sample of urban citizens in China showed how experiencing environmental harm positively influenced pro-environmental behaviors both directly and indirectly through the mediation of pro-environmental attitudes. These results and others support the growing body of research suggesting pro-environmental attitudes and behavior can be a response to environmental degradation (Chen et al., 2012; Dunlap & York, 2008).

Considering data from cross-national comparisons, Givens and Jorgenson (2011) assessed the effects of environmental degradation on the likelihood of environmental concern of individuals (i.e. the importance of looking after the environment) in 38 nations. Results of multilevel logistic regression analyses indicate that growth in

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environmental degradation increase the likelihood of such concern. The same results were found by Knight and Messer (2012) where a multivariate panel regression model using data from four WVS waves (1990-2008) suggests that environmental degradation is positively associated with environmental concern expressed as willingness to pay higher taxes. Nevertheless other scholars reported no significant or even negative relationships between environmental degradation and different facets of environmental concern (Dalton, 2005; Franzen & Meyer, 2010; Marquart-Pyatt, 2012a).

As will be noted throughout this section several of the macro-level factors analyzed are highly interrelated. Post-industrialized and wealthy societies tend to have more dense communication structures, mass education, urbanization and higher degrees of societal postmaterialist values. These characteristics all together enhance opportunities to translate public concerns into environmental behaviors (Dalton, 2005). For example, within more affluent societies, social movements and environmental NGOs can draw upon ample financial resources which make it easier to start and sustain movements in terms of participation, and urban areas are also more populated which makes it easier to find a concentration of like-minded individuals (Gillham, 2008). Also, in better-educated and postmaterialistic societies it is more likely that the public become more sensitive to the environmental problems facing their nation, and that this public possess skills and political resources that increase their engagement and environmental behaviors (Duroy, 2008).

It is therefore difficult to trace the development of and differences in environmental concern across cultures in a single source. Some of its manifestations, can be connected with relatively comfortable living conditions in advanced industrial societies (as is the case today for the green consumer segment). On many other occasions, resistance arises from the expropriation or destruction of vital resources in

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the name of "progress." There is no doubt that the dissemination of scientific reports and TV documentaries have aroused consciousness, and it is clear therefore that pro-environmental ideas are associated with a plurality of heterogeneous causal factors (Garcia, 2008).

2.2.1. Objectives, hypotheses or research questions

As Milfont (2012a) points out in a recent review of cultural differences on environmental attitudes and behaviors:

> … it is still *unclear* [emphasis added] what the main country-level determinants of environmental engagement are. Two important hypotheses arising from Inglehart's models still need further testing. First, there is the hypothesis related to 'objective problem and subjective values' in which environmental engagement is a result of either a shift from survival/materialist to self-expression/postmaterialist values or the experience of concrete environmental degradation. Second, there is the hypothesis related to modernization and affluence in which environmental engagement is a result of an increase in income and human development. A number of studies have made a start on testing these hypotheses but *no consensus* [emphasis added] has so far been reached … . (pp. 193-194)

In order to discover which of the competing national factors reviewed in the last section explain best cross-cultural differences on environmental behaviors, the following exploratory contextual-level hypotheses were proposed:

- *Hypotheses 6a-6d:* national wealth (*hypothesis 6a*), societal-level

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postmaterialism (*hypothesis 6b*), national information and educational development (*hypothesis 6c*), and national objective and subjective environmental problems (*hypothesis 6d*) will all be positively related to aggregate levels of PrEB and PuEB.

2.3. Multilevel studies on environmental behaviors

In recent years cross-cultural research in environmental concern has begun to use multilevel strategies to examine the effect of both individual and country-level variables simultaneously (for a review, see Milfont, 2012a). However, there is a lack of cross-cultural studies using the combined effect of micro and macro influences on environmental behaviors. With few exceptions (Guerin, Crete, & Mercier, 2001; Hadler & Haller, 2011; Pirani & Secondi, 2011) multilevel studies are focused on other dimensions of environmental concern such as sacrifice or willingness to pay (Gelissen, 2007; Liu & Sibley, 2012; Mostafa, 2011; Nawrotzki, 2012), seriousness of local-global environmental problems (Fairbrother, 2013; Marquart-Pyatt, 2012a), environmental efficacy (Marquart-Pyatt, 2012a), or a combination of two or more of these dimensions (Franzen & Meyer, 2010; Haller & Hadler, 2008; Marquart-Pyatt, 2012a). Other researchers have also examined cross-level interactions (i.e. the effect of a level-2 predictor on a level-1 slope coefficient) (Franzen & Meyer, 2010; Liu & Sibley, 2012; Marquart-Pyatt, 2012a; Nawrotzki, 2012) but again did not focus on environmental behaviors.

Even further, previous studies of cross-cultural differences on environmental behaviors have used only individual level survey data (Marquart-Pyatt, 2012b; Olofsson & Öhman, 2006), national level aggregations of such data (e.g. Dalton, 2005; Duroy, 2008), or a combination of both levels without taking the nested or multilevel nature of

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the data into account (e.g. Freymeyer & Johnson, 2010; Gillham, 2008; Oreg & Katz-Gerro, 2006). When considering the national and individual level simultaneously, multilevel models avoid conflicts about which is the appropriate level (Dunlap & Mertig, 1997; Fairbrother, 2013) and do not run the risk associated with ignoring either one (Subramanian, Jones, Kaddour, & Krieger, 2008).

For example, multilevel data have been analyzed with what have been called "aggregation" and "disaggregation" techniques in most of the previous research. In aggregating individual-level data to the level of a country, variation at the individual-level is lost. In disaggregating data or assigning the same value for a variable measured at the national level to all individual-level data, the individual cases are correlated, which violates the assumption of independence of measures in linear regression. Either of these techniques can lead to incorrect estimates and results as a consequence (Raudenbush & Bryk, 2002). Also, researchers who rely on these strategies and not on multilevel techniques are prone to commit what are commonly referred to as ecological and individualistic fallacies (i.e. the invalid transfer of aggregate results to individuals and vice versa) (Alker, 1969).

Another limitation of cross-cultural studies that have focused on the examination of aggregate-level relationships is that they are not able to control for potential compositional effects[5]. Consequently, they have ignored potentially meaningful

[5] Compositional effects occur when intergroup differences in an outcome are the result of differences in group composition, that is, in the characteristics of the individuals of which the groups are made up (Gelissen, 2007). In other words, if individual characteristics explain, to some extent, a person's decision to protect the environment and if these individual characteristics are unequally distributed across nations, then they also explain, to some extent, the differences in environmental behaviors across nations.

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individual-level variance in outcome measures as well as an important possible explanation for cross-national differences in pro-environmental behaviors.

Using data from 15 countries of the European Union, Guerin et al. (2001) provided the first work that applies multilevel modeling to explain cross-cultural differences in environmental behaviors. They examined how differences in national settings and in social and institutional factors interact with a series of individual characteristics to influence engagement in recycling. At the individual-level they observed that older individuals with higher education and income, who participate in local programs to protect the environment, who were worried about environmental problems and who believe that their government is making a reasonable effort to protect the environment were those who were more inclined to recycle. At the country-level they found out, after controlling for compositional effects, that the annual rate of deforestation, the waste policy and mainly the country´s percentage of people who were members of an ecological association were positively related to greater rates of sorting and separating domestic waste.

There are at least two other studies that have used multilevel regressions to predict environmental behaviors cross-culturally[6]. The individual-level effects of these

[6] An intensive search was carried out for relevant articles in large databases (Google Scholar, ISI Web of Science, Scopus, etc.) covering the period from 1995 to June 2013. Keywords used were *environmental behavior*, *multilevel models*, *cross-cultural* or a series of similar terms (conservation or ecological behavior, recycling, hierarchical, mixed-effect or random coefficient models, cross-national comparison, etc.). A secondary search was performed using the same databases to locate any article that had cited the three papers identified from the previous search (Guerin, Crete, & Mercier, 2001; Hadler & Haller, 2011; Pirani & Secondi, 2011). Additionally, most of the reference lists of the studies located during the search were reviewed as well as the 2013 bibliography list produce by the ISSP.

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studies were described above (see subsection 2.1.1. and 2.1.2.). Hadler and Haller (2011) using data from the 2000 International Social Survey Program including 23 countries showed that linkages to world society, national political opportunity structures and resources all had a positive impact on public and PrEB behaviors at the country-level. On the other hand, Pirani and Secondi (2011) discovered a positive relationship between the country´s wealth (measured by the gross national product per capita) and 7 out of 8 PrEBs, as well as and mixed results with regard to national total investment for the environment and percentage of waste treated on the total waste (both studies have controlled for compositional effects).

2.3.1. Objectives, hypotheses or research questions

As demonstrated throughout the Part I of our dissertation, research on environmental behaviors has heavily focused on two core questions: what are the relative roles of socio-demographic and psychological variables in explaining environmental behaviors cross-culturally? and, why does environmental behaviors vary cross-nationally? Unfortunately, both questions have remained largely unresolved due to the *mixed results* across many studies. For instance, while some studies emphasize the importance of social and psychological factors (Marquart-Pyatt, 2012b; Oreg & Katz-Gerro, 2006), other evidence the poor predictive value of sociodemographic variables (Diamantopoulos et al., 2003) and the gap or lack of correspondence between attitudes and environmental behaviors (Gifford, 2011; Kollmuss & Agyeman, 2002). With regard to the second question, environmental behaviors has been related to the wealth of the nations, the level of postmaterialist values of the population, the educational system and the environmental conditions that the country is facing, once

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again finding mixed results for these contextual factors affecting the expression of national environmental engagement (Dalton, 2005; Duroy, 2008).

This study argues that resolving some of these questions requires a multilevel approach that integrates in a more proper manner both individual and country-level factors as predictors of environmental behaviors. The core hypotheses of a multilevel theory are that how individual factors influence individual environmental behaviors is conditional on country-level context (i.e. cross-level effects), and at the same time how national factors influence national levels of environmental behaviors is also a function of individual-level characteristics (i.e. compositional effects). To test these types of hypotheses, our research employs multilevel statistical models where individuals (Level 1) are nested within countries (Level 2). The major advantage of multi-level models is that both the intercepts and slopes coefficients predicting behavior are allowed to vary across nations and that variation could be explained simultaneously by controlling for individual and national-level factors.

The studies discussed so far in sections 2.2. and 2.3. assume that national factors have a direct effect on environmental behaviors. However, it is possible that those contextual factors may also influence behavior indirectly. From this standpoint, the broader context could be operating as a mechanism that moderates (e.g. enhances or diminish) the well-documented gap or correspondence between attitudes and behavior[7].

[7] In fact Marquart-Pyatt (2012a) found out that pathways to private environmental behavior (PrEB) differs across countries. In particular, she discovered that environmental attitudes have no significant influences on behavior in four out of the sixteen countries analyzed, as well as other attitudinal-behavioral gaps (5/16 for awareness, 3/16 for knowledge, 6/16 for efficacy, and 2/16 for willingness to make personal contribution for the environment).

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While trying to explain this gap many researchers have proposed a series of internal and external barriers that make it difficult to translate real concerns into action (Gifford, 2011; Kollmuss & Agyeman, 2002). Although the broader social, economic and political national contexts have been recognized as one of these structural barriers (Leiserowitz et al., 2005) we did not find in the literature that this potential indirect effect has been tested empirically in cross-cultural research.

By applying a multilevel model, we are able to test if compositional effects influence national levels of environmental behaviors, and if the national contexts moderate the influence of attitudinal factors on environmental behaviors. Thus, the following hypotheses are proposed:

- *Hypothesis 7:* beyond the influence of contextual-level factors on national levels of environmental behaviors, the compositional effects will also predict aggregate levels of environmental behaviors.
- *Hypothesis 8:* contextual-level factors will indirectly influence the strength of the association between attitudes and behavior. That is, the association between attitudinal factors[8] and environmental behaviors will be stronger as the level of development of a country increase (i.e. the attitudinal-behavior gap will be less pronounced, being easier to translate environmental attitudes into reported behavior).

[8] According to the *theoretical approach* highlighted in section 1 (Gray, 1985; Jiménez & Lafuente, 2010), attitudinal factors correspond to several affective, cognitive and dispositional elements of environmental concern (e.g. risk perception, knowledge, efficacy, etc.).

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These two hypotheses will help us to partially explain the mixed results found in cross-cultural literature about the relative relevance of competing national-level theories of environmentalism, and about the gap or lack of correspondence between attitudes and environmental behaviors.

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Part II

Cross-cultural empirical models of environmental concern

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3. Restructuring the research goals and hypotheses

In Part I of this dissertation we reviewed the *state of the art* of cross-cultural research on environmental concern and behavior. Also we highlighted the limitations of the previous research and we proposed to address them by a series of objectives, hypotheses and research questions. Now we are going to redefine and restructure the objectives and hypotheses of our dissertation.

3.1. Goal A: Establishing functional equivalence of environmental concern measures

Issues of reliability and validity are especially important for cross-national comparison (Vijver et al., 2008). First, it is important to assess whether the survey items are similar enough in content to be categorized conceptually as a particular phenomenon, in this case, different facets of environmental concern. Second, it is essential to establish within (emic)- and between (etic)-country validity of the indicators, since this permits a differentiation between culture-specific and universal properties of attitudes and behaviors (McArthur, 2007). For our dissertation we expected to find *functional equivalence* of environmental concern measures, that is, the contrasted assumption that the scales measure the same psychological construct across countries (Przeworski & Teune, 2001). For more details about the rationale behind this goal, refer to chapter 1 and in particular section 1.1.

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3.2. Goal B: Explaining within-country variation on environmental behaviors with individual-level influences

Environmental problems have become global and as Milfont (2012a) stresses, tackling them will require "a cooperative effort from decision-maker worldwide, but their decisions to cooperate with or defect from any such wider effort will be made according to the values and behavioural patterns dominant in each national culture" (p. 182). However, these arguments have not been combined into a model specifying multiple paths to environmental behaviors and empirically assessed across nations individually (Marquart-Pyatt, 2012b).

Relying on theories of the social bases, the TPB and VBN, this dissertation proposed a path model that explains within-country variation on environmental behaviors with individual-level influences. We have thus created a path model as specified in Figure 1. The model hypothesizes that the affective dimension (i.e. postmaterialist values and risk perception) precedes the dispositional dimension (i.e efficacy and willingness), being the latter the more direct determinant of the active dimension (i.e PrEB and PuEB). Special mention deserves the cognitive dimension (i.e. knowledge) as it is not explicitly operationalized in the TPB or the VBN. Other studies suggest that the cognitive dimension influences the active dimension indirectly through the affective and the dispositional dimensions (Bord et al., 2000; Kaiser & Fuhrer, 2003; Kaiser et al., 1999; Milfont, 2012b). Something similar happens with the sociodemographic factors as they affect behaviors indirectly through the other dimensions of environmental concern (i.e. affective, cognitive and dispositional dimensions) (Berger, 1997; Corral & Zaragoza, 2000), being then the more remote variables in the causal chain. In addition to the indirect effects of the most distal influences (i.e. social bases, affective and cognitive facets), the dotted arrows in the

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figure specified possible direct effects of those variables on environmental behaviors. Although some of the effects may be completely mediated through the dispositional dimension, other effects may continue to directly influence environmental behaviors.

Prior research suggests differences in the performance of the TPB and VBN theory depending on the type of environmental behaviors being studied. Kaiser and Gutscher (2003) demonstrate that the direct effect of perceived behavioral control does not need to be included in a model predicting general ecological behavior. Madden, Ellen, and Ajzen (1992) argue that perceived behavioral control is especially important for behaviors in which it is difficult to engage. Studies also suggest that attitudes matter for some behaviors but not for others, depending on the degree of effort involved in their realization (Bagozzi, Yi, & Baumgartner, 1990) and whether they are routine activities (Schultz & Oskamp, 1996). Research examining VBN theory demonstrates different sets of influential factors depending on the type of environmental behaviors considered, where factors affecting or contributing to environmental organizations or signing petitions differ from those of consumer behavior and policy support (Dietz et al., 1998; Stern et al., 1999). Thus, the active dimension in our model considers two types of behaviors: PrEB and public.

Cross-national differences are also possible in the proposed model. Although education (Olofsson & Öhman, 2006) and environmental attitudes, willingness to sacrifice for the environment, and perceived behavioral control (Oreg & Katz-Gerro, 2006) have been shown to influence environmental political behaviors, these relationships have not been demonstrated for a large number of countries individually. In addition, gender-based differences have been shown across nations (Hunter et al., 2004), but factors influencing these relationships have not been investigated. It is therefore possible that relationships between the different facets of environmental

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concern may differ across contexts. By incorporating multiple frameworks, this study examines the proposed model of pathways to environmental behaviors across 30 countries individually.

3.3. Goal C: Explaining between-country variation on environmental behaviors with individual- and country-level influences

Research into environmental behaviors is traditionally divided into two major streams: "studies focused on sociodemographic factors associated with environmentalism and studies on values, beliefs and others social psychological constructs related to environmentalism" (Dietz et al., 1998, p. 451). However, these two major streams have received important criticisms and extensions over the years. Between the most prominent, some scholars had argued that a fuller theory of environmentalism must attend to consider and integrate the *contextual factors* (e.g. economic, cultural, environmental) that influence beliefs and behaviors as well as other individual level variables (Franzen & Meyer, 2010; Leiserowitz et al., 2005). In this regard, individual´s environmentalism levels will depends not only on their sociodemographic background, knowledge, attitudes and values, but also on the social context in which they live. Whereas assertions about the importance of context abound, comparatively less is known about how contextual factors affect the expression of environmental concern (Marquart-Pyatt, 2012a).

In recent years, many competing societal-macro level explanations were proposed to describe cross-cultural differences in preferences over specific facets of environmental concern. Between the most prominent, socioeconomic development, societal and cultural characteristics and actual environmental conditions were highlighted as important contextual factors influencing environmental attitudes and

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behavior. Nevertheless it is still unclear what the main country-level determinants of environmental behaviors are (Dalton, 2005; Duroy, 2008; Milfont, 2012a).

By applying a multilevel modeling approach, the third main goal of this dissertation is to expand the structural model of environmentalism proposed in section 3.2. by including some social, economic and environmental macro-level variables to the individual psychosocial model. Figure 2 summarizes the relationships that we proposed for the individual and for the country levels. On the bottom, a series of individual-level predictors will influence individual environmental behaviors but we expect that those relationships could be different between countries and could be moderated or explained by a series of country-level factors (i.e. cross-level effects). On the other hand, those contextual-level factors will influence national levels of behaviors but that relationships will be also partially influenced by the compositional effects.

3.4. Recalling all the hypotheses

There are several hypotheses for this research. All of them were presented so far in different sections. Now, in order to be easily visualized, we recapitulate all of the hypotheses.

- *Hypothesis 1:* the effects of the sociodemographic variables on environmental behaviors will differ across countries. That is, gender, age, education, household income, and size of hometown may be positively, negatively or not significant associated with both PrEB and PuEB depending of the country analyzed.

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- *Hypothesis 2:* the effects of the sociodemographic variables on environmental behaviors will be less pronounced across countries once we control for the effect of the psychosocial variables.
- *Hypothesis 3:* the effects of the psychosocial variables on environmental behaviors will not differ across countries. That is, postmaterialist values, risk perception, knowledge, efficacy and intention will be positively associated with both PrEB and PuEB in all the countries (all with effects of other individual-level variables being controlled).
- *Hypothesis 4:* the affective and cognitive dimensions will fully affect the active dimension through the dispositional dimension. That is, efficacy and willingness to make sacrifice positively and fully mediate the positive relationship between risk perception/postmaterialism/knowledge and PrEB/PuEB.
- *Hypothesis 5:* efficacy will partially affect environmental behaviors through willingness to make sacrifice (i.e. intention). That is, willingness to make sacrifice positively and partially mediates the positive relationship between efficacy and PrEB/PuEB.
- *Hypotheses 6a-6d:* after controlling for compositional effects[9], national wealth (*hypothesis 6a*), societal-level postmaterialism (*hypothesis 6b*), national information and educational development (*hypothesis 6c*), and national objective and subjective environmental problems (*hypothesis 6d*) will all be positively related to aggregate levels of PrEB and PuEB.

[9] See section 2.3. and in particular note 5 for an explanation of compositional effects.

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- *Hypothesis 7:* beyond the influence of contextual-level factors on national levels of environmental behaviors, the compositional effects will also predict aggregate levels of environmental behaviors.
- *Hypothesis 8:* contextual-level factors will indirectly influence the strength of the association between attitudes and behavior. That is, the association between attitudinal factors and environmental behaviors will be stronger as the level of development of a country increase (i.e. the attitudinal-behavior gap will be less pronounced, being easier to translate environmental attitudes into reported behavior).

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4. Methodology

4.1. Samples

To test the objectives, hypotheses and research questions formulated above, the analyses are mainly based on individual-level data from the 2010 Environment Module of the ISSP, International Social Survey Program (see Haller, Jowell, & Smith, 2009). Data from more than 38,000 individuals in 30 countries are 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 is composed largely of industrialized, higher income nations (two-third of them are members in the OECD and one-third are developing nations). The standard sampling procedure is stratified, multistage random sample considering region, household and person within the household. The target population is the adult population permanently living in civilian households. Sample size is about 1000 in most countries (ensuring sample representativeness). To preserve sample sizes, missing data were accounted for using multiple imputation procedures, specifically the EM algorithm in SPSS 20.

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4.2. Measures

4.2.1. Dependent variables: Private Environmental Behavior (PrEB) and Public Environmental Behavior (PuEB)

Previous works using exploratory factor analyses (EFA) of ISSP data had found a two-factor structure of environmental behaviors that was similar across countries (Hadler & Haller, 2011; Hunter et al., 2004). Following these results, two measures of environmental behaviors are created using confirmatory factor analysis (CFA) (see Table 1). The first latent construct, private environmental behavior (PrEB), contains four items which ask survey participants how often (4 = never to 1 = always) they recycle, avoid buying certain products for environmental reasons, reduce energy at home and save or re-use water for environmental reasons. Items are scaled so higher scores indicate pro-environmental responses. The second factor, public environmental behavior (PuEB), contains three dichotomous items (1 = yes and 2 = no) which ask survey participants if they are a member of an environmental organization, if they have signed a petition and if they have donated money during the last five years to an environmental group. Items are scaled so that higher scores indicate pro-environmental responses. Nevertheless, we use the factor scores of both dependent latent variables for the subsequent analyses.

Table 2 provides descriptive statistics for the outcome variables and individual and country level explanatory variables used in the following analyses. Also Table 3 presents a ranking of countries sorted by the factor scores means of the dependent variables. These tables will be interpreted in the results section.

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4.2.2. Individual-level independent variables

The ISSP collects a comprehensive set of sociodemographic variables and we included 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 is reported in country-specific currencies) and adjusted for household size following Franzen and Meyer (2010), and the size of hometown ranking from rural (= 1) to urban (=5).

Also we include Inglehart´s materialism/postmaterialism values scale. The short version use the item ´maintain order in the nation´, ´give people more say in government decisions´, ´fight rising prices´ and ´protect freedom of speech´. Respondents were asked what should be the highest priority in their country and afterwards what should be the second priority. Statements 2 and 4 are considered postmaterialistic items and respondents who picked no postmaterialistic items are coded as 0 (= materialistic), those who chose one postmaterialistic item are coded as 1 (= mixed), and those who picked two postmaterialistic goals as 2 (= postmaterialistic).

The ISSP environment modules includes several questions referring to different environmental concern facets that were successfully used in past environmental cross-cultural research (Hadler & Haller, 2011; Haller & Hadler, 2008; Marquart-Pyatt, 2012b; Oreg & Katz-Gerro, 2006). We applied CFAs to these questions and derived four facets that we call: environmental risk perception, knowledge, efficacy, and willingness to make personal sacrifice (see Table 1). Also we included 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 on a five-point scale ranging from 1 = strongly agree to 5 = strongly disagree (inversely recoded).

Environmental risk perception factor contains six items showing an awareness of

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the environmental consequences of societies' modern industrial activities. Respondents were asked: ''In general, do you think [Air pollution caused by cars; Air pollution caused by industry; Pollution of country's rivers, lakes, and streams; Pesticides and chemicals used in farming; The rise in the world's temperature caused by the 'greenhouse effect'; and Modifying the genes of certain crops] is extremely dangerous for the environment, very dangerous, somewhat dangerous, not very dangerous, or not dangerous at all for the environment.'' Higher values on this construct indicate pro-environmental responses.

Environmental knowledge is a two item latent construct that asks respondents to self-evaluate the level of understanding of the causes of and the solution to environmental problems in a scale of 5 points. Higher scores indicate higher levels of perceived knowledge.

Environmental self-efficacy contains three items on a five-point scale ranging from 1 = strongly agree to 5 = strongly disagree. The first indicator is ´It is just too difficult for someone like me to do much about the environment'. The second is 'There is no point in doing what I can for the environment unless others do the same'. The third statement is 'I find it hard to know whether the way I live is helpful or harmful to the environment´. Higher values on this construct indicate pro-environmental responses.

Finally, willingness to make personal sacrifice includes three items on a five-point scale ranging from 1= very willing to 5= very unwilling. The content related to the willingness to pay higher prices and taxes and to reduce one´s own living standards in order to protect the environment. Items are scaled so higher scores indicate pro-environmental responses. Nevertheless, we use the factor scores of each of the four independent latent variables for the subsequent analyses.

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Table 2 provides descriptive statistics for the outcome variables and individual and country level explanatory variables used in the following analyses. Also Table 4 presents a ranking of countries sorted by the factor scores means of the different individual-level independent variables. These tables will be interpreted in the results section.

4.2.3. Country-level independent variables

At the country-level, there are seven variables that come from different secondary sources. Two measures related to the wealth of a nation, two related to educational development of the country, and two more related to the environmental conditions of each nation. Also, we have created a composite measure called "development index" that synthesizes the above six variables.

To measure national wealth or affluence, we use 2010 per capita gross domestic product (GDP) in purchasing power parity (PPP US$ 2005) (World Bank, 2013). Country-level postmaterialism scores are derived by averaging individuals´ postmaterialism scores within each country of the ISSP. We measure education development using the 2010 Education Index taken from the International Human Development Indicator dataset (Human Development Report, 2013). The index comprises the adult literacy rate (with two-thirds weighting) and the combined primary, secondary, and tertiary gross enrollment ratio (with one-third weighting) of each country. We also consider the density of domestic environmental NGOs as a proxy of the level of diffusion of environmental information in a country (for the methodology, see Longhofer & Schofer, 2010).

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For environmental degradation, we gathered a single question from the Gallup 2011 World Poll Survey that measured personal satisfaction of water quality. Respondents from national representative samples were asked: "In the city or area where you live, are you satisfied or dissatisfied with the quality of water?" and we used the country mean of people that expressed satisfaction with the quality of this resource (Gallup, 2011). According to Guagnano, Stern and Dietz (1995), "attitude theory needs to be modified to include not only the perception of external conditions but the external conditions themselves." (p. 715). Thus, we included the 2010 Environmental Health component of the Environmental Performance Index (EPI) that cover three objective categories (environmental burden of disease, water resources for human health, and air quality for human health) through five performance indicators (Emerson et al., 2010). These two last macrovariables were multiplied by a negative one (-1) so that higher values represent lower environmental quality (or greater degradation). Finally, using principal factor analysis, we determined that the six variables earlier described consistently loaded on one factor. Therefore, we created a synthetic measure containing economic, educational and environmental information of each country that we called "Development Index"[10] (Cronbach's alpha = .70, and standardized factor loadings greater than 0.57).

Table 2 provides descriptive statistics for the outcome variables and individual and country level explanatory variables used in the following analyses. Also Table 5 presents a ranking of countries means of different country-level independent variables

[10] In this case the two environmental macro-variables were not recoded, thus higher values represent higher levels of environmental quality.

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sorted by level of development index. The correlations between all the variables used in this research are presented in Table 6. These tables will be interpreted in the results section.

4.3. Analysis

We applied a set of different multivariate techniques using SPSS v.20 and AMOS v.21. First we applied CFAs to test for functional equivalence measures across nations (i.e. first main goal, see section 3.1.). Once we established the measurement part, we proposed to test the structural part of the model by applying path model analyses in a structural equation modeling approach (i.e. second main goal, see section 3.2.). Finally, we applied multilevel regression analyses to test the joint effect of individual and national-level factors affecting environmental behaviors (i.e. third main goal, see section 3.3.).

In relation to issues of reliability and validity we provide a comprehensive assessment of the fit of the different facets of environmental concern. The comprehensive appraisal of model fit includes considerations of factor loadings of the indicators, Cronbach´s alpha coefficients, and some widely recognized model fit statistics like the chi-square, the goodness-of-fit index (GFI), the normed fit index (NFI), and the root mean square error of approximation (RMSEA). Opinions are fairly arbitrary about at which point loadings become important to a factor. However, Comrey and Lee (1992) suggest that anything above .30 can be considered salient, with increased loadings becoming more vital in determining the factor. According to Nunnally and Bernstein´s (1994) rule of thumb, instruments used in basic research should have Cronbach's alpha coefficients of .60 or higher. However, it has been even argued that for samples larger than 100, Cronbach's alpha coefficients greater than .40

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are acceptable for research purposes (Mueller, 1986). The chi-square test has been traditionally used as a goodness-of-fit statistic in SEM, but since it is sensitive to sample size and is a measure of "perfect" fit, fit statistics from other families are recommended to be reported too. Traditionally, values above .9 for GFI and NFI have been considered to represent adequate fit with values above .95 now recognized to suggest excellent fit (Hu & Bentler, 1999). RMSEA values closer to 0 indicate better fit of the model, where values close to .06 and .08 respectively indicate acceptable fit, and values in the ranges of .08 to .10 and above .10 indicate mediocre and poor fit, respectively (Browne & Cudeck, 1993). Beyond those model fit statistics, the within (emic) validity is established by obtaining good psychometric properties within each country individually, while between (etic) validity is established by correlating the common model with country-specific model.

In relation to the social bases of environmentalism, we applied SEM path analyses to model the relationships between sociodemographic characteristics and environmental behaviors. Two different models test those relationships. The first one just regress all the sociodemographic variables on both types of behaviors (PrEB and PuEB) without considering others individual-level influences. The second model is considered the full path model (see Figure 1) where sociodemographic characteristics influence behaviors directly, and indirectly through different facet of environmental concern (e.g. knowledge, risk perception, efficacy). To determine the types of social bases we establish the following criteria[11]: for the hard social base a cutoff of 75%

[11] The categorization criterion used, and in particular the cutoff with percentages chosen are arbitrary. We did not find in the literature any work that establishes cutoff for the different types of social bases proposed here.

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consensus between countries, for the soft social base a cutoff of 50% consensus, for the diffuse social base a cutoff of 75% no significant differences; and finally a category call "mixed results" for a combination of the other categories.

In relation to the multilevel models, the analyses proceeded in several steps. First, a null model was estimated, that is, a model without explanatory variables. This is also called a one-way ANOVA with random effects model (Raudenbush & Bryk, 2002). Here, we modeled an individual´s level of environmental behaviors (PrEB or public) as Y_{ij} follows:

Individual level:

$$Y_{ij} = \beta_{0j} + r_{ij}$$

Contextual level:

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

where:

β_{0j} = mean environmental behaviors for group *j*

γ_{00} = grand mean environmental behaviors

Variance (r_{ij}) = σ^2 = within group variance in environmental behaviors

Variance (u_{0j}) = τ_{00} = between group variance in environmental behaviors

This first model allows us to estimate the Intraclass Correlation Coefficient (ICC) that gives the proportion of the total variance that exists among groups, and which is defined as: ICC = $\frac{\tau 00}{(\tau 00+\sigma^2)}$. A low value indicates that there is little variance among groups. Most of the variance can then be observed among individuals.

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After this basic model, the multilevel hypotheses were systematically tested in several models. We estimate a one-way ANCOVA with random effects (Raudenbush & Bryk, 2002), which includes all the individual-level variables with their regression slopes fixed but excludes the contextual variables[12]. As regards the effect of the individual-level variables in this model, it is assumed that they are "group independent" (or "fixed"). This second model allows us to investigate how much of the variance within and among countries can be explained by compositional effects that are controlled by including the individual-level explanatory variables[13].

For the next submodels, all individual-level variables are in a stepwise manner supplemented with contextual-level variables. In this way, we investigated whether differences among nations with respect to environmental behaviors could be explained by either contextual effects or compositional effects (or a combination of both). Specifically, here we opted for the random intercept model with level-1 covariates (Raudenbush & Bryk, 2002). In the random intercept model, groups differ in regards to the mean value of the dependent variable: the random intercept is the only random "group effect". Individual-level coefficients are not allowed to vary randomly in these models. Thus, the full model including all individual- and contextual-level variables can formally be presented as follows:

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[12] In reality, we estimated two one-way ANCOVA with random effects models for each outcome variable. Model 1 includes only the socio-demographic variables and Model 2 includes all the individual-level variables. This allows us to more clearly test hypothesis 2 and 3 in the pooled model.

[13] Note that without the inclusion of such individual-level information, contextual-level variables may act partially or entirely as proxies for individual attributes and partition of the contribution of each to the chosen outcome is impossible (Gelissen, 2007).

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Individual level:

$$\text{Environmental behavior} = \beta_{0j} + \beta_{1j}\,(\text{gender}) + \beta_{2j}\,(\text{age}) + \beta_{3j}\,(\text{education}) + \beta_{4j}\,(\text{income}) + \beta_{5j}\,(\text{size town}) + \beta_{6j}\,(\text{postmaterialism}) + \beta_{7j}\,(\text{knowledge}) + \beta_{8j}\,(\text{everyday risk perception}) + \beta_{9j}\,(\text{env. risk perception}) + \beta_{10j}\,(\text{efficacy}) + \beta_{11j}\,(\text{willingness}) + r_{ij}$$

Country level[14]:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\,(\text{GDP}) + \gamma_{02}\,(\text{postmaterialism}) + \gamma_{03}\,(\text{env. NGO density}) + \gamma_{04}\,(\text{educational index}) + \gamma_{05}\,(\text{water satisfaction}) + \gamma_{06}\,(\text{env. health}) + \gamma_{07}\,(\text{development}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

.

.

.

$$\beta_{11j} = \gamma_{110}$$

Finally, we tested a series of slopes-as-outcomes models (Raudenbush & Bryk, 2002), where besides allowing the intercept and the slopes to vary randomly across countries, these models include predictors at the contextual level to account for the variation in the individual-level coefficients. In concrete, these models are capable of including cross-level interactions, a necessity to test whether potential cross-country variation in the social bases-behaviors relationships and in the attitudes-behaviors relationships can be explained by country-level characteristics. The following equation shows one of the slopes-as-outcomes submodel specified:

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[14] Because of close overlap among contextual-level variables (most correlation above .45) (see Table 6), each national variable is included one at a time and each coefficient comes from a separate model (Hadler & Haller, 2011).

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Individual level:

$$\text{Environmental behavior} = \beta_{0j} + \beta_{9j}\,(\text{environmental risk perception}) + r_{ij}$$

Country level:

$$\beta_{0j} = \gamma_{00} + \gamma_{07}\,(\text{development}) + u_{0j}$$

$$\beta_{9j} = \gamma_{90} + \gamma_{97}\,(\text{development}) + u_{9j}$$

where:

γ_{90} = within-country environmental risk perception-behavior slope

γ_{97} = development$_j$ * environmental risk perception$_{ij}$ or the moderating effect of development on the effect of environmental risk perception on environmental behaviors

Variance (u_{9j}) = τ_{11} = between group variance of the slope

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5. Results

5.1. Establishing functional equivalence of environmental concern measures

In this section, results are provided first considering the common or pooled model, and then turning to a discussion of model fit for each of the thirty countries separately.

As can be seen in Table 7, CFAs results indicate adequate fit for PrEB. For component fit in the pooled model, the standardized factor loadings ranges from .42 to .76 (all significant, $p < .001$). Overall model fit statistics are very good for this measure -although the chi-square value is significant, the GFI is 1, the NFI is .99, and the RMSEA is .06. The total sample Cronbach´s alpha is .72. Also, model summary statistics shown in Table 7 indicate good to very good model fit for each of the thirty countries in the sample considered separately. Standardized factor loadings range from .30 to .88 (except Israel and Slovenia where one item has a factor loading of .29) (all significant, $p < .001$). Although the chi-square test is significant in twenty cases, the GFI range from .97 to 1, the NFI range from .94 to 1, and the RMSEA range from 0 to .09 (Argentina have a RMSEA of .12 but in the rest of statistics the fits are adequate). Cronbach´s alpha values range from .62 to .83. Taken as a whole, these values suggest that a latent level of "PrEB" exists and is consisting of a similar set of behaviors across all thirty countries in the sample.

From Table 8, results indicate very good component fit of PuEB. For component fit in the pooled model, the standardized factor loadings range from .48 to .70 (all significant, $p < .001$) and between .33 to .86 for the country-specific models (with the exception of Chile with one item below .3). The total sample Cronbach´s alpha is .56.

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Because a three items model is exactly identified within a CFA overall model fit statistics (i.e. chi-square, GFI, NFI, RMSEA) are not available. A possible solution is to generate a model overidentified that includes a covariance between PrEB and public latent factors. This single CFA shows very good fit for the pooled model (χ^2 (13) = 1484, p = .000; GFI .99; NFI .97; and RMSEA .05). Although the chi-square test is significant in all the country-specific models, the GFI range from .98 to .99, the NFI range from .94 to .99, and the RMSEA range from 0 to .08. Finally, Cronbach´s alpha values range from .34 to .67. Just like the other depend latent factor, PuEB consists of a similar set of behaviors across all thirty countries in the sample.

In the following pages, results of the individual-level independent variables are provided first considering the common or pooled model, and then turning to a discussion of model fit for each of the thirty countries separately.

CFAs results indicate very good fit of environmental risk perception (Table 9). For component fit in the pooled model, the standardized factor loadings range from .57 to .71 (all significant, $p < .001$). Overall model fit statistics are very good for this measure -although the chi-square value is significant, the GFI is .99, the NFI is .97, and the RMSEA is .07. The total sample Cronbach's alpha is .81. Also, model summary statistics shown in the same Table indicate very good to excellent model fit for each of the thirty countries in the sample considered separately. Standardized factor loadings range from .41 to .79 (all significant, $p < .001$). Although the chi-square test is significant in all the countries, the GFI range from .96 to .99, the NFI range from .93 to .99, and the RMSEA range from .06 to .10 (except for Norway, Slovakia and South Africa with a RMSEA of .11, and UK with a RMSEA of .12). Cronbach´s alpha values range from .72 to .88. Taken as a whole, these values suggest that a latent level of

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"environmental risk perception" exists and is consisting of a similar set of behaviors across all thirty countries in the sample.

For environmental knowledge CFAs results indicate very good component fit (Table 10). For component fit in the pooled model, the standardized factor loadings range from .74 to .92 (all significant, $p < .001$). The total sample Cronbach´s alpha is .81. Because a two variable model is unidentified within a CFA, overall model fit statistics (i.e. chi-square, GFI, NFI, RMSEA) are not available. A possible solution is to generate a model overidentified that includes a covariance between risk perception and knowledge latent factors. This single CFA shows very good fit for the pooled model (χ^2 (18) = 1857, p = .000; GFI .99; NFI .98; and RMSEA .05). Also, for the country-specific models the standardized factor loadings range from .64 to 1.11 (all significant, $p < .001$), and the Cronbach´s alpha values ranges from .64 to .89. Taken as a whole, these values suggest that a latent level of "environmental knowledge" exists and is consisting of a similar set of behaviors across all thirty countries in the sample.

From Table 10, results indicate very good component fit of environmental efficacy. For component fit in the pooled model, the standardized factor loadings ranges from .50 to .65 (all significant, $p < .001$). The total sample Cronbach's alpha is .59. Because a three variable model is exactly identified within a CFA, overall model fit statistics (i.e. chi-square, GFI, NFI, RMSEA) are not available. A possible solution is to generate a model overidentified that includes a covariance between efficacy and willingness to make sacrifice latent factors. This single CFA shows very good fit for the pooled model fit (χ^2 (8) = 677, p = .000; GFI .99; NFI .99; and RMSEA .05). Also, for the country-specific models the standardized factor loadings ranges from .30 to .82 (all significant, $p < .001$), and the Cronbach´s alpha values ranges from .44 to .70. (with the exception of Taiwan with an alpha of .32). Taken as a whole, these values suggest that a

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latent level of “environmental efficacy” exists and is consisting of a similar set of behaviors across all thirty countries in the sample.

Finally, CFAs results also indicate very good component fit for willingness to make personal sacrifice Table 10. For component fit in the pooled model, the standardized factor loadings ranges from .67 to .85 (all significant, $p < .001$). The total sample Cronbach’s alpha is .83. Because a three variable model is exactly identified within a CFA, overall model fit statistics (i.e. chi-square, GFI, NFI, RMSEA) are not available. A possible solution is to generate a model overidentified that includes a covariance between efficacy and willingness to make sacrifice latent factors. This single CFA shows very good fit for the pooled model fit (χ^2 (8) = 677, p = .000; GFI .99; NFI .99; and RMSEA .05). Also, for the country-specific models the standardized factor loadings ranges from .30 to .95 (all significant, $p < .001$), and the Cronbach´s alpha values ranges from .56 to .89. Taken as a whole, these values suggest that a latent level of “willingness to make personal sacrifice” exists and is consisting of a similar set of behaviors across all thirty countries in the sample.

Once we checked within (emic) validity for all the six latent factors, discussion of one additional piece of information is also important for establishing between (etic) validity and functional equivalence of measurement. Table 11 presents correlations between the common model for each of the latent factor and each of the thirty countries separately. A perusal of the values shows that they are sufficiently strong (i.e. there are all above .93), suggesting that these are reliable and valid measures of environmental concern.

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5.2. Explaining within-country variation on environmental behaviors with individual-level influences

5.2.1. Social Bases

Table 12 presents results for private environmental behavior (PrEB) and Table 13 for public environmental behavior (PuEB) for the pooled sample and for each of the 30 countries separately. Answering question 1 and hypothesis 1, results show reliable relationships across nations on both behaviors only for education (29/31 significant and positive for PrEB, and 30/31 significant and positive for PuEB). Age has 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 is less strong for gender on PrEB and for income on PuEB (20/31 and 18/31 significant an positive, respectively). Therefore, these two effects could be considered within the *soft social base*. Size of hometown and income have quite specific and delimited effects for PrEB, as do gender, age and size of hometown for PuEB. Income for PrEB (22/31 no significant), and gender and size of hometown for PrEB (28 and 23/31 no significant) could be considered within the *diffuse social base*, while size of hometown for PrEB, and age for PuEB can not be grouped into the three categories above, and thus, may be considered as "mixed results".

Despite the result displayed above, the second half of Table 14 and 15 show a slightly different pattern for the social bases after controlling the effect of attitudinal variables (hypothesis 2). After adding some facets of environmental concern (e.g. knowledge, risk perception, efficacy) as control variables, eight of the ten social bases detected previously have changed. Four of them have become "mixed results", while education that was hard social base for PuEB has become soft, gender that was soft

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social base for PrEB has become hard, and size of hometown also for PrEB has changed 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 sociodemographic variables. For example, the standardized coefficient for education and PrEB varies by a factor of 5 (from 0.05 in Russian Federation to 0.248 in Bulgaria), and the standardized coefficient for education and PuEB varies by a factor of 7.3 (from 0.052 in Japan to 0.379 in the UK). These variations, and all the rest except gender for PuEB, are highly significant (see Table 12 and Table 13). Also, the sociodemographic determinants of both behaviors vary in predictable ways across nations going from .015 to .15 of explained variance for PrEB (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 seem to have the strongest impact on behaviors. For example, an additional year of education or age increases PrEB by .111 and .127, respectively; and an additional year of education increase PuEB by .216.

Finally, from the slopes-as-outcomes multilevel models we examined why in some countries the associations between sociodemographic characteristics and behaviors are stronger than in others (question 3). Table 16 shows all the significant cross-level interactions detected. In concrete, we found out that three of five possible interactions are significant for PrEB, and one of five for PuEB. Gender on PrEB and education on PuEB are positive and significant at $p < .05$ (two-tailed test), while age and size of hometown for PrEB are 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

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PrEB, and enhance the positive effect of several sociodemographic variables on both types of environmental behaviors.

5.2.2. Psychosocial factors

Table 17 and 18 present results assessing the full empirical model of social bases and environmental concern dimensions predicting PrEB and PuEB shown in Figure 1, and include direct and total effects. The results provide support for the model predicting environmentalism in the thirty countries included in the sample. To summarize briefly, the influence of most of the psychological factors are largely similar across countries (for a summary see Table 19 and Table 20). The following paragraphs discuss whether similar psychosocial sources of environmentalism can be identified across all countries in the sample pooled and then individually (hypothesis 3). Following that, the mediating role of the dispositional dimension is examined for the pooled model related to the effects of the cognitive and affective dimensions on environmental behaviors, respectively (hypotheses 4 and 5).

The first column of Table 17 and 18 shows results for the pooled model. In sum, the six possible paths leading directly to PrEB and PuEB, all have significant effects in the expected direction. Knowledge, postmaterialist values, risk perception, efficacy, and willingness to make personal sacrifice positively affect PrEB and PuEB. However, since they are based on a large sample size (more than 38,000 cases) and coefficients are averaged across countries, results from the pooled model cannot tell us how the model performs in each cultural context. Therefore, the model is examined separately for each country.

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Table 17 and 18 also show results for each country individually. Overall, results support the model in Figure 1 specifying pathways to both types of environmental behaviors. Adjusted R^2 values and overall model fit statistics from SEM support the model. For instance, adjusted R^2 values are above .20 in 28 countries and above .15 in Philippine and Mexico for PrEB (Min. = .17 in Philippine; Max. = .47 in Finland). Adjusted R^2 values are above .25 in 29 countries and above .15 in Philippine for PuEB (Min. = .18 in Philippine; Max. = .45 in Bulgaria)[15]. Goodness-of-fit index (GFI), the normed fit index (NFI), and the root mean square error of approximation (RMSEA) values also demonstrate adequate to excellent model fit for the thirty countries.

For the cognitive dimension, environmental knowledge has direct effects in 26 countries for PrEB and in 30 for PuEB, influencing latent levels of PrEB by between .030 (Belgium) and .090 (Spain) units; and by between .008 (Bulgaria) and .021 (Czech RePuEB) for PuEB. For the affective dimension, everyday environmental risk perception also directly influences PrEB in 26 countries net of other effects, by between .019 (Latvia and Turkey) and .062 units (Finland); and the same independent variable influences PuEB in 13 countries, by between .002 (Russia and Spain) and .009 (Switzerland). Environmental risk perception also directly promotes environmental behaviors in 29 and 12 countries (PrEB and PuEB respectively), increasing latent levels of environmental behaviors by between .037 (Latvia) and .236 units (Slovenia); and by between .005 (South Africa) and .032 units (New Zealand) respectively. Also for the affective dimension, postmaterialist values has direct effects in 8 countries for PrEB and

[15] R^2 values came from the full model (social bases influences net to environmental concern facets). To know the absolute influence of psychosocial factors, subtract the values of the R^2 in Table 17 to the values in Table 12 (the same for Table 18 and Table 13).

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in 10 for PuEB, influencing latent levels of PrEB by between -.066 (Mexico) and .067 (Croatia) units; and by between .004 (South Africa) and .017 (New Zealand) for PuEB. In the dispositional dimension, efficacy directly influences environmentalism in all the 30 countries for both types of behaviors. Net of other effects, efficacy increases environmentalism by between .05 (Mexico) and .309 units (Argentina) for PrEB; and between .020 (Mexico) and .079 (Belgium) for PuEB. Finally, willingness to make sacrifice also directly influences environmentalism in all the 30 countries for both types of behaviors. This variable influences latent levels of PrEB by between .034 (Croatia) and .129 (Turkey) units; and by between .010 (Russia) and .034 (Denmark) for PuEB.

Results indicate that higher levels of knowledge, risk perception, efficacy, and willingness to contribute promote environmentalism in most countries in this sample, while postmaterialistic values have the weaker and less consistent influence on behaviors across countries. All these relationships are similar regardless of the type of behavior analyzed (e.g. PrEB or PuEB), with the exception of risk perception that has shown not to be as consistent across cultures just for PuEB. Overall these results support hypothesis 3.

Standardized total effects are also reported in Table 17 and 18, and all the statistical significant total effects are summarized in Table 19 and 20. The previous low consistencies across nations found for postmaterialistic values on environmental behaviors seem not to be improve according to the total effect (i.e. the sum of its direct effect and all indirect effects on behaviors through others environmental concern facets). The total effect of postmaterialism on PrEB is significant in 10 countries (8 just from the direct effect), and in 10 for PuEB (the same as the direct effect). Moreover, everyday risk perception and environmental risk perception improve the consistency across nations by the addition of the indirect effects. Total effect of everyday risk

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perception for PuEB is significant in 26 countries (13 just with direct effect), while environmental risk perception significantly influence PuEB in 19 countries (12 just with direct effect). From the pooled model, efficacy and knowledge show the strongest effect on both types of behaviors, followed by willingness. Overall, total effects support the path model introduced in this research.

Nevertheless we also expected to find that the affective and cognitive dimensions would fully affect (i.e. full mediation) the active dimension through the dispositional dimension (hypothesis 4), and within the dispositional dimension, efficacy would partially affect (i.e. partial mediation) environmental behaviors through willingness to make sacrifice (hypothesis 5). Mediation tests presented in Table 21 for the pooled model show that the expectations are partially supported because we found partial mediations in all the cases. In particular and in the expected direction, willingness to make sacrifice positively and partially mediates the positive relationship between efficacy and PrEB/PuEB, and in the unexpected direction efficacy and willingness to make sacrifice positively and partially (not fully) mediate the positive relationship between risk perception/postmaterialism/knowledge and PrEB/PuEB.

5.3. Explaining between-country variation on environmental behaviors with individual- and country-level influences

Tables 3, 4, 5, and 6 provide some descriptive and bivariate statistics as a starting point for the different multilevel models. Table 3 provides a glimpse into the distribution of the two dependent variables of interest for the sample of countries pooled and within each country individually. The average value on PrEB for the countries pooled is 1.59, and 0.45 for PuEB. A quick scan of PrEB values show considerable variability across countries, and a bit less variability for the case of PuEB. In terms of

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PrEB the ranges for countries individually is from 1.30 in Bulgaria to 1.80 units in Canada, while for PuEB the ranges goes from 0.41 in Russia to 0.51 units in Switzerland. Both types of behaviors seem to be positively related to the level of development of the country (we will formally test it later).

Table 4 and 5 provide similar results to the described above but in this case for the level-1 and level-2 independent variables. However, environmental risk perception seems to follow a different pattern because its values are higher in less developed countries, and this is contrary to the positive relationships found between the level of development of a country and the rest of the independent variables. The bivariate relationships confirm those results for all the thirty countries pooled (Table 6). All the correlation between environmental behaviors and the independent variables are positive and significant (with the exception of size of hometown for PrEB that is negative and significant, and gender and age for PuEB that are negative, the first no significant and the second significant). Also, environmental risk perception is found to be negative and significantly correlated to every country-level variable, and all the country-level variables are highly correlated between each other (these multicollinearity problems will affect the future multilevel random intercept models with level-1 covariates).

From the two-level random intercept null model, we investigate how much of the total variance can be attributed to the individual level and how much to the contextual level. The point estimate for the grand-mean level of PrEB is 1.593 and for PuEB is 0.452. The variance among countries (.022 PrEB; .0007 PuEB) turns out to be much smaller than the variance among individuals within countries (.16 PrEB; .006 PuEB). This is also reflected in the value of the intraclass correlation coefficient (ICC), which is .12 for PrEB and .103 for PuEB (12% and 10% of the total variance is among countries). However, a chi-square test of the estimated between-country variance

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component proved to be highly significant (χ^2 (29) = 3507.2, p = .000 PrEB; χ^2 (29) = 8619.9, p = .000 PuEB). Thus, the evidence indicates significant variation among nations in their level of environmental behaviors that can potentially be explained by contextual and individual characteristics.

From the one-way ANCOVA with random effects model (Table 22), we examine the extent to which individual-level explanatory variables are related to individual-level environmental behaviors. In Model 1 (environmental concern facets excluded) all sociodemographic indicators show positive relations with both types of environmental behaviors (with the exception of income that is negative but not significant for PrEB behavior), thus there is a higher level of behaviors among women, adults, people with a high socio-economic status, and those living in a large town. Nevertheless, these influences have very limited impact on behavior (explained microvariance: 3% for PrEB and 6% for PuEB). Moreover, if we add the attitudinal variables (Model 2), four of the ten previous relationships are no longer significant or have changed the sign, while all attitudinal variables strongly and positively influence behavior (total explained microvariance: 30% for PrEB and PuEB behavior). Thus, these findings support again hypotheses 2 and 3.

Also, when we include all of these individual-level explanatory variables, the contextual-level variance goes down to .014 for PrEB and .0003 for PuEB (null model: 022 PrEB; .0007 PuEB). This amounts to a proportion of explained variance of .34 and .63 at the contextual level respectively[16]. Here, we have noticeable evidence of the

[16] We apply the formula of Snijders and Bosker (2011) where explained macrovariance = 1 – (macrovariance of final model / macrovariance of empty model). In our case 1 – (0.0143 / 0.0217) = .34 for PrEB, and 1 – (0.000264 / 0.00071) = .63 for PuEB.

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existence of compositional effects because the individual-level variables explain a substantive amount of the contextual-level variance. In other words, the social composition of the populations under study differs substantially with respect to the individual-level explanatory variables, which also causes the averages of these nations on these characteristics to differ. Thus, hypothesis 7 is highly supported.

Even after the introduction into the model of all of the individual-level explanatory variables, there is still significant variability to be explained between countries (Wald Z = 3.783, p = .000 and Conditional ICC = .11 for PrEB; Wald Z = 3.750, p = .000 and Conditional ICC = .06 for PuEB). This suggests that we could add other country-level variables that might explain this residual variability in the intercept. For this purpose, a series of random intercept models with level-1 covariates that investigate how contextual-level variables relate to environmental behaviors holding constant compositional effects are proposed.

Table 23 show that national wealth and average postmaterialism are both positively related to higher level of PrEB and PuEB. The inclusion of these variables increases around 10% the explanatory power of the macromodel. Hypotheses 6a and 6b are thus confirmed. Regarding the national information and educational development influences, hypothesis 6c is partially confirmed. The level of education of a population and the presence of environmental NGOs appear to have a significant positive effect on PuEB and no significant albeit positive effect on PrEB behavior. For national objective and subjective environmental problems we found significant effects, but the direction of the relationship is opposite to what was expected (the higher the level of environmental degradation, the lower the level of PrEB and PuEB), thus hypothesis 6d is not supported. Finally, the combination of all the contextual-level variables through the

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development index shows a significant positive effect on both types of behaviors with a final explained macrovariance of 44% for PrEB and 79% for PuEB.

Finally, from the slopes-as-outcomes models we examined why in some countries the association between environmental attitudes and behavior is weaker or stronger than in others[17]. Table 24 shows all the significant cross-level interactions detected. In concrete, we found that three of six possible interactions are significant and positive for PrEB, and six of six for PuEB. These results indicate that the extent of economic, educational and environmental development in a country enhance the positive effect of several environmental attitudes on both types of environmental behaviors. In other words, as the level of development of a country increases, it is easier to translate environmental attitudes to real actions. Overall, hypothesis 8 is supported.

A graph can depict these differences across nations. Figure 3 plots predicted environmental behaviors values by level of everyday environmental risk perception for countries at 1 standard deviations below mean development index, at the mean, and 1 standard deviations above the mean development index (corresponding to absolute development index values of -1.74, -0.07, 1.16, values roughly of Turkey, South Korea, and Germany). The everyday environmental risk perception gradient is successively more positive for the nations: 0.051 for the low-developed nation, 0.095 for the mean nation, and 0.099 for the high-developed nation for PrEB; and 0.0055 for the low-developed nation, 0.0145 for the mean nation, and 0.0205 for the high-developed nation for PuEB. The three gradients for both behaviors are graphed in the figure. On the other

[17] Besides the strength of the association, in subsection 5.2.2. we also demonstrated that there is a lack of correspondance between risk perception and PuEB in 18 of the 30 countries, and a similar gap for postmaterialist values and PrEB in 22 countries, and in 20 countries for PuEB.

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hand, Figure 4 shows the strongest cross-level effect detected. In this case and in the left side of the figure we see how the slopes of environmental risk perception predicting PuEB varies significantly across countries. In the right side of the same figure we summarize those relationships through the cross-level effect and we see how in countries with low development index the slope is flat (i.e. no significant) while as the development of a country increase, the slopes becomes steeper. These results may help explain the lack of correspondence between attitudes and behaviors found in the literature.

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6. Discussion and conclusions

6.1. Establishing functional equivalence of environmental concern measures

Though numerous studies have been published in the last decades examining environmental concern, few are truly comparable in that they seek to establish cross-national comparisons. To our knowledge, very few published research to date has incorporated a latent variable approach that considers clusters of knowledge, attitudes, behavioral intentions, and behaviors as indicative of environmental concern *and* considers a substantial range of countries (i.e. more than five).

Relying on existing theoretical frameworks and empirical research highlighted in previous sections, the first goal of our research was to establish functional equivalence of environmental concern measures across nations. We did so by using the *theoretical approach* that conceptualizes and operationalizes environmental concern in accordance with attitudinal theories that highlight and distinguish between affective, cognitive, dispositional and behavioural elements in the relationship between the subject and the environment. Those four dimensions had focused on both multiple environmental issues and multiple expressions of concern (i.e. multiple-topic, multiple-expression instrument), thus representing a comprehensive assessment of environmental concern.

Also, by applying a series of statistical techniques we were able to establish within (emic)- and between (etic)-country validity of the indicators permitting a differentiation between culture-specific and universal properties of values and behaviors. We found and confirmed the multidimensionality of the construct environmental concern through seven facets with multiple indicators, and of most

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importance, they were measuring the same psychological constructs across thirty countries.

6.2. Explaining within-country variation on environmental behaviors with individual-level influences

6.2.1. Social bases

The results suggest that across the 30 ISSP nations studied, the relations between sociodemographic characteristics and environmental behaviors are complex. As expected, we found that across cultures all the types of social bases (hard, soft, diffuse, or mixed[18]) are present nowadays. These results emphasize the idea that theories that highlight or defend just one type of social base should develop their insights with more attention.

This work has shown how the disparity of the social bases can be explained in large part due to a number of reasons. First, the social bases vary considerably regarding the type of behavior analyzed. With the exception of education, all the rest of sociodemographic variables have shown a specific and differential social base depending on whether it is a PrEB or a PuEB. For example, income has a diffuse social

[18]A hard social base was established by a cutoff of 75% consensus or consistency across nations in regard of the effect of each sociodemographic variable on environmental behaviors, a soft social base was established by a cutoff of 50% consensus. The diffuse social base considered a cutoff of 75% consensus of not significant effects of any sociodemographic variable on behaviors across nations, and mixed social base is a combination of the other categories.

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base for PrEB while is soft for PuEB. Therefore, the social bases are behavior-specific. A second reason is due to the fact that once we add and control for the effect of attitudinal variables, the pattern of social bases changes substantially (hypothesis 2 is supported). Therefore, sociodemographic factors may be playing a minor role on behavior compared to psychological factors (Diamantopoulos et al., 2003), and this also would make the social bases more unstable. Finally, in some cases the social bases are contingent and could be related to specific country-level characteristics. In this work we found that as the level of development of a country increases, the association between the sociodemographic variables and environmental behaviors become stronger or weaker. In particular, the extent of economic, educational and environmental development in a country dampens the effect of size of hometown for PrEB, and enhances the positive effect of gender and age for PrEB, and education for PuEB.

In addition to the reasons discussed above, the apparently contradictory results highlight the need to have similar and unified theoretical and methodological frameworks in order to establish cumulative and reliable evidence about the cross-cultural social bases of environmentalism. Also, it should be noted that despite the growing interest in cross-cultural studies (for a review, see Milfont, 2012a), few of them have focused specifically on analyzing the social bases of pro-environmental behaviors.

6.2.2. Psychological factors

Results from path model analyses presented in subsection 5.2.2. point to remarkable consistencies with regard to how cognitive, affective and dispositional forces influence environmental behaviors. Briefly, consistent effects of knowledge, risk perception, efficacy, and willingness to contribute were noted (hypothesis 3 is supported). Although somewhat expected from previous research (Marquart-Pyatt,

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2012b; Oreg & Katz-Gerro, 2006), these effects had not been demonstrated for both types of environmental behaviors, for all variables in the proposed model, and across thirty countries individually.

Results also indicate that postmaterialistic values have the least consistent influence on behaviors across countries, even after taking into account the indirect effect through the dispositional dimension. This result contradicts our expectations and previous research (Gillham, 2008; Olofsson & Öhman, 2006; Oreg & Katz-Gerro, 2006), refuting Inglehart´s postmaterialist explanation.

Prior research suggests that environmental concern facets matter for some behaviors but not others, depending on the degree of effort involved in their realization (Bagozzi et al., 1990; Hidalgo et al., 2011), while other research suggests differences in the performance of the TPB and VBN theory depending on the type of environmental behaviors being studied (Kaiser & Gutscher ,2003; Stern et al., 1999). Nevertheless, our cross-national investigation shows that the relationships found between the different psychosocial factors and behaviors were similar regardless of the type of behavior analyzed. The only exception is risk perception that has shown strong consistency across cultures for PrEB, and weak/medium consistency across cultures for the case of PuEB.

Overall, results are broadly supportive of the model proposed in figure 1 across 30 countries individually. Indeed, there are consistent cross-cultural findings showing that environmental behaviors are positively related to: negative assessment of environmental quality, environmental knowledge, environmental self-efficacy, and willingness to make sacrifice. In addition, within the dispositional dimension, we found that efficacy was directly and indirectly influencing environmental behaviors, thus confirming hypothesis 5 of our research, and one important assumption of the Theory of

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Planned Behavior. In the TPB pro-environmental behavior is predicted by behavioral intentions, which are, in turn, predicted by attitudes, perceived social norms, and perceived behavioral control. Nevertheless, beside the prominent indirect effect of efficacy on behavior throughout intentions, the theory also states that efficacy may influence behavior directly.

Moreover, the cognitive and affective dimensions also influence environmental behaviors directly and indirectly cross-nationally. Mediating tests of the dispositional dimension demonstrate a prominent but not exclusive role in promoting environmentalism, especially in shaping how the cognitive and affective dimensions affect environmental behaviors, relationships that are masked in previous cross-national research (hypothesis 4 is not supported). These results could be explain by the methodological principles of compatibility and aggregation pointed out by Ajzen and Fishbein (1980). Compatibility refers to the issue of specificity and generality, where correspondence between the levels strengthens the correlations between the measures, and in a path model analysis, ensuring measurement correspondence between the different facets of environmental concern should produce better predictive power. Also, aggregation or composite measures depict attitudinal constructs with greater accuracy because problems connected with single-items are minimized when combined in a scale. This axiom also has implications for the strength of the relationship between the different dimensions of environmental concern and behaviors, typically increasing the correlation (Ajzen & Fishbein, 1980).

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6.3. Explaining between-country variation on environmental behaviors with individual- and country-level influences

Section 5.3. attempts to provide new cross-national evidence of how and to what extent environmental behaviors are related to individual- and contextual-level characteristics. Several important conclusions arise from the analyses.

Our multilevel analysis of the ISSP 2010 demonstrates that individuals´ environmental behaviors vary between countries and within countries. For the within-country differences, similar to previous research (Hadler & Haller, 2011; Marquart-Pyatt, 2012a; Oreg & Katz-Gerro, 2006), we found that the sociodemographic characteristics have a significant effect, although small compared to the effect exerted by the psychosocial factors, and all together these variables reach a fair amount of explained micro-level variance.

For the between-country differences we pointed out the importance of considering the so-called compositional effects (Gelissen, 2007). We found that a substantial proportion of the macro-level variance in environmental behaviors is just explained by the individual-level variables (hypothesis 7 is supported). These results demonstrate how compositional effects are outshining the relative influence of national level factors, and this fact could be explaining the contradictory results found in the literature about competing national level predictors. Also, if we consider that compositional effects have not been estimated in the vast majority of the cross-national studies reviewed, our analyses represent an original contribution to the field and a call for future research to consider this important effect.

Even after controlling for the compositional effect, we found that citizens of countries with high level of national wealth and postmaterialist values appear to have more individual involvement in environmental protection than citizens of countries with

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lower levels of wealth and postmaterialism. These findings are similar to the previous research (Dalton, 2005; Freymeyer & Johnson, 2010; Inglehart, 1995; Oreg & Katz-Gerro, 2006; Pirani & Secondi, 2011) thus confirming the positive effect of wealth and postmaterialism in facilitating the emergence of environmental behaviors. Also, we found that post-industrialized societies that have more dense communication structures and mass education (measured through environmental NGOs density and level of education of the population) tend to display more environmental behaviors than developing countries. Thus, all these interrelated factors seem to be creating better conditions and opportunities to foster environmental behaviors (hypotheses 6a to 6c are supported).

Contrary to our expectation, environmental degradation negatively affects environmental behaviors (hypothesis 6d is not supported). At least two explanations for this result can be given. First, the two indicators of environmental conditions are highly correlated with the rest of contextual-level variables (i.e. r = -0.678, p < .01 for water dissatisfaction and GDP; r = -0.842, p < .01 for unhealthy environment and GDP), which the negative effect found may be a spurious relationship linked to national affluence or to the other macrovariables described above. For example, we found that environmental actions are more available in developed countries than in less developed ones, and it may be that the involvement in these countries could also have improved the environmental quality found there instead of environmental quality shaping involvement (Freymeyer & Johnson, 2010). Another possible explanation of the results found may be due to the nature of the environmental indicators chosen. If instead of choosing environmental indicators where developed countries perform better (like the two used in this paper) we had chosen other environmental problems related with over-industrialization and consumption (i.e. the ecological footprint) the detected relations

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could be opposite to those reported here[19]. Thus, a rival theory to the modernization thesis or to the spurious effect holds here where growing environmental problems related to patterns of production and consumption may be creating strong incentives for environmental action in advanced industrial societies (Dalton, 2005). Future research must consider this dimensionality argument and test the effect of different environmental indicators in cross-national comparison studies.

Finally, besides the direct effects that national contextual factors have on environmental behaviors, we found that as a country becomes more developed the attitude-behavior correspondence is stronger (hypothesis 8 is supported). These results suggest that in more developed countries the "external barriers" that make it harder to match people's intentions to behavior are less pronounced, thus making it easier to translate a set of environmental attitudes into real actions. Apart from the external barriers, the "internal or psychological barriers" may be also considered as possible explanations for the cross-national variations in attitude-behavior correspondence. For instance, if people in a country general do not trust others, or do not believe that things are within their control, they might think that environmental behavior will not pay off even if they are concerned about the current situation of the environment. The moderation effect detected may be also explaining the mixed results found in the literature about the lack of correspondence between attitudes and behaviors. Therefore,

[19] In fact, the correlation between country-level GDP and environmental footprint is positive and very strong (r = 0.739, p < .01), and in a random intercept model with level-1 covariates similar to those in Table 23, environmental footprint was found to be positive and significantly related to PuEB (b = .005, *s.e.* = .002, p = .009) and although found to be positive it was not significant for PrEB (b = .019, *s.e.* = .013, p = .171).

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we believe that these findings represent a novel contribution to the field and a valid way to examine more complex and interactive models of environmental behaviors, offering promising avenues for future research.

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7. Final conclusions and future directions

Our dissertation sought to understand similarities and differences across countries in the sources of environmentalism. Our interest in comparative work necessitated both an examination of within country and between country variation with regards to environmental behaviors. We focused on individuals embedded within different social contexts and also explored how national level factors affected the level and sources of pro-ecological behaviors. Though largely considered to be atheoretical, our dissertation demonstrated the applicability of different theoretical frameworks for understanding similarities and differences across countries in the sources of environmental behaviors. In this chapter, we briefly summarize previous chapters and discuss the main results. We also address the implications of the findings and the limitations of the research. Finally, we conclude by providing some directions for future research.

In chapter one we argued that despite decades of research on environmental concern the literature remains highly fragmented and disorganized (Xiao & Dunlap, 2007). We proposed a theoretical framework to organize the field, and we tested for functional equivalence of environmental concern measures. We confirmed the multidimensionality of the construct through seven facets with several indicators, and most importantly, we demonstrated that the facets were measuring the same psychological constructs across the thirty countries analyzed.

In Chapter two we reviewed the research that attempts to explain environmentalism across cultures using individual or country level factors (or a combination of both). As a brief review, our results pointed to considerable cross-national similarities in how the affective, cognitive and dispositional dimensions translate into actions geared toward the environment, and less cross-cultural similarities

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for the social bases and for postmaterialist values. At the national level, we found mixed results regarding the influence of some economic, educational and environmental factors. However, countries with higher levels of development tend to display more pro-environmental behaviors. Finally, from the multilevel analyses we demonstrated how the influence of individual-level factors on environmental behavior could be dampened or enhanced by contextual-level factors, and how compositional effects are as important as contextual-level factors. The first statement may help explain the mixed results found in the literature about the lack of correspondence between attitudes and behavior, while the second may help explain the contradictory results found in the literature about competing national level predictors. All these findings point out the necessity of simultaneously assessing the effects of individual- and contextual-level characteristics on environmental behaviors in cross-cultural research.

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 attitudes 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 et al., 1995; Thøgersen, 2005).

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Besides the contributions of this work, a number of limitations deserve mentioning. First, despite that the focus is a cross-national comparison, the sample of countries analyzed here is composed largely of industrialized, higher income nations thus posing problems for the generalizability of the presented findings. Second, the study is limited through its cross-sectional design causing problems with the demonstration of true causality. These two limitations can be partially solved in future studies with the use of other databases (e.g. Word Value Survey for a larger number of countries that would allow to replicate and better generalize our results; ISSP waves 1993, 2000 and 2010 for longitudinal designs and changes over time). Third, contrary to our results for private and public environmental behaviors, a recent study found a positive relationship between an anti-ecological behavior (i.e. higher water consumption) and the level of development of a country (Carrus, Bonnes, Corral, Moser, & Sinha, 2010). Also, there is some evidence that individual-level predictors (i.e. sociodemographic and psychosocial) have differential influences depending of the nature and type of behavior analyzed (Berenguer & 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 & 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

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should start using more accurate measures such as official metrics and statistics (e.g. metered household water/energy data).

Finally, there is still a substantial amount of behavior variability unexplained. In addition to the use of classical models such as TPB and VBN or the socio-economic development theories, further research should incorporate other individual- and national-level influences and theories for cross-cultural comparison. Among others individual-level influences, new models are focusing the attention on habits, different types of attachment and identity, or feelings such as guilt or embarrassment (Bamberg & Möser, 2007; Kaiser, Schultz, Berenguer, Corral-Verdugo, & Tankha, 2008; Klöckner, 2013; Ramkissoon, Smith, & Weiler, 2013). At the national level, beside the role of economic development, future research should considered the psychological correlates of economic development and their potential role in explaining or mediating the effect ef economic development. One example may be generalized trust. Trust is correlated with GDP (Delhey & Newton, 2005) and predicts environmental behaviors (Mannemar Sønderskov, 2009). Is it possible that the effect of economic development is actually mediated by generalized trust? Further research are needed in this regard. Also, the addition or incorporation of meso-level data (e.g. household level factors, behavior settings, social networks, regional and subnational communities) represent another way to improve the predictive power of the models, being all these promising avenues for a more comprehensive models of environmentalism.

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Appendices

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Appendix A. Tables

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Table 1. List of items used for the confirmatory factor analysis (CFA)

Factor	Variable Name	Item	Recoded Values
Risk perception	V40	In general, do you think that air pollution caused by cars is …	1 = Not dangerous at all for the environment 5 = Extremely dangerous for the environment
Risk perception	V41	In general, do you think that air pollution caused by industry is …	1 = Not dangerous at all for the environment 5 = Extremely dangerous for the environment
Risk perception	V42	And do you think that pesticides and chemicals used in farming are …	1 = Not dangerous at all for the environment 5 = Extremely dangerous for the environment
Risk perception	V43	And do you think that pollution of COUNTRY'S rivers, lakes and streams is …	1 = Not dangerous at all for the environment 5 = Extremely dangerous for the environment
Risk perception	V44	In general, do you think that a rise in the world's temperature caused by climate change is …	1 = Not dangerous at all for the environment 5 = Extremely dangerous for the environment
Risk perception	V45	And do you think that modifying the genes of certain crops is …	1 = Not dangerous at all for the environment 5 = Extremely dangerous for the environment
Knowledge	V19	How much do you feel you know about the causes of these sorts of environmental problems?	1 = Know nothing at all 5 = Know a great deal
Knowledge	V20	And how much do you feel you know about solutions to these sorts of environmental problems?	1 = Know nothing at all 5 = Know a great deal
Efficacy	V33	It is just too difficult for someone like me to do much about the environment	1 = Agree strongly 5 = Disagree strongly
Efficacy	V36	There is no point in doing what I can for the environment unless others do the same	1 = Agree strongly 5 = Disagree strongly
Efficacy	V38	I find it hard to know whether the way I live is helpful or harmful to the environment	1 = Agree strongly 5 = Disagree strongly

(continued)

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Factor	Variable Name	Item	Recoded Values
Willingness to make sacrifices	V30	How willing would you be to pay much higher prices in order to protect the environment?	1 = Very unwilling 5 = Very willing
Willingness to make sacrifices	V31	And how willing would you be to pay much higher taxes in order to protect the environment?	1 = Very unwilling 5 = Very willing
Willingness to make sacrifices	V32	And how willing would you be to accept cuts in your standard of living in order to protect the environment?	1 = Very unwilling 5 = Very willing
PrEB	V56	How often do you make a special effort to sort glass or tins or plastic or newspapers and so on for recycling?	1 = Never 4 = Always
PrEB	V59	How often do you reduce the energy or fuel you use at home for environmental reasons?	1 = Never 4 = Always
PrEB	V60	And how often do you choose to save or re-use water for environmental reasons?	1 = Never 4 = Always
PrEB	V61	And how often do you avoid buying certain products for environmental reasons?	1 = Never 4 = Always
PuEB	V62	Are you a member of any group whose main aim is to preserve or protect the environment?	1 = No 2 = Yes
PuEB	V63	In the last five years, have you signed a petition about an environmental issue?	1 = No, I have not 2 = Yes, I have
PuEB	V64	In the last five years, have you given money to an environmental group?	1 = No, I have not 2 = Yes, I have

Note. PrEB = private environmental behavior; PuEB = public environmental behavior

Table 2. Descriptive statistics for the individual- and country-level variables in the pooled sample

Variable	Mean	SD	Min.	Max.
Individual-level variables				
Private environmental behavior[a]	1.59	.42	.72	2.73
Public environmental behavior[a]	.45	.08	.36	.81
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	0	1.00	-2.34	28.54
Size of hometown	3.39	1.28	1.00	5.00
Postmaterialist values	.79	.62	.00	2.00
Knowledge of environ. problems[a]	2.81	.86	1.04	4.86
Everyday environ. 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
Country-level variables				
GDP	24.25	11.17	3.38	46.58
Posmaterialism	.77	.15	.36	1.13
Env. NGO Density	.66	.31	.00	1.26
Education Index	.83	.11	.58	1.00
Water Satisfaction	79.71	14.64	52.80	97.40
Environmental Health	82.87	10.35	59.00	95.00
Development Index[a]	-.12	1.02	-1.95	1.30

Note. Pooled sample size: 38.543. Number of countries: 30.
[a]They are latent factors.

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Table 3. Rank of group mean individual-level dependent factors by country

Rank	Country	Private environmental behavior	Rank	Country	Public environmental behavior
1	Canada	1.80	1	Switzerland	0.51
2	Switzerland	1.79	2	Canada	0.51
3	Germany	1.78	3	New Zealand	0.50
4	Belgium	1.76	4	Denmark	0.48
5	Japan	1.73	5	Finland	0.48
6	Austria	1.73	6	Austria	0.47
7	Denmark	1.71	7	Sweden	0.47
8	Finland	1.70	8	Norway	0.47
9	Argentina	1.69	9	Germany	0.47
10	Taiwan	1.69	10	UK	0.46
11	South Korea	1.68	11	Belgium	0.46
12	Spain	1.67	12	USA	0.46
13	Mexico	1.67	13	South Korea	0.45
14	Philippines	1.65	14	Spain	0.45
15	Slovenia	1.65	15	Israel	0.45
16	New Zealand	1.62	16	Taiwan	0.44
17	Turkey	1.59	17	Slovenia	0.44
18	Czech Rep.	1.58	18	Mexico	0.44
19	UK	1.58	19	Chile	0.44
20	Sweden	1.58	20	Philippines	0.44
21	USA	1.55	21	Argentina	0.44
22	Norway	1.54	22	Czech Rep.	0.44
23	Slovak Rep.	1.50	23	Japan	0.44
24	Croatia	1.49	24	Slovak Rep.	0.43
25	Chile	1.48	25	Croatia	0.43
26	Russia	1.35	26	Turkey	0.42
27	Israel	1.35	27	South Africa	0.42
28	South Africa	1.34	28	Latvia	0.42
29	Latvia	1.33	29	Bulgaria	0.41
30	Bulgaria	1.30	30	Russia	0.41
	Grand Mean	1.59		Grand Mean	0.45

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Table 4. Rank of group mean individual-level independent factors by country

Rank & Country	Knowledge	Rank & Country	Everyday Risk	Rank & Country	Risk Perception	Rank & Country	Efficacy	Rank & Country	Willingness to make sacrifices
1. Norway	3.20	1. Taiwan	3.86	1. Chile	3.56	1. Canada	3.26	1. Norway	3.26
2. Canada	3.15	2. Mexico	3.73	2. Turkey	3.47	2. Switzerland	3.22	2. Canada	3.21
3. Slovenia	3.11	3. Philippines	3.66	3. Russia	3.39	3. Finland	3.19	3. Slovenia	3.14
4. Finland	3.10	4. Chile	3.58	4. Argentina	3.32	4. Norway	3.08	4. Finland	3.00
5. Switzerland	3.06	5. South Africa	3.58	5. Mexico	3.29	5. New Zealand	3.08	5. Switzerland	2.97
6. New Zealand	3.01	6. South Korea	3.51	6. Philippines	3.27	6. Sweden	3.07	6. New Zealand	2.96
7. Austria	2.97	7. Israel	3.48	7. Croatia	3.27	7. Austria	3.06	7. Austria	2.92
8. Israel	2.96	8. Argentina	3.46	8. Spain	3.24	8. Denmark	3.04	8. Israel	2.91
9. Sweden	2.95	9. Spain	3.44	9. Bulgaria	3.23	9. Slovenia	3.00	9. Sweden	2.87
10. Denmark	2.95	10. Bulgaria	3.43	10. Slovak Rep.	3.22	10. USA	2.95	10. Denmark	2.84
11. Philippines	2.94	11. Japan	3.35	11. Taiwan	3.21	11. Spain	2.94	11. Philippines	2.83
12. Germany	2.93	12. Russia	3.27	12. Germany	3.17	12. Germany	2.92	12. Germany	2.79
13. Croatia	2.92	13. Canada	3.26	13. Slovenia	3.14	13. Israel	2.89	13. Croatia	2.78
14. Taiwan	2.88	14. Slovenia	3.24	14. Canada	3.14	14. Croatia	2.89	14. Taiwan	2.76
15. UK	2.88	15. USA	3.21	15. Israel	3.13	15. Mexico	2.87	15. UK	2.73
16. Mexico	2.77	16. Turkey	3.09	16. South Africa	3.13	16. Belgium	2.86	16. Mexico	2.72
17. Belgium	2.76	17. New Zealand	3.08	17. South Korea	3.11	17. Taiwan	2.84	17. Belgium	2.70
18. Turkey	2.73	18. Belgium	2.98	18. Austria	3.10	18. UK	2.82	18. Turkey	2.67
19. Argentina	2.71	19. Croatia	2.97	19. Japan	3.09	19. Turkey	2.80	19. Argentina	2.66
20. South Korea	2.71	20. Latvia	2.96	20. Czech Rep.	3.05	20. South Korea	2.78	20. South Korea	2.65
21. Latvia	2.70	21. UK	2.92	21. USA	2.96	21. Chile	2.78	21. Latvia	2.64
22. USA	2.69	22. Czech Rep.	2.92	22. Sweden	2.96	22. Argentina	2.76	22. USA	2.57
23. Czech Rep.	2.68	23. Switzerland	2.92	23. New Zealand	2.95	23. Czech Rep.	2.73	23. Czech Rep.	2.52
24. Chile	2.66	24. Slovak Rep.	2.89	24. Switzerland	2.93	24. Japan	2.71	24. Chile	2.49
25. Spain	2.66	25. Austria	2.86	25. Denmark	2.92	25. Latvia	2.70	25. Spain	2.42
26. Bulgaria	2.64	26. Germany	2.84	26. Latvia	2.91	26. Slovak Rep.	2.65	26. Bulgaria	2.35
27. South Africa	2.61	27. Finland	2.83	27. Finland	2.86	27. Russia	2.59	27. South Africa	2.33
28. Japan	2.59	28. Sweden	2.82	28. Belgium	2.86	28. Philippines	2.54	28. Japan	2.29
29. Russia	2.52	29. Denmark	2.63	29. UK	2.79	29. Bulgaria	2.53	29. Russia	2.26
30. Slovak Rep.	2.51	30. Norway	2.62	30. Norway	2.72	30. South Africa	2.47	30. Slovak Rep.	2.12
Grand Mean	2.81	Grand Mean	3.23	Grand Mean	3.13	Grand Mean	2.84	Grand Mean	2.71

Note. Postmaterialism appear in Table 5. Everyday risk is a single item not a factor.

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Table 5. Countries group means of different national-level independent variables sorted by level of development index

Rank	Country	Development Index	GDP	Postmaterialism	Env. NGO	Education	Water Satisfaction	Env. Health
1	Canada	1.30	34729	.99	1.26	.93	91.30	92.77
2	Denmark	1.29	33709	1.00	1.22	.92	97.40	89.82
3	Norway	1.28	46582	.83	.87	.99	95.30	90.75
4	Germany	1.15	33923	1.13	.54	.93	95.00	90.75
5	USA	1.14	42253	.93	1.00	.94	89.50	88.30
6	Sweden	1.06	34615	.92	.87	.90	96.70	92.77
7	Switzerland	.94	39236	.82	.87	.87	96.10	92.29
8	Finland	.84	31605	.97	.65	.88	95.00	90.75
9	UK	.81	32975	.85	1.20	.82	94.80	89.82
10	New Zealand	.75	23776	.77	1.09	1.00	89.00	90.75
11	Austria	.65	34926	.81	.65	.86	97.10	89.47
12	Japan	.51	31856	.81	.66	.88	87.80	90.18
13	Slovenia	.31	24451	.69	.93	.93	90.00	84.98
14	Belgium	.27	33050	.70	.58	.88	84.70	89.05
15	Spain	.26	26362	.78	.74	.87	83.60	88.71
16	South Korea	-.10	27109	.71	.41	.93	81.60	80.15
17	Israel	-.16	25456	.71	.68	.91	55.70	92.11
18	Czech Rep.	-.17	21083	.69	.00	.92	89.20	86.87
19	Taiwan	-.21	35604	.75	.51	.62	71.00	95.00
20	Chile	-.25	12741	.85	.73	.80	84.50	81.28
21	Croatia	-.50	15533	.76	.47	.78	81.20	82.47
22	Slovak Rep.	-.52	19285	.61	.00	.88	86.00	84.50
23	Latvia	-.61	13793	.75	.88	.87	65.30	75.05
24	Argentina	-.94	13833	.61	.59	.81	73.80	74.49
25	Mexico	-1.04	12784	.72	.53	.73	67.70	76.63
26	Bulgaria	-1.07	11024	.57	1.09	.80	60.80	73.21
27	Philippines	-1.62	3378	.58	.35	.68	83.40	65.88
28	South Africa	-1.65	9257	.81	.66	.71	53.40	59.00
29	Turkey	-1.79	11841	.60	.16	.58	64.10	74.45
30	Russia	-1.95	13843	.36	.32	.78	52.80	68.59
	Grand Mean	-0.12	24249	.77	.66	.83	79.71	82.87

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Table 6. Correlations between all the variables of the research in the pooled sample

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1																			
2	.443**	1																		
3	.068**	-.003	1																	
4	.118**	-.011*	.030**	1																
5	.087**	.226**	-.040**	-.205**	1															
6	.029**	.133**	-.091**	-.054**	.318**	1														
7	-.013**	.028**	.009	-.079**	.201**	.149**	1													
8	.095**	.164**	-.056**	-.072**	.115**	.058**	.024**	1												
9	.319**	.393**	-.102**	-.086**	.301**	.154**	.058**	.140**	1											
10	.184**	.115**	.008	-.013**	.035**	.014**	.071**	.016**	.121**	1										
11	.254**	.097**	.084**	-.052**	.003	.007	.097**	-.005	.095**	.278**	1									
12	.434**	.505**	.008	-.055**	.300**	.151**	.035**	.162**	.537**	.098**	.144**	1								
13	.382**	.431**	-.009	-.039**	.216**	.133**	.049**	.156**	.326**	.154**	.157**	.385**	1							
14	.190**	.219**	.001	.136**	.167**	-	-.089**	.143**	.117**	-.145**	-.229**	.241**	.178**	1						
15	.135**	.186**	.000	.040**	.032**	-	-.030**	.250**	.099**	-.105**	-.165**	.172**	.145**	.556**	1					
16	.024**	.159**	.006	.063**	.137**	-	.003	.131**	.095**	-.051**	-.171**	.146**	.094**	.400**	.512**	1				
17	.078**	.167**	.009	.151**	.170**	-	-.095**	.098**	.070**	-.182**	-.211**	.172**	.072**	.557**	.377**	.403**	1			
18	.243**	.226**	-.003	.144**	.085**	-	-.177**	.147**	.120**	-.195**	-.174**	.233**	.133**	.678**	.564**	.291**	.631**	1		
19	.214**	.206**	.000	.157**	.152**	-	-.114**	.117**	.117**	-.127**	-.145**	.261**	.149**	.842**	.458**	.277**	.533**	.722**	1	
20	.201**	.249**	.002	.153**	.158**	-	-.115**	.186**	.132**	-.176**	-.231**	.267**	.167**	.886**	.726**	.557**	.749**	.855**	.858**	1

Note. Variables 1 to 13 are individual-level covariates, and variables 14 to 20 are country-level covariates. Household income is *z*-transformed. 1 = Private environmental behavior (PrEB); 2 = Public environmental behavior (PuEB); 3 = Gender; 4 = Age; 5 = Education; 6 = Household income; 7 = Size of hometown; 8 = Postmaterialist values; 9 = Knowledge of environmental problems; 10 = Everyday environmental risk perception; 11 = Environmental risk perception; 12 = environmental efficacy; 13 = Willingness to make sacrifice; 14 = GDP; 15 = Posmaterialism; 16 = Environmental NGO density; 17 = Education index; 18 = Water satisfaction; 19 = Environmental health; 20 = Development index.

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

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Table 7. Confirmatory factor analysis (CFA) results and internal consistency for PrEB for pooled and country-specific models

	Summary Measures of Model Fit					Cronbach's α	Standardized Factor Loadings[a]			
	Chi-square	p-value	GFI	NFI	RMSEA		V56	V59	V60	V61
Pooled Model	305596	.00	1	.99	.06	.72	.42	.76	.71	.63
Argentina	34002	.00	.98	.97	.12	.78	.50	.77	.84	.65
Austria	2754	.25	1	1	.02	.75	.32	.79	.80	.77
Belgium	2051	.36	1	1	.01	.62	.31	.67	.84	.35
Bulgaria	4583	.10	1	.99	.04	.65	.37	.71	.59	.61
Canada	7696	.02	.99	.98	.06	.71	.37	.67	.69	.67
Chile	1066	.58	1	1	0	.78	.41	.77	.75	.75
Taiwan (China)	1583	.45	1	1	0	.68	.38	.72	.71	.57
Croatia	22635	.00	.99	.99	.09	.83	.58	.83	.84	.74
Czech Republic	17144	.00	.99	.99	.07	.73	.38	.80	.84	.52
Denmark	2279	.32	1	1	.01	.62	.35	.64	.63	.50
Finland	12479	.00	.99	.99	.07	.77	.39	.80	.82	.66
Germany	7885	.02	1	.99	.05	.71	.31	.74	.79	.61
Israel	.123	.93	1	1	0	.64	.29	.62	.74	.64
Japan	7224	.03	1	.99	.04	.77	.47	.77	.81	.66
Republic of Korea	10871	.00	1	.99	.05	.70	.35	.78	.79	.51
Latvia	16783	.00	.99	.97	.09	.62	.33	.67	.65	.55
Mexico	14735	.00	1	.99	.06	.75	.45	.77	.72	.67
New Zealand	.112	.94	1	1	0	.66	.31	.72	.61	.66
Norway	14246	.00	.99	.98	.07	.66	.32	.68	.68	.63
Philippines	9786	.01	1	.98	.06	.63	.38	.51	.61	.63
Russian Federation	21417	.00	.99	.98	.08	.71	.30	.88	.79	.53
Slovakia	18075	.00	.99	.98	.09	.71	.33	.75	.74	.71
Slovenia	13864	.00	.99	.97	.07	.61	.29	.65	.69	.50

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	Summary Measures of Model Fit					Cronbach's α	Standardized Factor Loadings[a]			
	Chi-square	p-value	GFI	NFI	RMSEA		V56	V59	V60	V61
South Africa	19935	.00	.99	.99	.06	.80	.59	.71	.73	.79
Spain	27927	.00	.99	.98	.07	.65	.38	.67	.64	.57
Sweden	5919	.05	1	.99	.04	.64	.30	.71	.63	.63
Switzerland	3497	.17	1	1	.02	.69	.30	.68	.74	.63
Turkey	11571	.00	.97	.94	.08	.75	.41	.47	.76	.68
United Kingdom	4252	.12	1	.99	.04	.70	.33	.73	.68	.73
United States	7235	.03	1	.99	.05	.67	.45	.65	.62	.69
Summary		.00 - .94	.97 - 1	.94 - 1	.12 - 0	.62 - .83	.29 - .58	.47 - .88	.59 - .84	.35 - .79

[a] See Table 1 for the correspondence between the variable name and the item.

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Table 8. Confirmatory factor analysis (CFA) results and internal consistency for PuEB for pooled and country-specific models

	Summary Measures of Model Fit[a]					Cronbach's α	Standardized Factor Loadings[b]		
	Chi-square	p-value	GFI	NFI	RMSEA		V62	V63	V64
Pooled Model	1484439	.00	.99	.97	.05	.56	.48	.59	.70
Argentina	54431	.00	.99	.97	.05	.49	.39	.57	.60
Austria	33834	.00	.99	.98	.04	.58	.61	.48	.66
Belgium	62852	.00	.99	.95	.06	.59	.56	.43	.82
Bulgaria	26486	.01	.99	.96	.03	.30	.47	.43	.32
Canada	32240	.00	.99	.96	.05	.56	.57	.54	.60
Chile	29614	.01	.99	.98	.04	.47	.27	.65	.34
Taiwan (China)	10172	.06	.99	.99	.00	.39	.43	.34	.50
Croatia	76203	.00	.98	.97	.06	.47	.55	.45	.61
Czech Republic	69269	.00	.99	.96	.05	.54	.45	.66	.53
Denmark	68540	.00	.99	.94	.06	.63	.50	.47	.88
Finland	53887	.00	.99	.97	.05	.52	.48	.59	.56
Germany	41638	.00	.99	.98	.04	.61	.48	.52	.85
Israel	50381	.00	.99	.97	.05	.67	.63	.67	.64
Japan	41892	.00	.99	.97	.04	.34	.35	.50	.35
Republic of Korea	37265	.00	.99	.98	.03	.45	.50	.34	.76
Latvia	26336	.02	.99	.96	.03	.49	.36	.54	.61
Mexico	38351	.00	.99	.98	.03	.56	.53	.55	.59
New Zealand	50740	.00	.99	.96	.05	.61	.48	.59	.70
Norway	47201	.00	.99	.96	.04	.52	.44	.51	.65
Philippines	28106	.01	.99	.96	.03	.48	.55	.42	.50
Russian Federation	42040	.00	.99	.98	.04	.49	.80	.35	.49
Slovakia	34685	.00	.99	.97	.04	.44	.35	.48	.61
Slovenia	38272	.00	.99	.94	.04	.44	.37	.46	.60

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	Summary Measures of Model Fit[a]					Cronbach's α	Standardized Factor Loadings[b]		
	Chi-square	p-value	GFI	NFI	RMSEA		V62	V63	V64
South Africa	94866	.00	.99	.97	.06	.55	.50	.62	.60
Spain	86617	.00	.99	.96	.05	.53	.47	.48	.72
Sweden	33599	.00	.99	.97	.04	.50	.40	.34	.86
Switzerland	31360	.00	.99	.98	.03	.67	.62	.58	.73
Turkey	39161	.00	.98	.94	.08	.58	.33	.59	.80
United Kingdom	24861	.02	.99	.98	.03	.58	.53	.61	.62
United States	40332	.00	.99	.97	.04	.63	.47	.59	.78
Summary		.00 - .06	.98 - .99	.94 - .99	.08 - .00	.34 - .67	.27 - .80	.34 - .67	.32 - .86

[a] Because a three items model is exactly identified within a CFA, overall model fit statistics come from a single CFA that include a correlation between public and PrEB latent factors.
[b] See Table 1 for the correspondence between the variable name and the item.

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Table 9. Confirmatory factor analysis (CFA) results and internal consistency for environmental risk perception for pooled and country-specific models

	Summary Measures of Model Fit					Cronbach's α	Standardized Factor Loadings[a]					
	Chi-square	p-value	GFI	NFI	RMSEA		V40	V41	V42	V43	V44	V45
Pooled Model	47140	.00	.98	.96	.07	.81	.43	.52	.72	.61	.54	.53
Argentina	47822	.00	.99	.98	.07	.81	.56	.70	.68	.72	.62	.56
Austria	47140	.00	.98	.96	.07	.72	.43	.52	.72	.61	.54	.53
Belgium	62531	.00	.98	.96	.08	.79	.58	.58	.69	.67	.62	.49
Bulgaria	37268	.00	.99	.98	.06	.80	.55	.61	.74	.65	.58	.66
Canada	34657	.00	.98	.97	.07	.81	.66	.71	.68	.68	.62	.49
Chile	45501	.00	.98	.97	.07	.81	.53	.64	.64	.73	.71	.60
Taiwan (China)	49832	.00	.99	.97	.06	.74	.48	.56	.66	.60	.60	.48
Croatia	99455	.00	.98	.96	.09	.84	.57	.65	.71	.71	.75	.68
Czech Republic	63813	.00	.99	.97	.07	.79	.58	.68	.69	.65	.62	.54
Denmark	74014	.00	.98	.96	.08	.77	.56	.58	.80	.70	.48	.45
Finland	112754	.00	.97	.94	.10	.75	.58	.66	.72	.64	.54	.41
Germany	65667	.00	.99	.99	.07	.75	.49	.61	.69	.66	.50	.49
Israel	68532	.00	.98	.95	.08	.72	.44	.54	.65	.57	.49	.55
Japan	121484	.00	.97	.94	.10	.78	.61	.64	.71	.70	.56	.43
Korea	100321	.00	.98	.97	.09	.81	.63	.71	.73	.65	.57	.56
Latvia	92362	.00	.97	.96	.10	.83	.65	.65	.79	.69	.60	.62
Mexico	123758	.00	.98	.95	.09	.78	.46	.54	.64	.71	.64	.52
New Zealand	64567	.00	.98	.97	.08	.78	.67	.70	.68	.58	.62	.50
Norway	133463	.00	.97	.93	.11	.75	.65	.67	.61	.56	.61	.43
Philippines	64072	.00	.98	.96	.08	.76	.52	.55	.56	.59	.66	.60
Russian	93829	.00	.98	.97	.09	.83	.64	.73	.78	.73	.53	.61
Slovakia	123043	.00	.96	.94	.11	.82	.57	.58	.72	.74	.68	.58
Slovenia	41476	.00	.99	.97	.06	.76	.46	.51	.69	.68	.57	.55

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	Summary Measures of Model Fit					Cronbach's α	Standardized Factor Loadings[a]					
	Chi-square	p-value	GFI	NFI	RMSEA		V40	V41	V42	V43	V44	V45
South Africa	185997	.00	.97	.94	.11	.79	.48	.48	.67	.69	.67	.64
Spain	126391	.00	.98	.97	.08	.77	.55	.65	.69	.65	.59	.47
Sweden	100664	.00	.97	.95	.10	.78	.64	.62	.72	.68	.59	.43
Switzerland	74302	.00	.98	.95	.08	.74	.50	.60	.74	.59	.45	.50
Turkey	79048	.00	.98	.98	.07	.88	.63	.70	.76	.78	.73	.77
United Kingdom	105427	.00	.96	.93	.12	.77	.73	.71	.64	.56	.66	.40
United States	62776	.00	.98	.97	.08	.81	.69	.77	.67	.67	.63	.49
Summary		.00	.96 - .99	.93 - .99	.11 - .06	.72 - .88	.43 - .73	.48 - .77	.56 - .79	.56 - .78	.45 - .75	.41 - .77

[a] See Table 1 for the correspondence between the variable name and the item.

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Table 10. Confirmatory factor analysis (CFA) results and internal consistency for knowledge, efficacy and willingness to make sacrifice for pooled and country-specific models

	Environmental Knowledge			Self-efficacy				Willingness to sacrifice			
	Cronbach's α	Standardized Factor Loadings[ab]		Cronbach's α	Standardized Factor Loadings[ac]			Cronbach's α	Standardized Factor Loadings[ac]		
		V19	V20		V33	V36	V38		V30	V31	V32
Pooled Model	.81	.92	.74	.59	.65	.58	.38	.83	.85	.85	.67
Argentina	.81	.86	.80	.60	.67	.59	.49	.87	.81	.90	.78
Austria	.79	1.11	.58	.70	.69	.71	.61	.73	.86	.71	.54
Belgium	.76	.85	.64	.60	.62	.55	.57	.80	.91	.92	.55
Bulgaria	.85	.88	.85	.60	.43	.57	.43	.89	.92	.90	.75
Canada	.82	1.05	.65	.59	.69	.61	.42	.81	.87	.79	.64
Chile	.85	.86	.85	.53	.55	.45	.49	.86	.83	.87	.77
Taiwan	.77	.84	.67	.32	.38	.30	.48	.59	.69	.78	.30
Croatia	.80	.65	.70	.68	.69	.68	.55	.89	.89	.88	.78
Czech Rep.	.87	1	.76	.66	.71	.66	.53	.89	.88	.90	.77
Denmark	.83	1.01	.70	.62	.76	.63	.41	.83	.81	.83	.73
Finland	.75	.89	.61	.66	.77	.63	.49	.83	.86	.87	.65
Germany	.78	.98	.65	.63	.69	.63	.50	.82	.81	.77	.74
Israel	.71	.80	.69	.62	.81	.52	.47	.80	.81	.84	.66
Japan	.88	1.04	.76	.48	.62	.50	.35	.80	.77	.86	.65
Korea	.81	1	.67	.57	.55	.61	.48	.78	.82	.87	.53
Latvia	.81	.93	.74	.63	.57	.76	.48	.88	.84	.94	.75
Mexico	.78	.91	.71	.62	.64	.69	.46	.79	.81	.85	.59
New Zealand	.83	1.01	.71	.63	.81	.60	.43	.82	.84	.82	.68
Norway	.80	.95	.70	.56	.78	.59	.31	.84	.90	.78	.74
Philippines	.64	.79	.60	.44	.31	.32	.82	.76	.77	.85	.55

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	Environmental Knowledge			Self-efficacy				Willingness to sacrifice			
	Cronbach's α	Standardized Factor Loadings[ab]		Cronbach's α	Standardized Factor Loadings[ac]			Cronbach's α	Standardized Factor Loadings[ac]		
		V19	V20		V33	V36	V38		V30	V31	V32
Russian	.76	.87	.70	.50	.50	.61	.39	.84	.83	.95	.65
Slovakia	.78	.95	.67	.63	.62	.69	.49	.85	.89	.86	.69
Slovenia	.78	1.07	.60	.63	.72	.63	.46	.84	.93	.80	.67
South Africa	.83	.83	.86	.47	.59	.35	.53	.88	.87	.91	.76
Spain	.82	.99	.71	.58	.70	.55	.47	.85	.83	.89	.71
Sweden	.83	1.04	.68	.62	.81	.64	.36	.80	.85	.82	.59
Switzerland	.76	1.07	.57	.55	.71	.50	.43	.78	.89	.78	.55
Turkey	.89	.89	.89	.53	.58	.57	.47	.88	.83	.89	.80
UK	.84	.87	.75	.67	.72	.61	.53	.86	.86	.87	.73
United States	.79	.91	.73	.61	.78	.60	.40	.82	.81	.85	.67
Summary	.64 - .89	.65 - 1.11	.57 - .89	.32 - .70	.31 - .81	.30 - .76	.31 - .82	.56 - .89	.71 - .92	.71 - .95	.30 - .80

[a] See Table 1 for the correspondence between the variable name and the item.

[b]Because a two items model is unidentified within a CFA, overall model fit statistics cannot be computed. Nevertheless, a single CFA that includes a correlation between environmental knowledge and risk perception for the sample of all countries pooled was estimated. Overall model fit statistics are very good for these measures (χ^2 (18) = 1857, p = .000, GFI .989, NFI .979, RMSEA .051).

[c]Because a three items model is exactly identified within a CFA, overall model fit statistics cannot be computed. Nevertheless, a single CFA that includes a correlation between environmental efficacy and willingness to sacrifice for the sample of all countries pooled was estimated. Overall model fit statistics are very good for these measures (χ^2 (8) = 677, p = .000, GFI .994, NFI .989, RMSEA .047).

Table 11. Correlations between common/pooled model and country-specific latent variables (Emic validity)

	PrEB	PuEB	Risk perception	Knowledge	Efficacy	Willingness to sacrifice
Argentina	0.947	0.974	0.976	0.963	0.974	0.938
Austria	0.964	0.935	0.955	0.934	0.984	0.964
Belgium	0.976	0.986	0.985	0.977	0.965	0.993
Bulgaria	0.943	0.996	0.989	0.985	0.983	0.945
Canada	0.968	0.958	0.996	0.989	0.945	0.982
Chile	0.930	0.997	0.994	0.995	0.984	0.934
Taiwan	0.938	0.968	0.946	0.993	0.959	0.990
Croatia	0.990	0.958	0.986	0.946	0.934	0.956
Czech Rep.	0.935	0.996	0.956	0.986	0.979	0.974
Denmark	0.964	0.993	0.975	0.948	0.983	0.964
Finland	0.984	0.988	0.935	0.993	0.952	0.982
Germany	0.925	0.979	0.957	0.945	0.993	0.928
Israel	0.997	0.990	0.933	0.975	0.935	0.955
Japan	0.956	0.999	0.968	0.967	0.952	0.953
Korea	0.977	0.976	0.974	0.985	0.946	0.933
Latvia	0.965	0.946	0.995	0.943	0.996	0.975
Mexico	0.978	0.978	0.956	0.968	0.993	0.964
N. Zealand	0.934	0.983	0.985	0.997	0.946	0.983
Norway	0.952	0.992	0.936	0.957	0.974	0.999
Philippines	0.992	0.991	0.986	0.967	0.984	0.993
Russian	0.937	0.989	0.965	0.982	0.948	0.953
Slovakia	0.929	0.996	0.983	0.934	0.995	0.957
Slovenia	0.965	0.957	0.929	0.949	0.953	0.985
S. Africa	0.978	0.996	0.995	0.964	0.968	0.997
Spain	0.956	0.967	0.975	0.985	0.997	0.993
Sweden	0.970	0.988	0.938	0.946	0.958	0.945
Switzerland	0.959	0.956	0.984	0.978	0.943	0.979
Turkey	0.977	0.980	0.966	0.945	0.957	0.937
UK	0.997	0.975	0.946	0.989	0.996	0.984
USA	0.976	0.956	0.986	0.949	0.935	0.963

Note. PrEB = private environmental behavior; PuEB = public environmental behavior

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Table 12. Regression results for the social bases of private environmental behavior (PrEB), 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[t]	.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[t]	.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[t]	.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[t]	.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[t]	.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[t]	.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[t]	.017	.036	.002**	.001	.093	.067**	.008	.224	-.019[t]	.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[t]	.011	-.052	.009	.009	.026	.063
Turkey	.055**	.02	.068	.003**	.001	.132	.046**	.008	.165	.012	.01	.03	.004	.008	.013	.029

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	Gender[a]			Age			Education			Income			Size Hometown			R^2
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β	
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[t]	.016	.054	.024
Summary	20/31 significant			26/31 significant			29/31 significant			9/31 significant			12/31 significant			.015
	20: positive			26: positive			29: positive			5: positive; 4: negative			9: positive; 3 negative			to
Category[b]	Soft social base			Hard social base			Hard social base			Diffuse social base			Mixed results			.15

Note. In all models, we estimate the net effects of all the sociodemographic characteristics without controlling for the effects of environmental concern facets. B = unstandardized coefficients; SE = standard errors; β = standardized coefficients.

[a] Male = 0 ; female = 1.

[b]Hard social base: cutoff 75% consensus; Soft social base: cutoff 50% consensus; Diffuse social base: cutoff 75% no significant differences; Mixed results: a combination of the other categories.

[t]$p < .10$, two-tailed. *$p < .05$, two-tailed. **$p < .01$, two-tailed.

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Table 13. Regression results for the social bases of public environmental behavior (PuEB), 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 [t]	.003	.054	.063
Bulgaria	.001	.003	.014	0	0	-.048	.008**	.001	.231	.009**	.002	.193	.002 [t]	.001	.06	.163
Canada	-.004	.008	-.018	0	0	.026	.014**	.003	.17	.003	.004	.031	-.006 [t]	.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 [t]	.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 [t]	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 [t]	.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 [t]	.005	.048	0	0	.006	.009**	.002	.13	0	.002	-.002	.005**	.002	.078	.030
Philippines	-.006 [t]	.004	-.048	0	0	-.023	.006**	.001	.144	.002	.002	.039	-.003*	.001	-.061	.028
Russian	.002	.003	.016	0**	0	-.077	.005**	.001	.123	.002 [t]	.001	.054	-.001	.001	-.025	.032
Slovakia	-.008 [t]	.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

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	Gender[a]			Age			Education			Income			Size Hometown			R^2
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β	
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 [t]	.004	.05	.108
Summary	3/31 significant			9/31 significant			30/31 significant			18/31 significant			8/31 significant			.018
	2: positive; 1: negative			9: positive			30: positive			18: positive			4: positive; 4: negative			to
Category[a]	Diffuse social base			Mixed results			Hard social base			Soft social base			Diffuse social base			.163

Note. In all models, we estimate the net effects of all the sociodemographic characteristics without controlling for the effects of environmental concern facets. B = unstandardized coefficients; SE = standard errors; β = standardized coefficients.

[a] Male = 0 ; female = 1.

[b]Hard social base: cutoff 75% consensus; Soft social base: cutoff 50% consensus; Diffuse social base: cutoff 75% no significant differences; Mixed results: a combination of the other categories.

[t]$p < .10$, two-tailed. *$p < .05$, two-tailed. **$p < .01$, two-tailed.

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Table 14. Summary of the relationships for different models predicting private environmental behavior (PrEB)

	Direct effect			Total effect			Category[a]
	Positive	Negative	No significant	Positive	Negative	No significant	
Social Bases[b]							
Gender	20	-	11				soft social base
Age	26	-	5				hard social base
Education	29	-	2				hard social base
Household income	5	4	22				diffuse social base
Size of hometown	9	3	19				mixed social base
Social Bases[c]							
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

Note. Total effect is the sum of direct and indirect effect. Positive and negative effects are significant at $p < .05$. $n_{macro} = 31$ (pooled sample and 30 countries), $n_{micro} = 38{,}543$.
[a] In the first model (i.e. first half of the Table), categories come from Direct effects and in the meditational model (i.e. second half of the Table) categories come from Total effects. Both models use the same criteria: Hard social base: cutoff 75% consensus; Soft social base: cutoff 50% consensus; Diffuse social base: cutoff 75% no significant differences; Mixed results: a combination of the other categories.
[b]Model with just the sociodemographic variables as predictors.
[c]Mediational model. Sociodemographic variables influence behaviors directly and indirectly through the cognitive, affective and dispositional environmental concern dimensions.

Table 15. Summary of the relationships for different models predicting public environmental behavior (PuEB)

	Direct effect			Total effect			Category[a]
	Positive	Negative	No significant	Positive	Negative	No significant	
Social Bases[b]							
Gender	2	1	28				diffuse social base
Age	9	-	22				mixed social base
Education	30	-	1				hard social base
Household income	18	-	13				soft social base
Size of hometown	4	4	23				diffuse social base
Social Bases[c]							
Gender	6	1	24	11	-	20	mixed social base
Age	9	-	22	9	4	18	mixed social base
Education	11	1	19	21	-	10	soft social base
Household income	10	-	21	12	-	19	mixed social base
Size of hometown	5	3	23	5	2	24	diffuse social base

Note. Total effect is the sum of direct and indirect effect. Positive and negative effects are significant at $p < .05$. $n_{macro} = 31$ (pooled sample and 30 countries), $n_{micro} = 38{,}543$.
[a] In the first model (i.e. first half of the Table), categories come from Direct effects and in the meditational model (i.e. second half of the Table) categories come from Total effects. Both models use the same criteria: Hard social base: cutoff 75% consensus; Soft social base: cutoff 50% consensus; Diffuse social base: cutoff 75% no significant differences; Mixed results: a combination of the other categories.
[b]Model with just the sociodemographic variables as predictors.
[c]Mediational model. Sociodemographic variables influence behaviors directly and indirectly through the cognitive, affective and dispositional environmental concern dimensions.

Table 16. Cross-level interactions of social bases-behavior slopes with development index

Slopes as outcomes model	PrEB		PuEB	
	B	(SE)	B	(SE)
Gender-behavior slope	.0625***		-.0003	
		(.006)		(.001)
Gender X development index	.0194**		.0022	
		(.006)		(.001)
Age-behavior slope	.0022***		-.0002***	
		(.000)		(.000)
Age X development index	.0006[t]		.0000	
		(.000)		(.000)
Education-behavior slope	.0279***		.0131***	
		(.004)		(.001)
Education X development index	-.0029		.0025*	
		(.004)		(.001)
Household Income-behavior slope	.0118*		.0107***	
		(.005)		(.001)
Household Income X development index	-.0015		.0008	
		(.005)		(.001)
Size of hometown-behavior slope	.0111**		.0042***	
		(.004)		(.001)
Size of hometown X development index	-.0070[t]		.0005	
		(.004)		(.001)

Note. PrEB = private environmental behavior; PuEB = public environmental behavior. Unstandardized coefficients. Individual-level independent variables are group mean centered and entered only one at a time as covariates. REML estimation, n_{macro} = 30, n_{micro} = 38,543

[t]$p < .10$, two-tailed. *$p < .05$, two-tailed. **$p < .01$, two-tailed. ***$p < .001$, two-tailed.

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Table 17. Path model results for the full model of social bases and environmental concern predicting private environmental behavior (PrEB), by pooled model and country

	Pooled			Argentina			Austria			Belgium			Bulgaria		
	Direct		Total	Direct		Total	Direct		Total	Direct		Total	Direct		Total
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Social Bases															
Gender	.046**	.004	.096	.058*	.025	.098	.015	.022	.089	.009	.016	.079	.048*	.02	.078
Age	.003**	.000	.134	.003**	.001	.09	.003**	.001	.131	.005**	.0	.293	.003**	.001	.11
Education	-.014**	.001	.012	-.036**	.011	-.037	-.018*	.01	.049	-.01	.007	.054	.019*	.009	.121
Household income	-.012**	.002	-.007	.003	.013	.051	-.016**	.011	-.049	-.028**	.008	-.055	-.017	.012	-.02
Size of hometown	-.012**	.001	-.019	-.02	.013	.001	-.046**	.009	-.109	.012	.007	.045	.003	.008	.044
Environmental concern[a]															
Postmaterialist values	.013**	.003	.062	.056**	.021	.099	-.013	.018	.047	-.009	.013	.019	-.001	.018	.026
Knowledge	.052**	.003	.332	.059**	.017	.358	.072**	.018	.376	.03*	.013	.335	.015	.014	.3
Everyday env. risk pp.	.028**	.002	.096	.027*	.013	.057	.021*	.01	.135	.015	.009	.083	.043**	.011	.16
Env. risk pp.	.124**	.004	.207	.199**	.03	.225	.218**	.024	.321	.104**	.018	.263	.019	.02	.018
Efficacy	.185**	.004	.335	.309**	.027	.382	.177**	.019	.327	.188**	.02	.372	.193**	.021	.36
Willingness	.095**	.002	.217	.044**	.014	.089	.093**	.013	.193	.047**	.01	.136	.065**	.011	.187
Model fit statistics															
Adj. R-squared	. .31			.30			.41			.35			.28		
Chi-square	154661 (4df) p= .000			1440 (4df) p=.816			3867 (4df) p=.424			11639 (4df) p=.020			20428 (4df) p=.000		
GFI	1			1			1			1			1		
NFI	1			1			.98			1			1		
RMSEA	.03			.00			.00			.04			.06		

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	Canada			Chile			Taiwan (China)			Croatia			Czech Republic		
	Direct		Total	Direct		Total	Direct		Total	Direct		Total	Direct		Total
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Social Bases															
Gender	.072**	.022	.211	.033	.026	.061	.099**	.015	.194	.042*	.019	.068	.077**	.018	.158
Age	.003**	.001	.166	.004**	.001	.147	.004**	.001	.205	.003**	.001	.127	.003**	.001	.094
Education	-.018	.009	.005	.019	.011	.141	.003	.007	.105	-.006	.009	.009	-.016	.01	-.019
Household income	.026*	.011	.115	-.032*	.015	-.018	-.001	.007	.011	-.016	.01	-.053	-.006	.01	.008
Size of hometown	-.014	.009	-.036	-.003	.01	-.056	.028**	.007	.111	.013	.008	.079	.002	.008	.013
Environmental concern[a]															
Postmaterialist values	.016	.019	.119	.007	.02	.027	.007	.012	.028	.067**	.017	.11	-.036*	.015	.004
Knowledge	.07**	.017	.389	.025	.019	.268	.046**	.011	.334	.077**	.014	.421	.081**	.015	.428
Everyday env. risk pp.	.031**	.012	.132	.043*	.017	.098	.016	.009	.049	.054**	.01	.139	.055**	.009	.174
Env. risk pp.	.183**	.023	.348	.072*	.032	.122	.185**	.019	.246	.178**	.02	.287	.138**	.018	.228
Efficacy	.18**	.024	.321	.263**	.032	.343	.234**	.019	.359	.189**	.019	.298	.125**	.018	.245
Willingness	.075**	.013	.187	.101**	.016	.192	.093**	.01	.211	.034**	.012	.07	.076**	.012	.165
Model fit statistics															
Adj. R-squared	.48			.23			.36			40			.35		
Chi-square	15792 (4df) p= .003			4059 (4df) p= .398			46584 (4df) p= .000			5450 (4df) p= .244			21095 (4df) p= .000		
GFI	1			1			1			1			1		
NFI	.98			1			.98			1			1		
RMSEA	.06			.04			.08			.02			.05		

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	Denmark			Finland			Germany			Israel			Japan		
	Direct		Total	Direct		Total	Direct		Total	Direct		Total	Direct		Total
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Social Bases															
Gender	.012	.016	.12	.075**	.018	.237	.007	.017	.061	.048*	.021	.08	.039*	.018	.1
Age	.004**	0	.176	.004**	.001	.198	.004**	0	.164	.002**	.001	.049	.006**	0	.367
Education	.002	.007	.018	-.007	.007	.058	-.021**	.007	-.018	.008	.008	.094	-.028**	.007	-.027
Household income	-.018*	.008	-.02	.003	.008	.025	-.017	.009	.009	.017	.011	.084	-.02*	.009	-.057
Size of hometown	-.009	.006	.014	-.015*	.007	-.018	-.011	.008	-.047	.006	.008	.018	.015*	.009	.055
Environmental concern[a]															
Postmaterialist values	-.01	.015	.046	-.003	.014	.058	-.011	.014	.05	.046*	.018	.104	-.022	.017	-.024
Knowledge	.054**	.012	.351	.068**	.013	.363	.04**	.013	.29	.007	.013	.194	.048**	.012	.286
Everyday env. risk pp.	.044**	.007	.192	.062**	.009	.233	.03**	.008	.117	.025*	.011	.101	.022*	.009	.089
Env. risk pp.	.143**	.017	.306	.138**	.019	.264	.153**	.019	.243	.122**	.022	.192	.151**	.018	.234
Efficacy	.11**	.015	.274	.175**	.019	.333	.167**	.017	.342	.132**	.022	.277	.123**	.017	.239
Willingness	.088**	.011	.208	.095**	.011	.209	.077**	.011	.177	.09**	.014	.196	.06**	.011	.14
Model fit statistics															
Adj. R-squared	.38			.47			.29			.22			.35		
Chi-square	21102 (4df) p= .017			23550 (4df) p= .000			8395 (4df) p= .078			9785 (4df) p= .044			9960 (4df) p= .041		
GFI	1			1			1			1			1		
NFI	1			1			1			1			1		
RMSEA	.04			.06			.03			.03			.03		

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SPICUM
servicio de publicaciones

	South Korea			Latvia			Mexico			New Zealand			Norway		
	Direct		Total	Direct		Total	Direct		Total	Direct		Total	Direct		Total
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Social Bases															
Gender	.1**	.018	.162	.031	.02	.056	-.002	.019	.001	.055**	.018	.172	.054**	.016	.198
Age	.005**	.001	.27	.003**	.001	.131	.004**	.001	.168	0	.001	-.028	.002**	0	.08
Education	-.018*	.009	.01	0	.008	.049	0	.007	.024	-.006	.006	.038	-.016**	.006	0
Household income	-.052**	.01	-.116	-.051**	.011	-.152	-.006	.011	.008	-.021*	.009	-.071	.005	.007	.007
Size of hometown	-.003	.009	-.002	.002	.007	.071	.036**	.008	.111	.002	.007	.024	-.005	.005	.014
Environmental concern[a]															
Postmaterialist values	-.007	.014	.016	.009	.018	.041	-.066**	.014	-.09	.028	.015	.09	.006	.013	.079
Knowledge	.063**	.014	.319	.022	.014	.278	.059**	.012	.212	.044**	.013	.335	.023*	.01	.246
Everyday env. risk pp.	.014	.008	.082	.019*	.01	.131	.036**	.009	.094	.033**	.01	.134	.045**	.008	.179
Env. risk pp.	.202**	.019	.266	.037*	.018	.045	.09**	.018	.155	.203**	.018	.407	.15**	.018	.329
Efficacy	.122**	.018	.235	.191**	.02	.376	.05**	.016	.097	.201**	.019	.341	.154**	.017	.3
Willingness	.076**	.011	.169	.105**	.013	.237	.086**	.009	.225	.078**	.011	.184	.085**	.01	.217
Model fit statistics															
Adj. R-squared	.30			.29			.18			.44			.36		
Chi-square	6951 (4df) p= .138			12314 (4df) p= .015			30326 (4df) p= .000			12288 (4df) p= .015			5723 (4df) p= .221		
GFI	1			1			1			1			1		
NFI	1			1			.98			1			1		
RMSEA	.02			.05			.06			.04			.02		

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SPICUM
servicio de publicaciones

	Philippine			Russia			Slovak			Slovenia			South Africa		
	Direct		Total	Direct		Total	Direct		Total	Direct		Total	Direct		Total
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Social Bases															
Gender	.019	.019	.029	.07**	.021	.089	.039	.022	.078	.011	.018	.085	.04*	.016	.058
Age	.001	.001	.034	.002**	.001	.059	.003**	.001	.13	.003**	.001	.17	.001**	.001	.046
Education	.015*	.007	.091	-.018	.01	-.003	.017	.011	.088	-.01	.008	.024	-.003	.007	.04
Household income	.005	.01	.019	-.035*	.011	-.096	-.028*	.012	-.055	.009	.009	.051	-.001	.009	.016
Size of hometown	.027**	.007	.119	-.009	.008	.003	-.011	.011	-.036	-.022**	.008	-.101	-.015*	.006	-.033
Environmental concern[a]															
Postmaterialist values	.017	.016	.038	-.009	.02	.011	.05**	.019	.118	.015	.015	.072	.035**	.013	.067
Knowledge	.052**	.012	.203	.053**	.014	.288	.048**	.017	.341	.054**	.014	.322	.062**	.011	.418
Everyday env. risk pp.	.015	.01	.017	.023*	.009	.074	.021	.011	.094	.05**	.009	.154	.036**	.008	.105
Env. risk pp.	.119**	.019	.18	.15**	.02	.226	.119**	.022	.156	.236**	.021	.341	.105**	.014	.17
Efficacy	.076**	.02	.115	.212**	.02	.331	.181**	.022	.317	.144**	.018	.242	.208**	.017	.321
Willingness	.072**	.01	.196	.069**	.012	.146	.053**	.014	.115	.064**	.011	.163	.101**	.009	.243
Model fit statistics															
Adj. R-squared	.17			.26			.26			.37			.35		
Chi-square	10402 (4df) p= .034			43951 (4df) p= .000			10719 (4df) p= .030			30783 (4df) p= .000			6511 (4df) p= .164		
GFI	1			1			1			1			1		
NFI	1			.97			1			.98			1		
RMSEA	.04			.09			.04			.08			.02		

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SPICUM
servicio de publicaciones

	Spain			Sweden			Switzerland			Turkey			Great Britain		
	Direct		Total	Direct		Total	Direct		Total	Direct		Total	Direct		Total
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Social Bases															
Gender	.054**	.014	.089	.041*	.017	.183	.053**	.018	.165	.033	.018	.073	.058**	.022	.139
Age	.004**	0	.143	.003**	0	.163	.004**	0	.156	.002*	.001	.121	.002**	.001	.177
Education	.005	.007	.077	-.008	.006	-.011	.002	.007	.106	-.011	.008	.06	-.014	.008	.127
Household income	-.021*	.009	-.049	-.017*	.008	-.039	-.026**	.009	-.065	.002	.009	.023	-.041**	.012	-.113
Size of hometown	.011	.006	.037	.001	.006	.047	.009	.008	.028	.006	.007	.014	.008	.012	.042
Environmental concern[a]															
Postmaterialist values	-.021	.012	.02	-.025	.014	.032	-.009	.015	.021	.03*	.013	.029	-.02	.018	.02
Knowledge	.09**	.012	.386	.067**	.012	.372	.039**	.014	.318	.042**	.011	.265	.041*	.016	.338
Everyday env. risk pp.	.027**	.007	.101	.048**	.009	.193	.02*	.008	.085	.019*	.008	.03	.05**	.012	.171
Env. risk pp.	.194**	.017	.246	.128**	.018	.282	.111**	.021	.222	.127**	.017	.209	.198**	.024	.363
Efficacy	.171**	.015	.286	.132**	.018	.284	.202**	.02	.367	.139**	.017	.268	.199**	.025	.377
Willingness	.063**	.009	.131	.089**	.011	.226	.079**	.012	.184	.129**	.01	.298	.103**	.014	.236
Model fit statistics															
Adj. R-squared	.30			.40			.33			.26			.46		
Chi-square	24247 (4df) p= .000			7337 (4df) p= .119			10437 (4df) p= .034			40390 (4df) p= .000			1933 (4df) p= .748		
GFI	1			1			1			1			1		
NFI	1			1			1			.98			1		
RMSEA	.05			.03			.04			.07			.00		

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	United States		
	Direct		Total
	B	SE	β
Social Bases			
Gender	.057**	.021	.145
Age	.002**	.001	.081
Education	-.006	.01	.007
Household income	-.012	.012	-.054
Size of hometown	.006	.013	.041
Environmental concern[a]			
Postmaterialist values	-.019	.017	-.034
Knowledge	.079**	.015	.388
Everyday env. risk pp.	.037**	.011	.122
Env. risk pp.	.175**	.021	.336
Efficacy	.124**	.023	.233
Willingness	.087**	.012	.207
Model fit statistics			
Adj. R-squared	.36		
Chi-square	10217 (4df) p= .037		
GFI	1		
NFI	1		
RMSEA	.04		

Note. In all models, we estimate the net effects of the social bases, postmaterialist values and environmental concern covariates. B = unstandardized coefficients; SE = standard errors; β = standardized coefficients.

[a]Contains the cognitive, affective and dispositional dimensions of environmental concern.

*****$p < .05$. ******$p < .01$.

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Table 18. Path model results for the full model of social bases and environmental concern predicting public environmental behavior (PuEB), by pooled model and country

	Pooled			Argentina			Austria			Belgium			Bulgaria		
	Direct		Total	Direct		Total	Direct		Total	Direct		Total	Direct		Total
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Social Bases															
Gender	.002**	.001	.039	.002	.003	.02	-.005	.005	.031	-.002	.005	.055	.004	.002	.051
Age	0**	0	.043	0	0	.012	0	0	.056	0	0	.036	0	0	-.053
Education	.002**	0	.121	.008**	.001	.226	.001	.002	.122	-.002	.002	.092	0	.001	.05
Household income	.002**	0	.050	-.003	.002	.011	-.002	.003	-.02	-.001	.002	.049	.006**	.001	.164
Size of hometown	-.001**	0	-.02	0	.002	.002	.007**	.002	.104	.004	.002	.039	.001	.001	.062
Environmental concern[a]															
Postmaterialist values	.008**	.001	.109	0	.003	.022	.009**	.004	.121	.003	.004	.059	.003	.002	.064
Knowledge	.011**	0	.35	.014**	.002	.383	.014**	.004	.343	.004	.004	.343	.007**	.002	.417
Everyday env. risk pp.	.003**	0	.059	.002	.002	.033	.01**	.002	.202	-.001	.003	.053	.001	.001	.071
Env. risk pp.	-.001	.001	.051	-.005	.004	.012	.001	.006	.078	.003	.005	.163	-.002	.002	-.025
Efficacy	.042**	.001	.388	.031**	.004	.304	.054**	.005	.407	.079**	.006	.531	.024**	.002	.366
Willingness	.022**	0	.248	.014**	.002	.203	.02**	.003	.171	.023**	.003	.225	.012**	.001	.257
Model fit statistics															
Adj. R-squared	.34			.36			.38			.38			.45		
Chi-square	154661 (3df) p=.000			1440 (3df) p=.696			2248 (3df) p=.523			7662 (3df) p=.054			9492 (3df) p=.023		
GFI	.99			1			1			1			1		
NFI	.97			.99			1			1			1		
RMSEA	.03			0			0			.04			.05		

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	Canada			Chile			Taiwan (China)			Croatia			Czech Republic		
	Direct		Total	Direct		Total	Direct		Total	Direct		Total	Direct		Total
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Social Bases															
Gender	-.015*	.007	.013	0	.004	.017	.007*	.003	.082	.002	.003	.02	.005	.003	.082
Age	0	0	.023	0	0	-.011	0**	0	.134	0	0	.014	0*	0	-.07
Education	0	.003	.076	.005**	.002	.177	-.001	.001	.051	.004*	.001	.1	.002	.002	.059
Household income	0	.003	.036	-.002	.002	.02	.005**	.001	.091	-.001	.002	-.001	.002	.002	.053
Size of hometown	-.006	.003	-.054	.001**	.001	-.017	0	.001	.02	.001	.001	.044	.003*	.001	.048
Environmental concern[a]															
Postmaterialist values	.011	.006	.142	0	.003	.018	.003	.002	.042	.011**	.003	.133	.003	.003	.079
Knowledge	.017**	.005	.344	.009**	.003	.322	.010**	.002	.321	.011**	.002	.399	.021**	.003	.462
Everyday env. risk pp.	.006	.004	.111	.005	.002	.08	.003	.002	.053	.002	.002	.057	.003	.002	.071
Env. risk pp.	.022**	.007	.214	-.004	.005	.031	.001	.004	.043	.007*	.003	.132	.003	.003	.078
Efficacy	.047**	.008	.313	.035**	.005	.317	.041**	.004	.352	.031**	.003	.351	.024**	.003	.271
Willingness	.027**	.004	.241	.018**	.002	.23	.015**	.002	.195	.016**	.002	.215	.017**	.002	.214
Model fit statistics															
Adj. R-squared	.33			.30			.25			.37			.36		
Chi-square	14572 (3df) p=.002			1347 (3df) p=.718			37361 (3df) p=.000			2820 (3df) p=.420			12969 (3df) p=.005		
GFI	1			1			.1			1			.1		
NFI	.99			1			.99			1			.99		
RMSEA	.07			0			.08			0			.05		

(continued)

SPICUM
servicio de publicaciones

	Denmark			Finland			Germany			Israel			Japan		
	Direct		Total	Direct		Total	Direct		Total	Direct		Total	Direct		Total
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Social Bases															
Gender	-.005	.005	.066	.013**	.005	.182	.009*	.004	.081	.003	.004	.036	-.002	.003	.014
Age	0	0	.014	0	0	-.018	0	0	.016	0	0	-.048	0*	0	.124
Education	.001	.002	.039	0	.002	.089	.004*	.002	.136	.004*	.002	.148	-.003*	.001	.008
Household income	.002	.002	.051	.001	.002	.023	.004	.002	.11	.006**	.002	.12	-.002	.002	-.028
Size of hometown	0	.002	.022	.001	.002	.027	0	.002	-.019	-.002	.002	-.042	.003*	.001	.057
Environmental concern[a]															
Postmaterialist values	.01*	.005	.108	0	.004	.063	.008*	.003	.123	.011**	.003	.111	.003	.003	.04
Knowledge	.008*	.004	.283	.012**	.003	.316	.008*	.003	.272	.008**	.003	.302	.013**	.002	.36
Everyday env. risk pp.	.007**	.002	.141	.006*	.002	.154	.003	.002	.07	.007**	.002	.132	.004**	.002	.118
Env. risk pp.	.009	.005	.174	.011*	.005	.162	.019**	.005	.156	.012**	.004	.122	-.006	.003	-.01
Efficacy	.037**	.004	.338	.042**	.005	.355	.039**	.004	.338	.043**	.004	.373	.024**	.003	.309
Willingness	.034**	.003	.283	.028**	.003	.26	.03**	.003	.27	.017**	.003	.171	.014**	.002	.215
Model fit statistics															
Adj. R-squared	.31			.34			.34			.35			.27		
Chi-square	2407 (3df) p=.492			12216 (3df) p=.007			6564 (3df) p=.087			3145 (3df) p=.370			7159 (3df) p=.067		
GFI	1			.1			1			1			1		
NFI	1			.99			1			1			1		
RMSEA	0			.05			.03			.01			.03		

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SPICUM
servicio de publicaciones

	South Korea			Latvia			Mexico			New Zealand			Norway		
	Direct		Total	Direct		Total	Direct		Total	Direct		Total	Direct		Total
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Social Bases															
Gender	.004	.003	.037	0	.003	.014	-.003	.003	-.016	.006	.005	.107	-.001	.004	.088
Age	0*	0	.137	0	0	.007	0*	0	.074	0*	0	-.075	0	0	.011
Education	.002	.001	.14	0	.001	.039	.001	.001	.048	.002	.002	.094	0	.002	.058
Household income	.003*	.002	.072	.002	.001	.031	.003	.002	.063	0	.003	.005	.001	.002	.008
Size of hometown	-.002	.001	-.022	-.002	.001	.007	0	.001	.004	-.003	.002	-.026	.002	.001	.057
Environmental concern[a]															
Postmaterialist values	.002	.002	.037	-.002	.003	.004	.002	.002	.035	.017**	.005	.13	.005	.004	.105
Knowledge	.012**	.002	.373	.011**	.002	.388	.014**	.002	.276	.016**	.004	.339	.011**	.003	.287
Everyday env. risk pp.	.001	.001	.081	.002	.001	.121	.004**	.001	.058	.005	.003	.102	.008**	.002	.153
Env. risk pp.	.002	.003	.055	.001	.003	-.003	-.005	.003	.023	.032**	.005	.287	.008	.005	.192
Efficacy	.03**	.003	.349	.026**	.003	.366	.02**	.003	.205	.057**	.006	.347	.043**	.005	.331
Willingness	.02**	.002	.272	.016**	.002	.255	.016**	.001	.25	.027**	.003	.221	.03**	.003	.288
Model fit statistics															
Adj. R-squared	.33			.32			.38			.33			.33		
Chi-square	6630 (3df) p=.085			4038 (3df) p=.257			22664 (3df) p=.000			9638 (3df) p=.022			4060 (3df) p=.255		
GFI	1			1			1			1			1		
NFI	1			1			.99			1			1		
RMSEA	.03			.02			.06			.04			.02		

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SPICUM
servicio de publicaciones

	Philippine			Russia			Slovak			Slovenia			South Africa		
	Direct		Total	Direct		Total	Direct		Total	Direct		Total	Direct		Total
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Social Bases															
Gender	-.005	.004	-.04	.005*	.002	.045	-.004	.004	-.005	-.005	.003	.002	.006**	.002	.052
Age	0	0	-.005	0	0	-.023	0	0	.039	0	0	-.021	0	0	.008
Education	.004**	.001	.091	-.001	.001	.036	.005**	.002	.122	.002	.002	.129	-.001	.001	.023
Household income	.001	.002	.026	.001	.001	.035	.001	.002	.06	.007**	.002	.144	.006**	.001	.119
Size of hometown	-.004**	.001	-.074	-.002*	.001	-.031	.001	.002	0	.002	.002	.031	0	.001	.021
Environmental concern[a]															
Postmaterialist values	.005	.003	.036	.006**	.002	.098	.005	.003	.086	0	.003	.026	.004*	.002	.063
Knowledge	.009**	.002	.228	.011**	.001	.419	.016**	.003	.392	.014**	.003	.332	.01**	.002	.425
Everyday env. risk pp.	.007**	.002	.066	.002*	.001	.072	.002	.002	.076	.002	.002	.04	.002	.001	.061
Env. risk pp.	-.011**	.004	-.07	-.002	.002	.028	0	.004	.002	.003	.004	.086	-.005*	.002	-.011
Efficacy	.023**	.004	.189	.026**	.002	.374	.024**	.004	.274	.03**	.003	.278	.031**	.002	.336
Willingness	.017**	.002	.257	.01**	.001	.196	.021**	.002	.254	.016**	.002	.228	.018**	.001	.292
Model fit statistics															
Adj. R-squared	.18			.35			.33			.32			.38		
Chi-square	4902 (3df) p=.179			33565 (3df) p=.000			7912 (3df) p=.048			25396 (3df) p=.000			5601 (3df) p=.133		
GFI	1			1			1			1			1		
NFI	1			.99			1			.98			1		
RMSEA	.02			.09			.04			.08			.02		

(continued)

SPICUM
servicio de publicaciones

	Spain			Sweden			Switzerland			Turkey			Great Britain		
	Direct		Total	Direct		Total	Direct		Total	Direct		Total	Direct		Total
	B	SE	β	B	SE	β	B	SE	β	B	SE	β	B	SE	β
Social Bases															
Gender	-.003	.002	-.006	-.001	.005	.095	.006	.005	.101	-.002	.002	-.001	-.004	.005	.022
Age	0**	0	.067	0	0	.009	0**	0	.035	0	0	.069	0	0	.093
Education	.007**	.001	.208	.001	.002	.047	.013**	.002	.244	.002	.001	.141	.005**	.002	.261
Household income	.003*	.001	.059	.001	.002	.031	.003	.003	.041	.002*	.001	.071	-.003	.003	-.03
Size of hometown	-.001	.001	-.013	-.001	.002	.005	.003	.002	.028	.002*	.001	.025	.001	.003	.01
Environmental concern[a]															
Postmaterialist values	.002	.002	.062	.001	.004	.086	.013**	.005	.103	.006**	.002	.079	.003	.004	.057
Knowledge	.012**	.002	.343	.008*	.004	.311	.011*	.004	.306	.011**	.001	.376	.011**	.004	.334
Everyday env. risk pp.	.002*	.001	.075	.003	.003	.101	.009**	.003	.113	.003**	.001	.029	.009**	.003	.15
Env. risk pp.	.01**	.003	.12	.006	.005	.152	.017*	.007	.154	-.006**	.002	.006	.008	.006	.161
Efficacy	.032**	.002	.328	.054**	.005	.403	.063**	.006	.365	.026**	.002	.368	.056**	.006	.428
Willingness	.018**	.001	.221	.026**	.003	.242	.035**	.004	.247	.012**	.001	.229	.019**	.003	.192
Model fit statistics															
Adj. R-squared	. .37			.31			.40			.37			.41		
Chi-square	24194 (3df) p=.000			4351 (3df) p=.226			5374 (3df) p=.146			27392 (3df) p=.000			1397 (3df) p=.706		
GFI	1			1			1			1			1		
NFI	1			1			1			1			1		
RMSEA	.05			.02			.03			.07			.05		

(continued)

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	United States		
	Direct		Total
	B	SE	β
Social Bases			
Gender	-.008	.005	.029
Age	0	0	.016
Education	.004	.002	.102
Household income	.012**	.003	.142
Size of hometown	.001	.003	.033
Environmental concern[a]			
Postmaterialist values	.003	.004	.023
Knowledge	.015**	.003	.375
Everyday env. risk pp.	.004	.002	.083
Env. risk pp.	.015**	.005	.194
Efficacy	.047**	.005	.349
Willingness	.019**	.003	.196
Model fit statistics			
Adj. R-squared	.38		
Chi-square	10018 (3df) p=.018		
GFI	1		
NFI	1		
RMSEA	.05		

Note. In all models, we estimate the net effects of the social bases, postmaterialist values and environmental concern covariates. B = unstandardized coefficients; SE = standard errors; β = standardized coefficients.

[a]Contains the cognitive, affective and dispositional dimensions of environmental concern.

*$p < .05$. **$p < .01$.

Table 19. Summary of the relationships for the full model of environmental concern predicting private environmental behavior (PrEB)

	Pooled Model & Number of countries	Direct effect			Total effect			Category[a]
		Positive	Negative	No significant	Positive	Negative	No significant	
Social Bases								
Gender[b]	31	20	-	11	27	-	4	hard social base
Age	31	29	-	2	27	-	4	hard social base
Education	31	2	7	22	12	-	19	mixed social b.
Household income	31	2	14	15	2	9	20	mixed social b.
Size of hometown	31	4	5	22	5	3	23	diffuse social b.
Env. concern								
Postmaterialism	31	7	2	22	10	1	20	weak influence
Knowledge	31	27	-	4	31	-	-	strong influence
Everyday risk pp.	31	27	-	4	29	-	2	strong influence
Env. risk pp.	31	30	-	1	28	-	3	strong influence
Efficacy	31	31	-	-	31	-	-	strong influence
Willingness	31	31	-	-	31	-	-	strong influence

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

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

[b] Male = 0 ; female = 1.

Table 20. Summary of the relationships for the full model of environmental concern predicting public environmental behavior (PuEB)

	Pooled Model & Number of countries	Direct effect			Total effect			Category[a]
		Positive	Negative	No significant	Positive	Negative	No significant	
Social Bases								
Gender[b]	31	6	1	24	11	-	20	mixed social base
Age	31	9	-	22	9	4	18	mixed social base
Education	31	11	1	19	21	-	10	soft social base
Household income	31	10	-	21	12	-	19	mixed social base
Size of hometown	31	5	3	23	5	2	24	diffuse social base
Env. concern								
Postmaterialism	31	11	-	20	11	-	20	weak influence
Knowledge	31	31	-	-	31	-	-	strong influence
Everyday risk pp.	31	14	-	17	27	-	4	strong influence
Env. risk pp.	31	9	3	19	20	-	11	medium-strong inf.
Efficacy	31	31	-	-	31	-	-	strong influence
Willingness	31	31	-	-	31	-	-	strong influence

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

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

[b] Male = 0 ; female = 1.

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Table 21. Mediation test for private environmental behavior (PrEB) and public environmental behavior (PuEB) on the pooled model

Hypothesis	Direct B w/o Mediator	Direct β w/ Mediator	Indirect β	Sobel Test[a]	Mediation type observed[b]
Full Mediation RP-EF-PrEB	.201**	.197*	.058*	27.4100**	Partial
Full Mediation RP-WS-PrEB	.201**	.202*	.054*	28.4011**	Partial
Full Mediation PM-EF-PrEB	.065**	.025*	.070*	0.5704	Partial or no mediation (3 independent direct effects)
Full Mediation PM-WS-PrEB	.065**	.036*	.058*	2.4651**	Partial
Full Mediation KN-EF-PrEB	.158**	.126*	.195*	54.5482**	Partial
Full Mediation KN-WS-PrEB	.158**	.220*	.100*	49.6298**	Partial
Partial Mediation EF-WS-PrEB	.281**	.332*	.097*	58.5858**	Partial
Full Mediation RP-EF-PuEB	.015**	.024*	.073*	26.3565**	Partial
Full Mediation RP-WS-PuEB	.015**	.031*	.066*	30.5545**	Partial
Full Mediation PM-EF-PuEB	.023**	.087*	.081*	2.4650**	Partial
Full Mediation PM-WS-PuEB	.023**	.103*	.065*	5.9832**	Partial
Full Mediation KN-EF-PuEB	.038**	.170*	.223*	50.0685**	Partial
Full Mediation KN-WS-PuEB	.038**	.283*	.111*	75.5787**	Partial
Partial Mediation EF-WS-PuEB	.072**	.398*	.107*	44.0446**	Partial

Note. B = unstandardized beta coefficients; β = standardized beta coefficients; RP = risk perception; PM = postmaterialism; KN = knowledge; EF = efficacy; WS = willingness to sacrifice; PrEB = Private environmental behavior; PuEB = public environmental behavior.

[a]Sobel test informs whether a mediator variable significantly carries the influence of an independent variable to a dependent variable (i.e. whether the indirect effect of the independent variable on the dependent variable through the mediator variable is significant).

[b]There are four possible cases: No Mediation if indirect effect is not significant, or if direct effect of iv on mediator is insignificant, or if direct effect from mediator to Y is insignificant; Indirect Effects if both direct effects are not significant, but indirect effect is significant; Full Mediation when given the direct effects were significant prior to adding the mediator, and if indirect effect is significant and direct effect (with mediator) is not significant; Partial Mediation if direct effect (with mediator) and indirect effects are significant.

**$p < .05$. ***$p < .01$.

Table 22. Individual-level determinants of private environmental behavior (PrEB) and public environmental behavior (PuEB)

One-way ANCOVA with random effects	PrEB		PuEB	
	Model 1	Model 2	Model 1	Model 2
	B (SE)	B (SE)	B (SE)	B (SE)
Intercept	1.593***	1.593***	.452***	.451***
	(.027)	(.021)	(.005)	(.003)
Social Bases				
Gender (1 = female)	.062***	.048***	.002*	.002*
	(.004)	(.003)	(.001)	(.001)
Age	.003***	.003***	.001***	.001***
	(.000)	(.000)	(.000)	(.000)
Education	.036***	-.005***	.011***	.002***
	(.002)	(.001)	(.000)	(.000)
Household income	-.001	-.014***	.006***	.002***
	(.002)	(.002)	(.000)	(.000)
Size of hometown	.005**	-.001	.001*	.000
	(.002)	(.001)	(.000)	(.000)
Environmental concern				
Postmaterialist values		.002		.005***
		(.003)		(.001)
Knowledge of env. problems		.052***		.011***
		(.002)		(.000)
Everyday env. risk perception		.034***		.004***
		(.002)		(.000)
Environmental risk perception		.142***		.005***
		(.003)		(.001)
Efficacy		.165***		.037***
		(.003)		(.001)
Willingness to make sacrifice		.087***		.020***
		(.002)		(.000)
Intraclass correlation coefficient (ICC) (null model)	.120	.120	.103	.103
Conditional ICC (with micro-model)	.119	.112	.096	.058
Explained microvariance	3%	30%	6%	30%
Explained macrovariance	0%	34%	13%	63%

Note. PrEB = private environmental behavior; PuEB = public environmental behavior. Unstandardized coefficients. Individual-level independent variables are grand mean centered. REML estimation, n_{macro} = 30, n_{micro} = 38,543.
$^{t}p < .10$, two-tailed. $^{*}p < .05$, two-tailed. $^{**}p < .01$, two-tailed. $^{***}p < .001$, two-tailed.

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Table 23. The effects of the context on private environmental behavior (PrEB) and public environmental behavior (PuEB)

Random intercept model with level-1 covariates	PrEB B (SE)							PuEB B (SE)						
Economic Development														
GDP	.004* (.002)							.001** (.000)						
Posmaterialism		.263[t] (.138)							.055** (.017)					
Educational Development														
ENGO Density			.021 (.068)							.021* (.008)				
Education Index				.152 (.220)							.079** (.026)			
Environmental Degradation														
Water Satisfaction[a]					-.005*** (.001)							-.001*** (.000)		
Environmental Health[a]						-.005* (.002)							-.001** (.000)	
Combined Models														
"Development Index"							.049* (.020)							.011** (.002)
Explained macrovariance[b]	43%	40%	34%	34%	60%	42%	44%	74%	72%	69%	72%	79%	72%	79%

Note. PrEB = private environmental behavior; PuEB = public environmental behavior. Unstandardized coefficients. Individual-level independent variables are grand mean centered (not shown). Each national variable is included one at a time and each coefficient comes from a separate model. REML estimation, $n_{macro} = 30$, $n_{micro} = 38{,}543$.

[a]Reversed values.

[b]Compositional effect explain 34% of the macrovariance for PrEB and 63% for PuEB (see micro-model on Table 1).

[t]$p < .10$, two-tailed. *$p < .05$, two-tailed. **$p < .01$, two-tailed. ***$p < .001$, two-tailed.

Table 24. Cross-level interactions of different attitudinal-behavior slopes and development index

Slopes as outcomes model	PrEB	PuEB
	B (SE)	B (SE)
Knowledge-behavior slope	.147***	.037***
	(.023)	(.001)
Knowledge X development index	.006	.008***
	(.007)	(.001)
Everyday environmental risk-behavior slope	.092***	.015***
	(.005)	(.001)
Everyday env. risk X development index	.018**	.006***
	(.005)	(.001)
Environmental risk-behavior slope	.255***	.031***
	(.012)	(.002)
Environmental risk X development index	.046**	.018***
	(.012)	(.002)
Postmaterialist value-behavior slope	.0454***	.0177***
	(.008)	(.002)
Postmaterialist X development index	.0033	.0057**
	(.008)	(002)
Efficacy-behavior slope	.273***	.063***
	(.013)	(.003)
Efficacy X development index	.012	.016***
	(.013)	(.003)
Willingness to make sacrifice-behavior slope	.157***	.037***
	(.005)	(.001)
Willingness X development index	.017**	.010***
	(.005)	(.001)

Note. PrEB = private environmental behavior; PuEB = public environmental behavior. Unstandardized coefficients. Individual-level independent variables are group mean centered and entered only one at a time as covariates. REML estimation, $n_{macro} = 30$, $n_{micro} = 38{,}543$.
$^{t}p < .10$, two-tailed. $^{*}p < .05$, two-tailed. $^{**}p < .01$, two-tailed. $^{***}p < .001$, two-tailed.

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Appendix B. Figures

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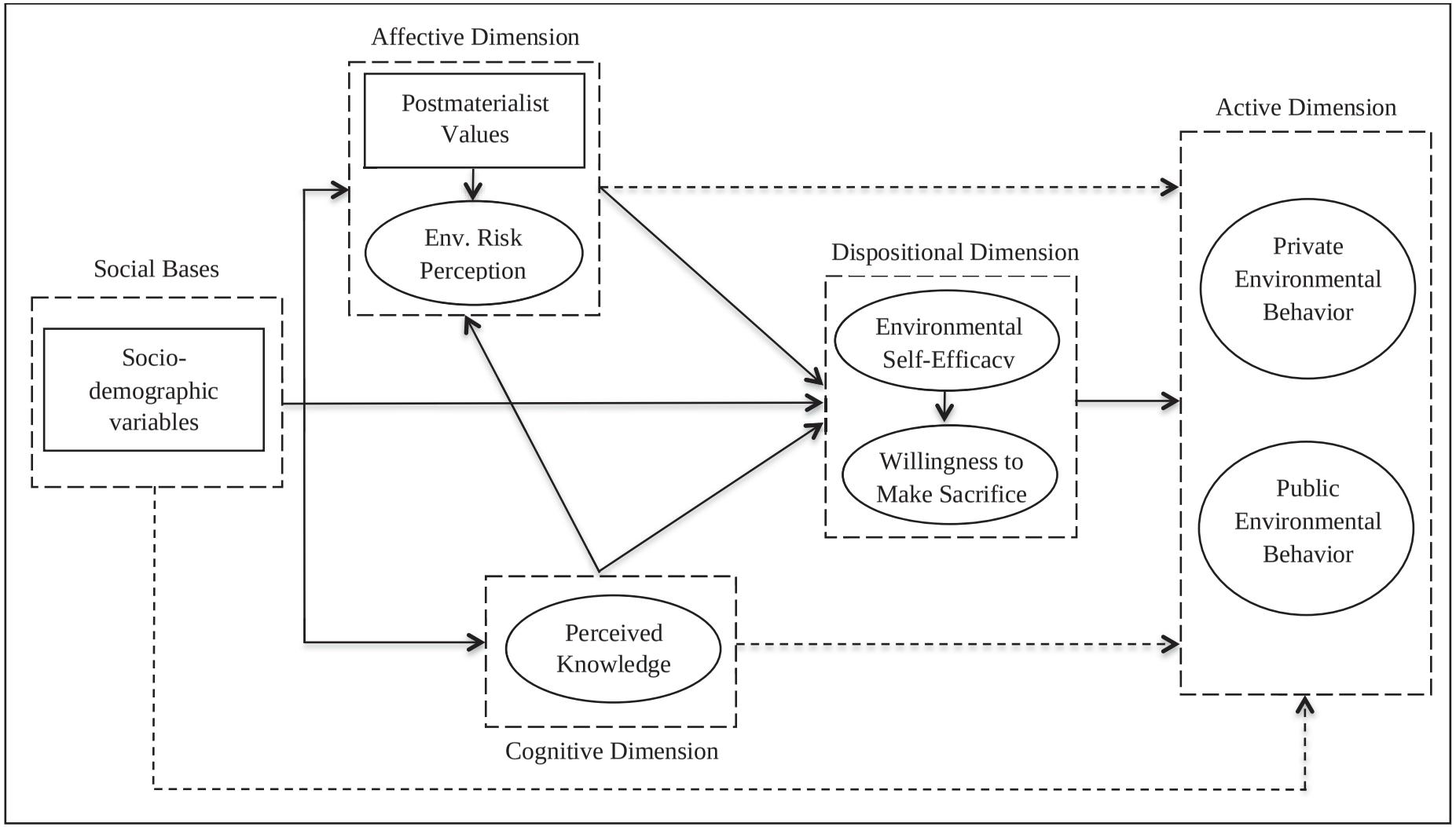

Figure 1. Proposed path model of environmental behaviors predicted by the social bases and others environmental concern dimensions

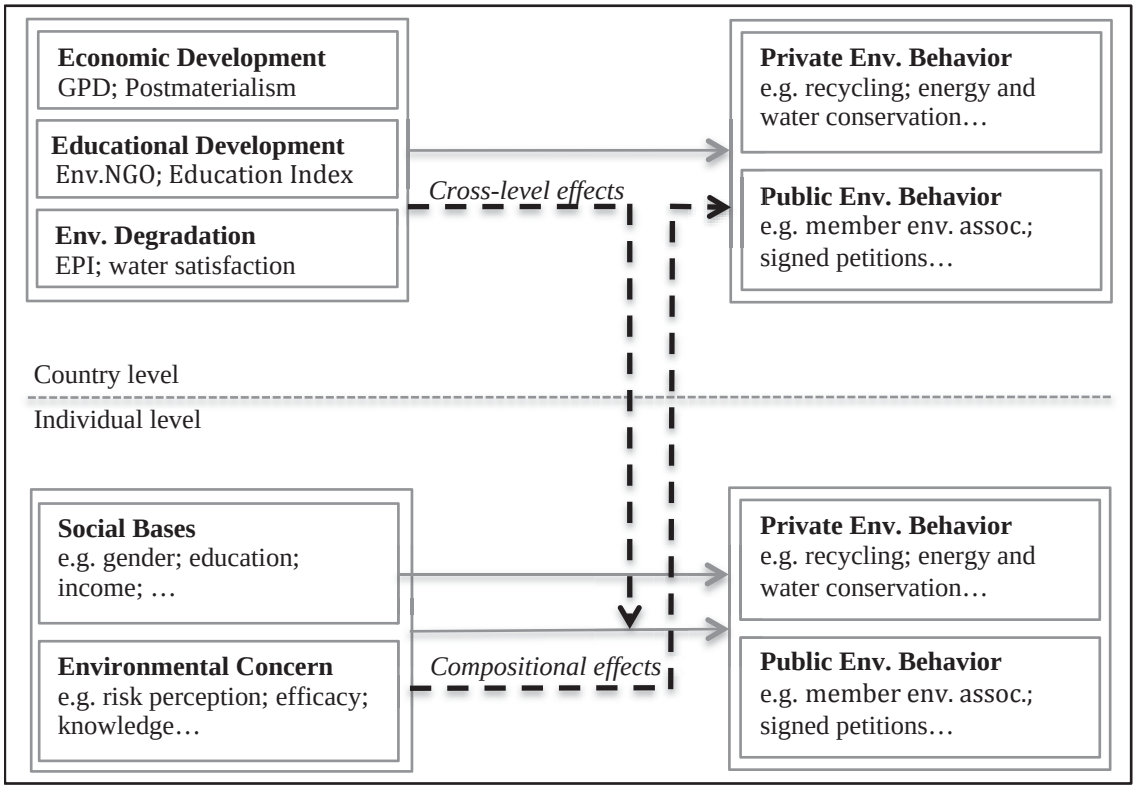

Figure 2. Multi-level theoretical framework

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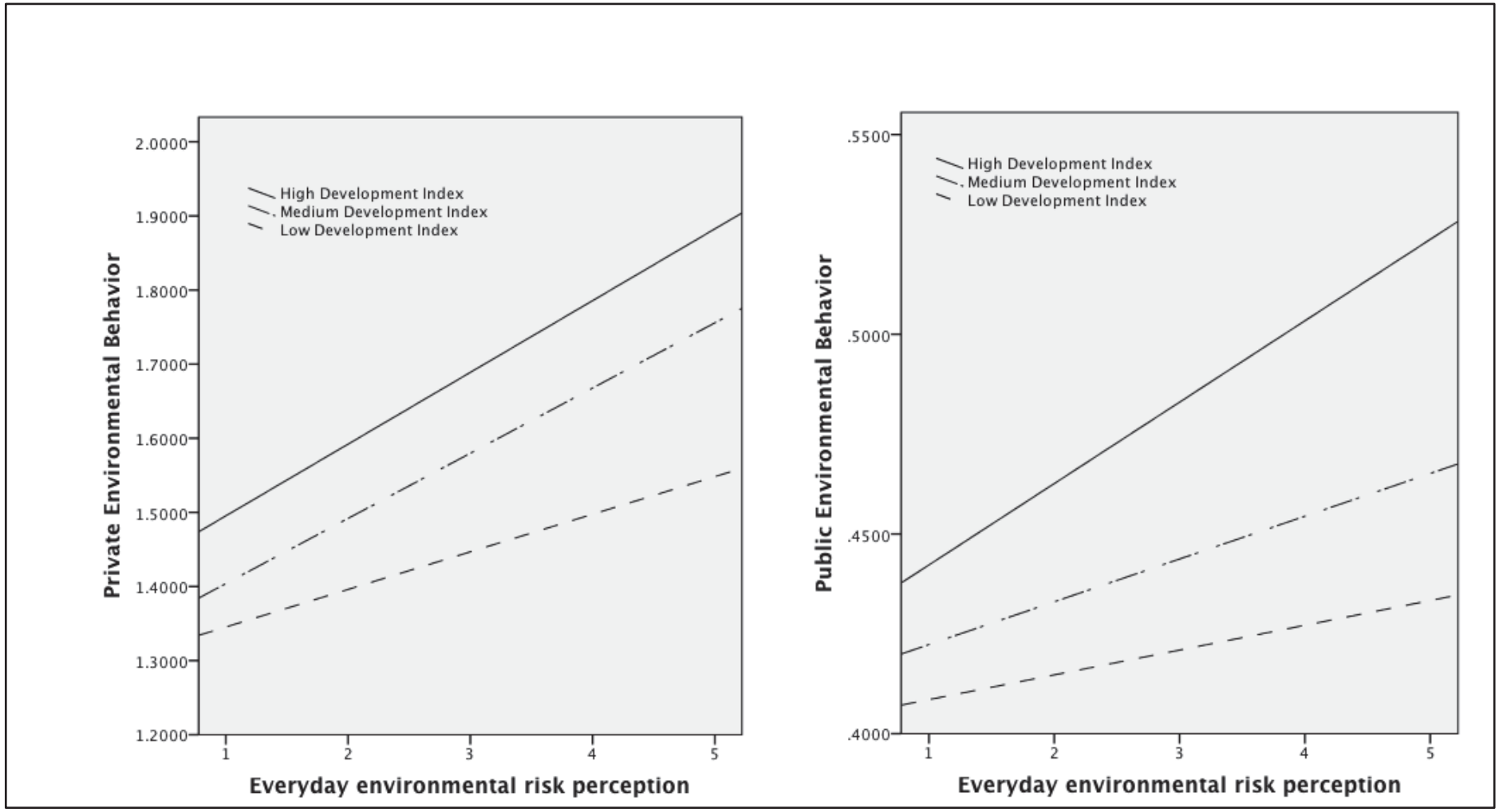

Figure 3. Slopes relating everyday environmental risk perception to environmental behaviors by level of Development

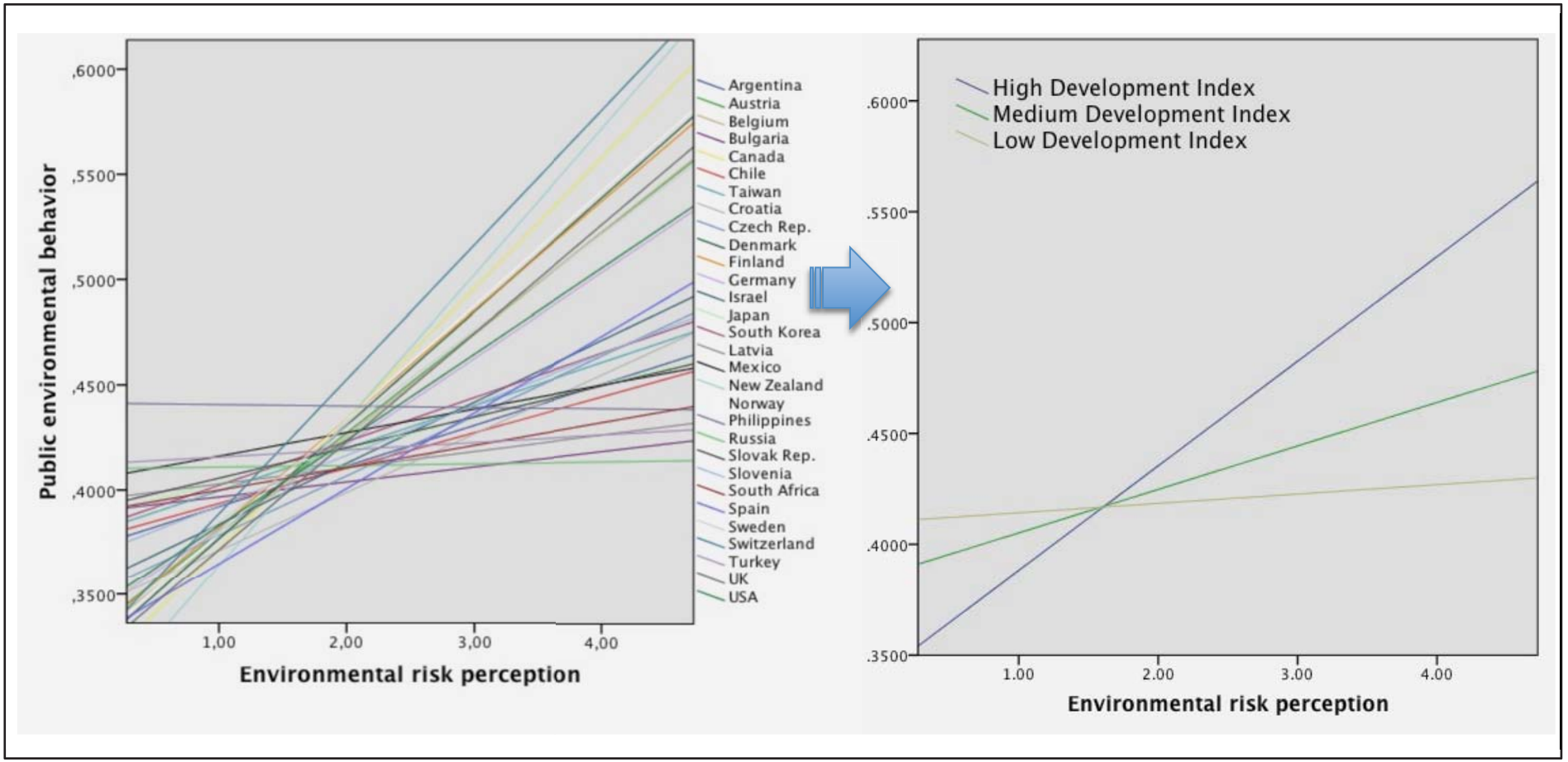

Figure 4. Slopes relating environmental risk perception to public environmental behavior (PuEB) by level of development.

Appendix C. Questionnaire

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ISSP 2010 Module on Environment

Final questionnaire July 2009

1 All notes which are not part of the questionnaire are enclosed in pointed brackets, e.g. **<ISSP 1993 Q2, V5-6>**.

2 For repeat items, the relevant question numbers from 1993/2000 are given in pointed brackets above the question text. New items are indicated by <NEW>.

3 Where items are new to the environment module, but have previously been used in other ISSP modules this is noted. Countries should ensure that their translation for these questions matches that used on any previous occasion(s) when the questions were fielded.

4 Where **[COUNTRY]** appears in the question text, members should insert the name of their country

5 The questionnaire is laid out for self-completion administration. Some of the wording will need to be altered for interviewer administered interviewing. e.g.3a. Looking at the list below, please tick a box next to the one thing …
For interviewer administered interviewing, please make sure that show cards are used to list answer options, particularly at Q1 and Q7.

6 Translation notes for repeat questions are intended for those countries which did not take part in the 1993 or 2000 ISSP. Others should repeat their wording from the 1993/2000 survey.
Note that questions 14e and optional item a) are counted as new items and all countries should refer to the accompanying translation note.

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<NEW>

1a. Which of these issues is the **most important** for **[COUNTRY]** today?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Health care	☐	(1)
Education	☐	(2)
Crime	☐	(3)
The environment	☐	(4)
Immigration	☐	(5)
The economy	☐	(6)
Terrorism	☐	(7)
Poverty	☐	(8)
None of these	☐	(9)
Can't choose	☐	(98)

b. Which is the **next most important**?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Health care	☐	(1)
Education	☐	(2)
Crime	☐	(3)
The environment	☐	(4)
Immigration	☐	(5)
The economy	☐	(6)
Terrorism	☐	(7)
Poverty	☐	(8)
None of these	☐	(9)
Can't choose	☐	(98)

<Q1 Answer option 6 "The economy" should capture all aspects of the economy rather than single issues such as unemployment or inflation>

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<ISSP 1993 Q2, 2000 Q1>

2. How much do you agree or disagree with each of these statements?

*PLEASE TICK **ONE** BOX ON EACH LINE*	**Agree strongly**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Disagree strongly**	**Can't choose**
a. Private enterprise is the best way to solve [**COUNTRY'S]** economic problems	☐	☐	☐	☐	☐	☐
b. It is the responsibility of the government to reduce the differences in income between people with high incomes and those with low incomes	☐	☐	☐	☐	☐	☐
	(1)	(2)	(3)	(4)	(5)	(8)

<ISSP 1993 Q3, 2000 Q2>

3a. Looking at the list below, please tick a box next to the **one** thing you think should be [**COUNTRY'S] highest priority**, the most important thing it should do.

*PLEASE TICK **ONE** BOX ONLY*

[COUNTRY] should ...	**Highest priority (✓)**	
Maintain order in the nation	☐	(1)
Give people more say in government decisions	☐	(2)
Fight rising prices	☐	(3)
Protect freedom of speech	☐	(4)
Can't choose	☐	(8)

b. And which **one** do you think should be [**COUNTRY'S**] **next highest priority**, the second most important thing it should do?

*PLEASE TICK **ONE** BOX ONLY*

[COUNTRY] should...	**Next highest priority (✓)**	
Maintain order in the nation	☐	(1)
Give people more say in government decisions	☐	(2)
Fight rising prices	☐	(3)
Protect freedom of speech	☐	(4)
Can't choose	☐	(8)

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<NEW> A version of Q4a (though with a different answer scale) was asked in the 2008 Religion module (v7), in the 2007 Sport and Leisure module (v14a), and in the 22004 Citizenship module (v43).
A version of Q4b (though with a different answer scale) was asked in the 2004 Citizenship module (v42)

4a. Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people?
Please tick one box to show what you think, where 1 means you can't be too careful and 5 means most people can be trusted.

*PLEASE TICK **ONE** BOX ONLY*

You can't be too careful				Most people can be trusted	Can't choose
1	2	3	4	5	
☐	☐	☐	☐	☐	☐
(1)	(2)	(3)	(4)	(5)	(8)

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b. Generally speaking, do you think that most people would try to take advantage of you if they got the chance, or would they try to be fair?
Please tick one box to show what you think, where 1 means most people would try to take advantage of you and 5 means that most people would try to be fair.

*PLEASE TICK **ONE** BOX ONLY*

Most people would try to take advantage				Most people would try to be fair	Can't choose
1	2	3	4	5	
☐	☐	☐	☐	☐	☐
(1)	(2)	(3)	(4)	(5)	(8)

<NEW> Q5a and b were asked in the 2004 citizenship module (v40 & 41)

5. To what extent do you agree or disagree with the following statements?

*PLEASE TICK **ONE** BOX ON EACH LINE*	Agree strongly	Agree	Neither agree nor disagree	Disagree	Disagree strongly	Can't choose
a. Most of the time we can trust people in government to do what is right	☐	☐	☐	☐	☐	☐
b. Most politicians are in politics only for what they can get out of it personally	☐	☐	☐	☐	☐	☐
	(1)	(2)	(3)	(4)	(5)	(8)

<Q5a "government" refers to the regime (i.e. any government that has been elected into power). In some countries the meaning of the question can be improved by adding "of any party" after "government" to stress that it does not necessarily have to be the current government>.

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<NEW>

6. Generally speaking, how concerned are you about environmental issues?
Please tick one box below to indicate what you think, where 1 means you are not at all concerned and 5 means you are very concerned.

*PLEASE TICK **ONE** BOX ONLY*

Not at all concerned				**Very concerned**	**Can't choose**
1	**2**	**3**	**4**	**5**	
☐	☐	☐	☐	☐	☐
(1)	(2)	(3)	(4)	(5)	(8)

<Q6. By "concerned about" we mean being worried about environmental issues. "Concern" should not Imply involvement with environmental pressure groups.>

<NEW>

7. Here is a list of some different environmental problems.
a) Which problem, if any, do you think is the most important **for [COUNTRY] as a whole**?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)
Air pollution	☐ (1)
Chemicals and pesticides	☐ (2)
Water shortage	☐ (3)
Water pollution	☐ (4)
Nuclear waste	☐ (5)
Domestic waste disposal	☐ (6)
Climate change	☐ (7)
Genetically modified foods	☐ (8)
Using up our natural resources	☐ (9)
None of these	☐ (10)
Can't choose	☐ (98)

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<NEW>

b) Which problem, if any, **affects you and your family** the most?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Air pollution	☐	(1)
Chemicals and pesticides	☐	(2)
Water shortage	☐	(3)
Water pollution	☐	(4)
Nuclear waste	☐	(5)
Domestic waste disposal	☐	(6)
Climate change	☐	(7)
Genetically modified foods	☐	(8)
Using up our natural resources	☐	(9)
None of these	☐	(10)
Can't choose	☐	(98)

<Q7 Code 6 "Domestic waste disposal" means disposal of household waste/garbage. Code 9 "Natural resources" could include both non-renewable sources such as coal or oil as well as other natural resources such as wood or water. >

<NEW>

8a. How much do you feel you know about the **causes** of these sorts of environmental problems? Please tick one box below to indicate what you think, where 1 indicates you feel you know nothing at all and 5 indicates you feel you know a great deal.

*PLEASE TICK **ONE** BOX ONLY*

Know nothing at all				**Know a great deal**	**Can't choose**
1	**2**	**3**	**4**	**5**	
☐	☐	☐	☐	☐	☐
(1)	(2)	(3)	(4)	(5)	(8)

b. And how much do you feel you know about **solutions** to these sorts of environmental problems?
Please tick one box below to indicate what you think, where 1 indicates you feel you know nothing at all and 5 indicates you feel you know a great deal.

*PLEASE TICK **ONE** BOX ONLY*

Know nothing at all				**Know a great deal**	**Can't choose**
1	**2**	**3**	**4**	**5**	
☐	☐	☐	☐	☐	☐
(1)	(2)	(3)	(4)	(5)	(8)

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**<Q8a The phrase "These sorts of environmental problems" is designed to make people think back to the types of issues raised at Q7 but without restricting attention to any one environmental problem.
Q8b "solutions" includes all possible/potential solutions, not just solutions which might currently be being implemented in your country>.**

<ISSP 1993 Q4 abd, 2000 Q3>

9. How much do you agree or disagree with each of these statements?

*PLEASE TICK **ONE** BOX ON EACH LINE*	**Agree strongly**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Disagree strongly**	**Can't choose**
a. We believe too often in science, and not enough in feelings and faith	☐	☐	☐	☐	☐	☐
b. Overall, modern science does more harm than good	☐	☐	☐	☐	☐	☐
c. Modern science will solve our environmental problems with little change to our way of life	☐	☐	☐	☐	☐	☐
	(1)	(2)	(3)	(4)	(5)	(8)

<9a By 'feelings and faith' we mean emotions and religious beliefs>

<ISSP 1993 Q5 ab Q6a, 2000 Q4>

10. And how much do you agree or disagree with each of these statements?

*PLEASE TICK **ONE** BOX ON EACH LINE*	**Agree strongly**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Disagree strongly**	**Can't choose**
a. We worry too much about the future of the environment and not enough about prices and jobs today	☐	☐	☐	☐	☐	☐
b. Almost everything we do in modern life harms the environment	☐	☐	☐	☐	☐	☐
c. People worry too much about human progress harming the environment	☐	☐	☐	☐	☐	☐
	(1)	(2)	(3)	(4)	(5)	(8)

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<ISSP 1993 Q6cf, 2000 Q5 acd>

11. And please tick one box for each of **these** statements to show how much you agree or disagree with it.

*PLEASE TICK **ONE** BOX ON EACH LINE*	**Agree strongly**	**Agree**	**Neither agree nor disagree**	**Disagree**	**Disagree strongly**	**Can't choose**
a. In order to protect the environment **[COUNTRY]** needs economic growth	☐	☐	☐	☐	☐	☐
b. Economic growth always harms the environment	☐	☐	☐	☐	☐	☐
c. The earth simply cannot continue to support population growth at its present rate	☐	☐	☐	☐	☐	☐
	(1)	(2)	(3)	(4)	(5)	(8)

<ISSP 1993 Q8, 2000 Q7>

12a. How willing would **you** be to pay **much higher <u>prices</u>** in order to protect the environment?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Very willing	☐	(1)
Fairly willing	☐	(2)
Neither willing nor <u>un</u>willing	☐	(3)
Fairly <u>un</u>willing	☐	(4)
Very <u>un</u>willing	☐	(5)
Can't choose	☐	(8)

b. And how willing would **you** be to pay **much higher <u>taxes</u>** in order to protect the environment?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Very willing	☐	(1)
Fairly willing	☐	(2)
Neither willing nor <u>un</u>willing	☐	(3)
Fairly <u>un</u>willing	☐	(4)
Very <u>un</u>willing	☐	(5)
Can't choose	☐	(8)

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c. And how willing would **you** be to **accept cuts in your standard of living** in order to protect the environment?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Very willing	☐	(1)
Fairly willing	☐	(2)
Neither willing nor unwilling	☐	(3)
Fairly unwilling	☐	(4)
Very unwilling	☐	(5)
Can't choose	☐	(8)

<ISSP 1993 Q9 ab, 2000 Q8
2 NEW ITEMS: 13f, g>

13. How much do you agree or disagree with each of these statements?

*PLEASE TICK **ONE** BOX ON EACH LINE*

	Agree strongly	Agree	Neither agree nor disagree	Disagree	Disagree strongly	Can't choose
a. It is just too difficult for someone like me to do much about the environment	☐	☐	☐	☐	☐	☐
b. I do what is right for the environment, even when it costs more money or takes more time	☐	☐	☐	☐	☐	☐
c. There are more important things to do in life than protect the environment	☐	☐	☐	☐	☐	☐
d. There is no point in doing what I can for the environment unless others do the same	☐	☐	☐	☐	☐	☐
e. Many of the claims about environmental threats are exaggerated	☐	☐	☐	☐	☐	☐
f. I find it hard to know whether the way I live is helpful or harmful to the environment	☐	☐	☐	☐	☐	☐
g. Environmental problems have a direct effect on my everyday life	☐	☐	☐	☐	☐	☐
	(1)	(2)	(3)	(4)	(5)	(8)

<13c This is an idiom which means in British English that the person has higher priorities in life than environmentally friendly behaviour>

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<ISSP 1993 Q12a Q13a Q14a Q15a Q16a, 2000 Q10a Q11 Q12b

1 NEW ITEM: 14e
Note required change of wording since inclusion in 2000 survey (as v12a) - "climate change" >

14a. In general, do you think that **air pollution caused by cars** is ...

*PLEASE TICK **ONE** BOX ONLY* (✓)

... extremely dangerous for the environment, ☐ (1)

very dangerous, ☐ (2)

somewhat dangerous, ☐ (3)

not very dangerous, ☐ (4)

or, not dangerous at all for the environment? ☐ (5)

Can't choose ☐ (8)

b. In general, do you think that **air pollution caused by industry** is ...

*PLEASE TICK **ONE** BOX ONLY* (✓)

... extremely dangerous for the environment, ☐ (1)

very dangerous, ☐ (2)

somewhat dangerous, ☐ (3)

not very dangerous, ☐ (4)

or, not dangerous at all for the environment? ☐ (5)

Can't choose ☐ (8)

c. And do you think that **pesticides and chemicals used in farming** are ...

*PLEASE TICK **ONE** BOX ONLY* (✓)

... extremely dangerous for the environment, ☐ (1)

very dangerous, ☐ (2)

somewhat dangerous, ☐ (3)

not very dangerous, ☐ (4)

or, not dangerous at all for the environment? ☐ (5)

Can't choose ☐ (8)

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d. And do you think that **pollution of COUNTRY'S rivers, lakes and streams** is ...

*PLEASE TICK **ONE** BOX ONLY* (✓)

... extremely dangerous for the environment, ☐ (1)

very dangerous, ☐ (2)

somewhat dangerous, ☐ (3)

not very dangerous, ☐ (4)

or, not dangerous at all for the environment? ☐ (5)

Can't choose ☐ (8)

14e. In general, do you think that **a rise in the world's temperature caused by climate change** is ...

*PLEASE TICK **ONE** BOX ONLY* (✓)

... extremely dangerous for the environment, ☐ (1)

very dangerous, ☐ (2)

somewhat dangerous, ☐ (3)

not very dangerous, ☐ (4)

or, not dangerous at all for the environment? ☐ (5)

Can't choose ☐ (8)

f. And do you think that **modifying the genes of certain crops** is ...

*PLEASE TICK **ONE** BOX ONLY* (✓)

... extremely dangerous for the environment, ☐ (1)

very dangerous, ☐ (2)

somewhat dangerous, ☐ (3)

not very dangerous, ☐ (4)

or, not dangerous at all for the environment? ☐ (5)

Can't choose ☐ (8)

g. And do you think that **nuclear power stations** are...

*PLEASE TICK **ONE** BOX ONLY* (✓)

... extremely dangerous for the environment, ☐ (1)

very dangerous, ☐ (2)

somewhat dangerous, ☐ (3)

not very dangerous, ☐ (4)

or, not dangerous at all for the environment? ☐ (5)

Can't choose ☐ (8)

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<14a "Industry" refers to large-scale industry, but avoid using the adjective in the translation
14e In a change from 1993/2000 this question now talks about "climate change" rather than the greenhouse effect/global warming. All countries should translate this question to refer to "climate change" (or the nearest equivalent) even if they previously used a different term.
14f "Modifying the genes" refers to actual alteration of a crop's genetic structure>

<ISSP 1993 Q18, 2000 Q13>

15a. If you had to choose, which **one** of the following would be closest to your views?

*PLEASE TICK **ONE** BOX ONLY*

(✓)

Government should let **ordinary people** decide for themselves how to protect the environment, even if it means they don't always do the right thing ☐ (1)

OR

Government should pass laws to make **ordinary people** protect the environment, even if it interferes with people's rights to make their own decisions ☐ (2)

Can't choose ☐ (8)

b. And which **one** of the following would be closest to your views?

*PLEASE TICK **ONE** BOX ONLY*

(✓)

Government should let **businesses** decide for themselves how to protect the environment, even if it means they don't always do the right thing ☐ (1)

OR

Government should pass laws to make **businesses** protect the environment, even if it interferes with businesses' rights to make their own decisions ☐ (2)

Can't choose ☐ (8)

<Q15a and 15b Here "government" refers to the regime (i.e. any government that has been elected into power). In some countries the meaning of the question can be improved by adding "of any party" after "government" to stress that it does not necessarily have to be the current government.
15a "Ordinary people" refers to people in general or the ordinary citizen.
15b "Business" refers to large-scale business, but avoid using the adjective in the translation>

<ISSP 2000 Q14>

16. Some countries are doing more to protect the world environment than other countries are. In general, do you think that **[COUNTRY]** is doing ...

*PLEASE TICK **ONE** BOX ONLY*

(✓)

... more than enough, ☐ (1)

about the right amount, ☐ (2)

or, too little? ☐ (3)

Can't choose ☐ (8)

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<NEW>

17a. Which of these approaches do you think would be the best way of getting **business and industry** in **[COUNTRY]** to protect the environment?

*PLEASE TICK **ONE** BOX ONLY* (✓)

- Heavy fines for businesses that damage the environment ☐ (1)
- Use the tax system to reward businesses that protect the environment ☐ (2)
- More information and education for businesses about the advantages of protecting the environment ☐ (3)
- Can't choose ☐ (8)

b. Which of these approaches do you think would be the best way of getting **people and their families** in **[COUNTRY]** to protect the environment?

*PLEASE TICK **ONE** BOX ONLY* (✓)

- Heavy fines for people who damage the environment ☐ (1)
- Use the tax system to reward people who protect the environment ☐ (2)
- More information and education for people about the advantages of protecting the environment ☐ (3)
- Can't choose ☐ (8)

<Q17a "Business and industry" refers to large-scale business and industry, but avoid using the adjective in the translation>

<NEW>

18. To which of the following should **[COUNTRY]** give priority in order to meet its future energy needs?

*PLEASE TICK **ONE** BOX ONLY* (✓)

- Coal, oil and natural gas ☐ (1)
- Nuclear power ☐ (2)
- Solar, wind or water power ☐ (3)
- Fuels made from crops ☐ (4)
- None of them ☐ (5)
- Can't choose ☐ (8)

< Q18 "Fuels made from crops" refers to fuel made from agricultural crops grown specifically for fuel">

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<ISSP 2000 Q16>

19. How much do you agree or disagree with each of these statements?

*PLEASE TICK **ONE** BOX ON EACH LINE*	Agree strongly	Agree	Neither agree nor disagree	Disagree	Disagree strongly	Can't choose
a. For environmental problems, there should be international agreements that **[COUNTRY]** and other countries should be made to follow	☐	☐	☐	☐	☐	☐
b. Poorer countries should be expected to make less effort than richer countries to protect the environment	☐	☐	☐	☐	☐	☐
c. Economic progress in **[COUNTRY]** will slow down unless we look after the environment better	☐	☐	☐	☐	☐	☐
	(1)	(2)	(3)	(4)	(5)	(8)

<ISSP 1993 Q19 abd, 2000 Q19
3 NEW ITEMS 20 d,e,f >

20. How often do you make a special effort to **sort glass or tins or plastic or newspapers and so on for recycling**?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Always	☐	(1)
Often	☐	(2)
Sometimes	☐	(3)
Never	☐	(4)
(Recycling not available where I live)	☐	(8)

b. How often do you make a special effort to **buy fruit and vegetables grown without pesticides or chemicals**?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Always	☐	(1)
Often	☐	(2)
Sometimes	☐	(3)
Never	☐	(4)
(Not available where I live)	☐	(8)

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c. And how often do you **cut back on driving a car for environmental reasons**?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Always	☐	(1)
Often	☐	(2)
Sometimes	☐	(3)
Never	☐	(4)
(I do not have or cannot drive a car)	☐	(8)

d. How often do you **reduce the energy or fuel you use at home for environmental reasons**?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Always	☐	(1)
Often	☐	(2)
Sometimes	☐	(3)
Never	☐	(4)

e. And how often do you **choose to save or re-use water for environmental reasons**?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Always	☐	(1)
Often	☐	(2)
Sometimes	☐	(3)
Never	☐	(4)

f. And how often do you **avoid buying certain products for environmental reasons**?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Always	☐	(1)
Often	☐	(2)
Sometimes	☐	(3)
Never	☐	(4)

<Q20f "Avoid buying" refers to taking a decision deliberately not to buy certain products for the sake of the environment>

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<ISSP 1993Q20, 2000 Q20>

21. Are you a member of any group whose main aim is to preserve or protect the environment?

*PLEASE TICK **ONE** BOX ONLY*

	(✓)	
Yes	☐	(1)
No	☐	(2)

<ISSP 1993 Q21, 2000 Q21>

22. In the last **five years**, have you ...
*PLEASE TICK **ONE** BOX ON EACH LINE*

	Yes I have	**No I have not**
a. ... signed a petition about an environmental issue?	☐	☐
b. ... given money to an environmental group?	☐	☐
c. ... taken part in a protest or demonstration about an environmental issue?	☐	☐
	(1)	(2)

<Q22b Environmental group includes NGOs and lobby groups>

OPTIONAL ITEMS

2 NEW ITEMS – note required change of wording since inclusion in 2000 survey (as v9e, f) - "climate change"

For each statement below, just tick the box that comes closest to your opinion of how true it is.

*PLEASE TICK **ONE** BOX ON EACH LINE* **In your opinion, how true is this?**	**Definitely true**	**Probably true**	**Probably not true**	**Definitely not true**	**Can't choose**
a. 'Climate change is caused by a hole in the earth's atmosphere'	☐	☐	☐	☐	☐
b. 'Every time we use coal or oil or gas, we contribute to climate change'	☐	☐	☐	☐	☐
	(1)	(2)	(3)	(4)	(8)

<Optional item (a) is false.
Optional item (b) is true. The word "contribute" here is not meant to imply a positive contribution; rather it is used in the sense of "have an effect on">
In a change from 1993/2000 these questions should now refer to "climate change" rather than the greenhouse effect/global warming. All countries should translate this questions to refer to "climate change" (or the nearest equivalent) even if they previously used a different term.>

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