PREDICTING PROENVIRONMENTAL BEHAVIOR CROSS-NATIONALLY
Values, the Theory of Planned Behavior, and Value-Belief-Norm Theory

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ABSTRACT: This article builds on Ajzen's theory of planned behavior and on Stern et al.'s value-belief-norm theory to propose and test a model that predicts proenvironmental behavior. In addition to relationships between beliefs, attitudes, and behaviors, we incorporate Inglehart's postmaterialist and Schwartz's harmony value dimensions as contextual antecedents at the national level. Structural equation modeling analyses of a 27-country sample provide almost full support for the mediation model. Postmaterialistic values, but not harmony, affect environmental concern; in turn, environmental concern, perceived threat, and perceived behavioral control affect willingness to sacrifice, which then affects a variety of proenvironmental behaviors. The findings emphasize the contribution of cultural conditions to the shaping of individuals' actions vis-à-vis environmental issues, alongside individual-level social-psychological variables.

Keywords: *proenvironmental behavior; value-belief-norm theory; theory of planned behavior; environmental attitudes*

In an attempt to further our understanding of the factors that predict proenvironmental concern and behaviors, the present article extends Ajzen's (1991) theory of planned behavior and in addition to personal-level attitudes

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also considers culture-level values to help explain variations in proenvironmental concerns and behaviors in a large cross-national sample.

The literature on proenvironmental behavior consists of two major streams: one that focuses on sociodemographic variables and the other on social-psychological constructs (Dietz, Stern, & Guagnano, 1998). A number of studies of the first stream showed consistent effects for education and age and yet weaker and less consistent effects for other variables (Dietz et al. 1998; Jones & Dunlap, 1992; Van Liere & Dunlap, 1980). Furthermore, as noted in Buttel's (1987) review of environmental sociology research, social structural variables in general "explain only modest levels of variance . . . in measures of environmental concern" (p. 473). This conclusion is repeated in Dietz et al.'s (1998) more recent account of the various bases of environmental concern.

Studies of the second stream, within which we situate the present study, that employed social-psychological constructs such as values, attitudes, and beliefs have been more successful in predicting proenvironmental behaviors (Boldero, 1995). These works (e.g., Guagnano, Stern, & Dietz, 1995; Heberlein & Black, 1981; Taylor & Todd, 1995) are based on the premise that individuals' behavior toward the environment should have something to do with what they feel and think with respect to the environment and with respect to proenvironmental action. Several of these works have therefore employed Ajzen's (1985, 1991) theory of planned behavior that aims to link attitudes with behaviors.

THE THEORY OF PLANNED BEHAVIOR

The theory of planned behavior has evolved as an extension of Fishbein and Ajzen's (1975; Ajzen & Fishbein, 1980) theory of reasoned action, which aims not only to predict behaviors from attitudes but also to explain the process through which the two are linked. Since its inception, the theory has been applied to a large variety of contexts such as leisure participation (Ajzen & Driver, 1991), sexual behavior (Boldero, Moore, & Rosenthal, 1992; Wilson, Zenda, McMaster, & Lavelle, 1992), driving (Parker, 1992), health-related practices (Black & Babrow, 1991), and recently proenvironmental behaviors (e.g., Cheung, Chan, & Wong, 1999; Stern, Dietz, Kalof, & Guagnano, 1995; Taylor & Todd, 1995, 1997).

According to the theory, the most proximal predictors of behavior are behavioral intentions, which in turn are anteceded by (a) the extent to which individuals hold a favorable attitude toward the behavior, (b) individuals' perceptions of the norms and conventions regarding the behavior (i.e., subjective norms), and (c) the extent to which the individual perceives the

behavior at hand to be under his or her personal control (i.e., perceived behavioral control). The latter relates to an individual's belief that his or her behavior will successfully promote desired goals.

Several studies have demonstrated the theory's value in predicting proenvironmental behaviors (e.g., Boldero, 1995; Sparks & Shepherd, 1992; Taylor & Todd, 1995, 1997). For example, Boldero (1995) found that intentions to recycle newspapers directly predicted actual recycling and that attitudes toward recycling predicted the recycling intentions. In another study, attitudes toward green consumerism, subjective norms, and perceived control were all significantly related to individuals' intentions to consume organic vegetables (Sparks & Shepherd, 1992). Also in line with the theory, Taylor and Todd (1995) found that both attitudes toward recycling and perceived behavioral control were positively related to individuals' recycling and composting intentions. In another study, Cheung et al. (1999) found all three predictor variables (i.e., attitudes, norms, and perceived behavioral control) to predict intentions to recycle wastepaper and in turn recycling intentions predicted actual recycling behavior.

In a recent series of articles, Stern and colleagues (e.g., Stern, 2000; Stern, Dietz, Abel, Guagnano, & Kalof, 1999; Stern, Dietz, & Guagnano, 1995; Stern, Dietz, Kalof, et al., 1995) applied a version of Schwartz's (1977, 1973) moral norm-activation theory and developed and tested the value-belief-norm (VBN) theory of environmentalism—a conceptual framework to explain environmentally significant individual behavior. According to the theory, proenvironmental behaviors stem from acceptance of particular personal values, from beliefs that things important to those values are under threat, and from beliefs that actions initiated by the individual can help alleviate the threat and restore the values (Stern et al., 1999). In line with Ajzen's (1991) notion that beliefs antecede behavioral intentions, which in turn antecede actual behavior, Stern and colleagues demonstrate a causal process in which environmental beliefs (e.g., adverse consequences for valued objects, perceived ability to reduce threat) antecede behavioral norms (i.e., intentions), which in turn antecede actual proenvironmental behaviors such as participating in proenvironmental demonstrations or donating money for environmental groups. VBN adds to Ajzen's causal chain by demonstrating that environmental beliefs are anteceded by personal values (e.g., altruistic values, egoistic values).

The theoretical value of these findings notwithstanding, they are based on simple regression analyses. Where path models are hypothesized, some form of path analysis is required to truly demonstrate mediation effects. If it is hypothesized that B mediates the relationship between A and C (i.e., A $\rightarrow$ B $\rightarrow$ C), it is not enough to show links between A and B and between B and C

(Baron & Kenny, 1986). The present article employs a large multinational sample that allows for the implementation of structural equation modeling (SEM) analyses, which are optimal for testing such mediation models. Furthermore, this present article goes beyond models based on Ajzen's (1991) and Schwartz's (1977) theories by incorporating the broader context within which personal-level attitudes and behaviors are formed, namely the cultural context. Thus, we propose a model that presents harmony (Schwartz, 1994) and postmaterialism (Inglehart, 1977)—two nation-level values—as preceding individual-level environmental attitudes and behaviors.

CONTEXT, ATTITUDES, AND PROENVIRONMENTAL BEHAVIORS

Intra-individual processes are central when trying to understand why and when individuals act in favor of the environment. Nevertheless, a more complete model of proenvironmental behavior should consider the social context within which the social-psychological processes occur. In this spirit, Stern, Dietz, Kalof, et al. (1995) stressed the importance of considering the social structure within which individuals are embedded, based on the belief that social structures shape individuals' experiences and ultimately their personal values, beliefs, and behaviors.

The hierarchical model presented by Stern, Dietz, Kalof, et al. (1995) extends Ajzen's (1985, 1991) models, and although the authors adopt the notion that attitudes guide intentions, which in turn guide behavior, they also suggest that individuals' worldviews precede their attitudes, that their personal values precede their worldviews, and that their position within the social structure precedes their values (i.e., position → values → worldviews → attitudes → intentions → behavior). In a following study, Dietz et al. (1998) tested the relationships between social structure, worldviews, attitudes, and environmentally relevant behaviors, such as willingness to sacrifice for environmental quality and collective or political behavior, and demonstrated the added value of each of the these variable groups. However, as in the case of their simpler models, the analyses have been based on simple OLS regressions and did not employ the types of path analysis required for demonstrating the hypothesized mediation effects.

More important, although their model elaborates on previous attitude-behavior conceptions, all of the variables remain at the level of the individual. In "position within the social structure" Stern, Dietz, Kalof, et al. (1995) refer to sociodemographic variables—such as age, income, and education—all of which are individual-level characteristics. Similarly, values and worldviews have also been conceptualized at the individual level. Although we share Stern, Dietz, Kalot, et al.'s (1995) desire to broaden our understanding of the

sources of proenvironmental behavior, we suggest that the context within which individuals behave should be conceptualized at a level higher than the individual. To truly complement social-psychological variables such as attitudes and beliefs, new variables that are considered should be external to the individual. We suggest that the culture within which individuals behave constitutes a meaningful context for the creation of the attitudes and beliefs that ultimately guide behavior.

CULTURAL VALUES AND PROENVIRONMENTAL BEHAVIOR

The term *value* denotes preference in terms of an individual's setting of one thing before or above another thing because of a notion of betterness (Brown, 1984). Preferences are usually derived using evaluative scales such as good-bad, likable-dislikable, moral-immoral, and pleasant-unpleasant (Tesser & Martin, 1996). *Culture* is often defined as the integrated pattern of meanings, beliefs, norms, symbols, and values that individuals hold within a society, with values representing perhaps the most central cultural feature (Hofstede, 2001; Schwartz, in press). These values "express shared conceptions of what is good and desirable in the culture, the cultural ideals" (Schwartz, in press, p. 2). Parallel to individual-level values—which involve enduring goals that serve as guiding principles in people's lives (Rokeach, 1973; Schwartz, 1992)—cultural value dimensions represent the society's guiding principles. These principles contribute to the formulation of individuals' attitudes, beliefs, and behaviors.

Although cultural dimensions are often inferred from the aggregation of individuals' personal values within a society (e.g., Inglehart, 1997; Schwartz, 1994), they are nevertheless distinct from them. As far as personal values are concerned, individuals can vary from one another in their value priorities. Indeed, all of the research to date on values and environmentalism has considered such individual differences in value orientations and attempted to predict personal attitudes and behaviors from personal values (e.g., Axelrod, 1994; Karp, 1996; McCarty & Shrum, 1994; Poortinga, Steg, & Vlek, 2004). On the other hand, cultural dimensions represent the common and shared ideals of individuals within a given society. Differences in cultural dimensions can therefore be observed only between societies rather than between individuals. In the present study, we will examine a cross-national sample that will allow for comparisons between countries. Although cultural boundaries do not necessarily coincide with geographical ones, because sociopolitical, ecological, ethnic, and even biological differences often exist across countries, countries present a primary site for the examination of cross-cultural differences (Smith & Bond, 1999). Furthermore, although

value differences will certainly exist even within countries, ample research has shown that on many value dimensions the differences among individuals within each country tend to be smaller and less meaningful than differences between individuals across countries (e.g., Hofstede, 2001; Schwartz, 1994).

Three of the most widely employed models of cultural value systems are Hofstede's (2001) five-dimensional theory, Inglehart's (1997) theory of materialist and postmaterialist values, and Schwartz's (1994, in press) theory of cultural value orientations. Works by all three have demonstrated value differences across countries such that different societies tend to emphasize different goals (Hofstede, 2001; Inglehart, 1977; Schwartz, 1994). Accordingly, research shows that these contexts influence behavioral patterns at the individual level (Hofstede, 2001; Inglehart, 1997; Schwartz, in press).

Although all three theories include values that bear relevance to environmental attitudes and behaviors, of the three, Schwartz's theory of cultural values and Inglehart's theory of postmaterialism appear to involve constructs that are most directly related to the context of the present study, as they either include reference to environmental issues or have been previously applied in environmental contexts.

Schwartz (1994) distinguishes between cultures across six primary values: autonomy, embeddedness, hierarchy, egalitarian commitment, self-mastery, and harmony. A country's position on each of the six dimensions represents the nature of individuals' shared ideals within a specific cultural context. Because cultural values are defined as representing common ideals, they are derived by averaging the value priorities of individuals within a given society based on a multidimensional scaling analysis (see Schwartz, 1994, for details on the methodology). Schwartz's harmony dimension involves a society's emphasis on "fitting into the world as it is, trying to understand and appreciate rather than to change, direct, or to exploit" (Schwartz, in press). Important values in the harmony dimension include "world at peace, unity with nature, and protecting the environment" (Schwartz, in press).[1] The higher a country ranks on harmony, the stronger is the cultural emphasis on such values.

A different value orientation was offered by Inglehart (1977). Inglehart's postmaterialist thesis posits that individuals in modern industrial societies, under the influence of material prosperity, tend to reject material values and to endorse new goals relating to quality of life. Although material values stem from needs for physiological sustenance and safety, postmaterial values stem from nonphysiological needs, such as those for esteem, self-expression, and aesthetic satisfaction (Inglehart, 1990, p. 68). The emergence of postmaterialist values is associated with a reshaping of social norms that emphasize new issues such as freedom, self-expression, and the quality of life.

To test his thesis, Inglehart (1977) developed an instrument for measuring value orientations. The instrument consists of a list of statements, which concern the evaluation of materialist and postmaterialist political goals (e.g., maintain order in the nation, give people more say in governmental decisions, fight rising prices, protect freedom of speech, maintain a high rate of economic growth, etc.). Numerous studies have applied the postmaterialist thesis to environmental research, showing that public support for environmental protection stems from the emergence of postmaterialist values (e.g., Inglehart, 1995a, 1995b; Milbrath & Fischer, 1984; Paehlke, 1989).[2]

Similar to Schwartz's aggregation of values to the national level, Inglehart (1995b) also considered postmaterialism at the national level and argued that advanced industrial countries, which tend to exhibit postmaterialist values, also tend to demonstrate greater support for the environment.[3] Overall, the higher a country is on postmaterialism, the greater should its members' concerns for the environment be. Despite the existence of studies linking between nation-level postmaterialism and proenvironmental concern, the latter has been operationalized in many different ways. Some have measured it by asking about proenvironmental behaviors, others have asked about perceived environmental risks, and yet others have evaluated individuals' willingness to sacrifice for the environment. Rather than theoretically distinguishing between attitudes, intentions, and behaviors, as the social psychological studies of environmental issues have, these diverse operationalizations are all treated as interchangeable measures of environmental concern.

Thus we identify two distinct bodies of literature: one that has focused on the social-psychological processes that link attitudes, intentions, and proenvironmental behaviors and a second that links between cultural values and some form of environmental concern. The vast majority of studies in the former camp have been conducted using local, one-country samples, none of which exceeded 1,500 participants (and most of which have involved less than 300). Far fewer cross-national studies on environmental issues have been conducted thus far. Most of these have focused on assessing the relationship between countries' wealth and citizens' concern for the environment (e.g., Dunlap & Mertig, 1995, 1997; Frank, Hironaka, & Schofer, 2000; Franzen, 2003).

Two cross-cultural studies that considered values in their frameworks bear some relevance to the present study. In one study that examined personal-level values and environmental attitudes in a 14-country sample, personal values have been found to predict environmental attitudes across countries, thus validating earlier intranational findings on environmental values and attitudes (Schultz & Zelezny, 1999). However, this study only considered values at the individual, rather than cultural, level. In a second study,

Inglehart (1995b) reported a relationship between countries' postmaterialist values and citizens' environmental attitudes. His study, however, did not consider beliefs or behaviors, which are central in the social-psychological models we wish to incorporate here. By linking between country-level values and individual-level attitudes, intentions, and behaviors, the present study integrates social-psychological and cross-cultural perspectives of proenvironmental behaviors to allow for a broader and more complete understanding of the phenomenon.

THE PRESENT STUDY

In line with Ajzen's (1991) theory of planned behavior, the core of our model suggests that intentions or willingness to make sacrifices for the environment mediate the relationship between environmental attitudes and proenvironmental behaviors (see Figure 1). We suggest that self-reported proenvironmental behaviors are preceded by individuals' willingness to sacrifice for the environment. This willingness is in turn preceded by individuals' perceptions of efficacy regarding their ability to protect the environment (i.e., perceived behavioral control), and by two related attitudinal variables that involve the concern individuals have for the environment and their perceptions of threat to the environment. Adding to prevalent models, we introduce Schwartz's country-level harmony dimension and Inglehart's postmaterialism index as the contextual antecedents that are expected to affect environmental concern.[4] In other words, country-level harmony and postmaterialism scores, which represent a cultural context, are expected to predict individuals' personal-level concern for the environment.

In addition, we considered the possibility that direct effects between the context variables (e.g., harmony and postmaterialism) and the proenvironmental behaviors might exist above and beyond the mediated effects. If only mediated effects are considered, one cannot tell whether significant effects derive from actual mediations or from direct effects that are not accounted for. For example, it is possible that aside from the mediated influence, through environmental concern and willingness to sacrifice, harmony will also have a direct effect on the proenvironmental behaviors. Therefore, our model will simultaneously estimate both direct and mediated effects.

For our dependent variables, we consider three types of behaviors: recycling, refraining from driving to cut down on air-pollution, and environmental citizenship (e.g., participating in proenvironmental demonstrations, contributing funds for environmental causes).[5]

To sum, the present article adds to current works on proenvironmental behavior in a number of respects: First, our inclusion of the cultural context

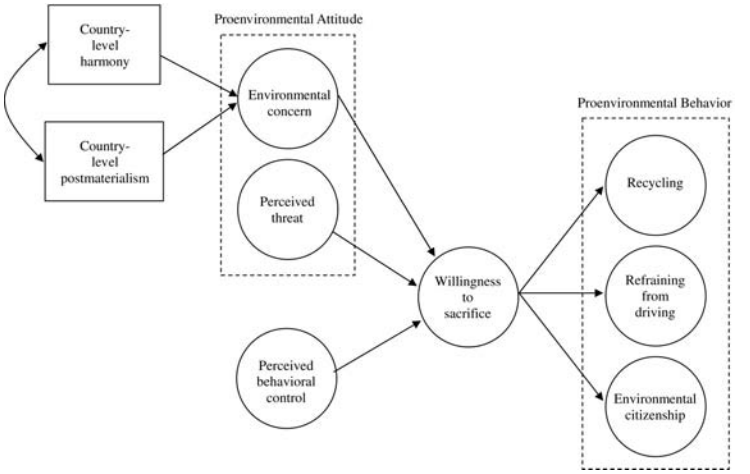

Figure 1: Schematic Model of Proenvironmental Behavior*
* Although they are included in our model, direct effects (e.g., the direct link between harmony and recycling) are not outlined so not to overcrowd the figure.

within which proenvironmental attitudes and behaviors are formed provides a more comprehensive picture of the process that leads from context to behavior. Second, although past works have been based on small local samples (i.e., within a particular country), the present study employed a 27-country sample that overall consists of 31,042 participants. Third, previous works have generally focused on one type of behavior (e.g., recycling); in the present study, we will examine three distinct types of proenvironmental behaviors. Fourth, our analysis procedures will be based on SEM (Bollen, 1989) that are more appropriate than the previously employed OLS regressions for testing complex models that involve mediation effects.

DATA

Data are drawn from the International Social Survey Programme (ISSP), which in the year 2000 included an environmental module. ISSP is an international public opinion consortium that since 1983 annually surveys various social issues in different countries across the globe. Currently, 38 countries participate in the surveys that cover various topics, among which are educa-

tion, welfare, and inequality. Of the 38 participating countries, 27 participated in the environmental module (see appendix). Within each of the countries, a national representative sample of the adult population was drawn and respondents participated in face-to-face interviews. In these interviews, respondents were asked to report on sociodemographic characteristics as well as on numerous environmental attitudinal and behavioral items. Overall, our sample involves data from 31,042 respondents.[6]

Our model was tested using SEM (Bollen, 1989). The model consisted of both a structural model, which involves the relationships drawn between variables as well as a measurement model in which scale items are considered indices of the latent variables in our model (e.g., environmental concern, perceived threat, etc.). A test of the measurement model indicates the extent to which our scale items appropriately load onto their designated latent variables. In line with SEM stipulations, both models are tested simultaneously. As expected, all of the items loaded significantly ($p < .001$) onto their designated variable. Furthermore, as will be noted, most of the scales' reliability coefficients have been satisfactory. Where low reliabilities have been found, this was for variables that were measured with two-item scales. In these cases, we also report the items' zero-order correlations. As will be reported in detail in the Results section, the model's overall fit was adequate (Hu & Bentler, 1999).

VARIABLES

Harmony. Schwartz (1994) provides national harmony scores for several of the countries in the present study. These scores have been derived by averaging individuals' value priorities within each country. Since 1994, there has been an ongoing effort to collect additional data and to expand the list of countries. For the present study, we obtained updated country harmony scores from Schwartz, who has integrated these data collection efforts (S. Schwartz, personal communication, September 14, 2004). All individuals within a given country were assigned the country's harmony score.

Postmaterialism. The index was measured in the ISSP by asking respondents two questions regarding four political goals that their country should place priority on, two materialist goals (maintaining order in the nation, fighting rising prices), and two postmaterialist goals (giving people more say in important government decisions, protecting freedom of speech). The first question asks which goal on the list should be the highest priority in the respondent's country; the second question asks which goal should be the next

highest priority in the respondent's country. Each answer is weighted according to the following system. A postmaterialist goal in response to the first question receives a value of 2, and a postmaterialist goal in response to the second question receives a value of 1; a materialist goal in response to either question receives a value of 0. Values are then summed for each respondent. The final index ranges from 0 to 3. Missing values were replaced by the index mean in the respondent's country. Country-level postmaterialism scores were derived by averaging individuals' postmaterialism scores within each country.

Environmental concern. ISSP questionnaire items have been used extensively to construct indices of environmental concern; however, the theoretical rationales for such constructions have varied widely. For the present study, we selected only those items that addressed the extent to which people are concerned about the future of the environment. We therefore chose two items: "People worry too much about the future of the environment" and "People worry too much about human progress harming the environment." Response options ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Items were reverse coded before including them in the analyses. The items' reliability alpha coefficient was .59 and their zero-order correlation was .42 ($p < .01$).

Perceived threat. Perceived threat was measured using two sets of items. Specific threat under personal control from air pollution by cars was measured with two items asking respondents to evaluate how dangerous air pollution by cars is to the environment and to their selves and their families. General threat not under personal control was measured using five items asking respondents to evaluate how dangerous to the environment are air pollution by industry, pesticides in farming, river and lake pollution, the rise in the world's temperature, and modifying the genes of certain crops. Response options for both subscales ranged from 1 (*not dangerous at all*) to 5 (*extremely dangerous*). The specific and general threat subscales' alpha coefficients were .85 and .79, respectively.

Perceived behavioral control. Perceived behavioral control was measured with the following two items: "It is just too difficult for someone like me to do much about the environment," and "There is no point in doing what I can for the environment unless others do the same." Response options ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Items were reverse coded before including them in the analyses. The scale's reliability coefficient alpha was

.55 and the zero-order correlation between the two scale items was .38 ($p <$ .01).

Willingness to sacrifice. Willingness to sacrifice was 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." Response options ranged from 1 (*very unwilling*) to 5 (*very willing*). The scale's alpha coefficient was .82.

Proenvironmental behavior. Proenvironmental behavior was assessed using three sets of questions: Recycling behavior was assessed by asking respondents to rate the frequency in which they sort glass or tins for recycling, car non-use was assessed by asking about the frequency in which respondents cut back on driving a car for environmental reasons, and environmental citizenship was assessed using three questions that asked respondents whether they (a) signed a petition about an environmental issue, (b) have taken part in a protest or demonstration about an environmental issue in the past 5 years, and (c) have given money to an environmental group in the past 5 years. Response options for the questions about recycling and car non-use ranged from 1 (*never*) to 4 (*always*). Another response option was 0 to represent the fact that recycling/car was not available and the data of participants who selected this option were omitted from analyses on these variables. Response options for the three environmental citizenship items were yes or no. The environmental citizenship reliability coefficient (KR20) was .50.

RESULTS

Descriptive statistics of the items used in the SEM analysis are presented in Table 1.

SEM, with the AMOS software package (Arbuckle, 1999) was used to test the study's path model (see Figure 1). The advantage of using SEM is that this enables one to test all sets of relationships simultaneously. As noted in the Method section, we started by testing the measurement model, which associates the observed responses to the questionnaire items with the latent constructs (e.g., environmental concern, perceived threat, etc.) on which they are expected to load. All of the items loaded significantly ($p < .001$) on their expected factor.

TABLE 1
Means and Standard Deviations of the Items Used in the SEM Analysis

Variable	M	SD
Harmony[a]	4.16	.32
Postmaterialism[a]	1.21	.24
Environmental concern		
Worry about future of environment	2.87	1.19
Worry about human progress harming environment	2.83	1.10
Specific threat		
Pollution by car dangerous to environment	3.73	0.87
Pollution by car dangerous to self and family	3.47	0.97
General threat		
Pollution by industry dangerous to environment	3.99	0.81
Pesticides in farming dangerous to environment	3.77	0.89
River and lake pollution dangerous to environment	3.90	0.89
Rise in world's temperature dangerous to environment	3.79	0.89
Modifying genes of crops dangerous to environment	3.41	1.00
Perceived behavioral control		
Too difficult for me to do about environment	2.82	1.20
No point in doing for environment unless others do	2.83	1.23
Willingness to sacrifice		
Willing to pay higher prices to protect environment	2.94	1.15
Willing to accept cuts in standards of living to protect environment	2.57	1.16
Willing to pay higher taxes to protect environment	2.78	1.17
Recycling	2.85	1.02
Car non-use	1.76	0.70
Citizenship		
Signed a petition	0.19	0.39
Taken part in protest or demonstration	0.17	0.38
Given money to environmental group	0.04	0.18

a. Means and standard deviations for these variables pertain to the aggregate level ($N = 27$).

Figure 1 denotes the tested model. In addition to the hypothesized links, the model also considered direct effects of the two context variables (i.e., harmony and postmaterialism) on each of the proenvironmental behaviors. Standardized coefficients of the path model are presented in Figure 2. The model's overall fit to the data was good (Hu & Bentler, 1999), (χ^2 = 15,671.95, $df = 159$, $p < .001$; Adjusted Goodness of Fit Index [AGFI] = .93; Comparative Fit Index [CFI] = .90; Root Mean Square Error of Approximation [RMSEA] = .056). As can be seen in Figure 2, all of the hypothesized relationships were significant in the expected direction except for harmony which was very weakly, yet significantly and negatively, associated with environmental concern. Postmaterialism was significantly and positively

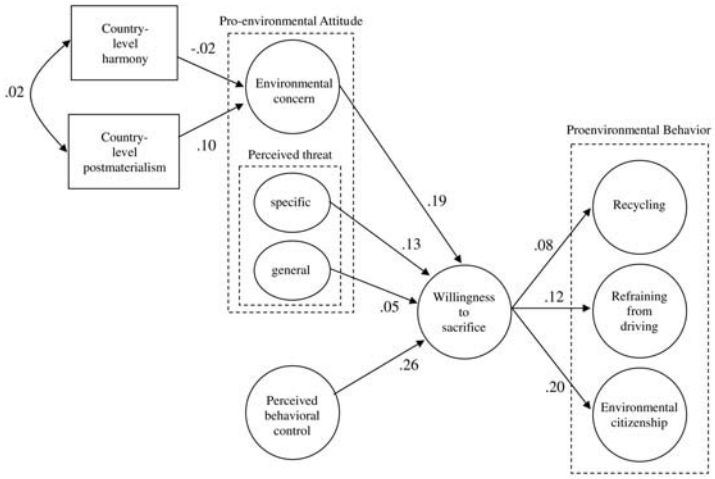

Figure 2: SEM Path Model Results*

* Values represent standardized coefficients. All of the paths in the figure achieved significance at $p <$ .01 or less except for the relationship between harmony and environmental concern that was significant at $p <$ .05. Significant direct effects of harmony, proenvironmental attitudes and perceived behavioral control on the proenvironmental behaviors are not drawn to not overcrowd the figure.

related to environmental concern; the four attitude variables (i.e., *environmental concern*, *perceived behavioral control*, and both perceived threat variables) were significantly and positively associated with willingness to sacrifice, and willingness to sacrifice was significantly and positively associated with the three proenvironmental behaviors (i.e., environmental citizenship, recycling, and car non-use).

In addition, several of the direct effects on proenvironmental behaviors were also significant ($p < .01$) and in the expected direction: harmony on recycling ($\beta = .16$) and car non-use ($\beta = .10$) and postmaterialism on recycling ($\beta = .33$), car non-use ($\beta = .10$) and citizenship ($\beta = .23$). One association that was not anticipated was the very weak ($\beta = -.02$) yet significant ($p <$ .05), negative relationship between harmony and environmental citizenship. We address this finding in our discussion.

As can be seen in Figure 2, the strongest of our model's hypothesized relationships turned out between perceived behavioral control and willingness to sacrifice and between willingness to sacrifice and environmental citizenship. Strong direct relationships were found between environmental concern and citizenship and between perceived behavioral control and citizenship and recycling.

To gain additional support for the relationships between attitudes, intentions and behaviors, as specified in the theoretical model following Ajzen's (1991) theory, we conducted a country-by-country analysis of the path model.[7] The results validated the model cross-nationally: The model presented good fit in all of the countries. The means and standard deviations (in parentheses) of the fit indices were .932 (.012) for the AGFIs, .920 (.015) for the CFIs, and .052 (.007) for the RMSEAs. In addition, the vast majority of hypothesized paths (ranging between 63% and 96% of the countries) were significant across countries, with the exception of the links between perceived threat and willingness to sacrifice for the environment. For these links, in most countries, a significant link was found for either specific perceived threat or general perceived threat but not for both.

DISCUSSION

This article introduces and cross-nationally validates a comprehensive model of proenvironmental behavior. We go beyond extant models by extending on Ajzen's theory of planned behavior (Ajzen, 1985) and on Stern et al.'s (1999) VBN theory, by incorporating country-level values as a broad contextual antecedent. Although harmony values were not meaningfully predictive of environmental concern, the significant effect for Inglehart's (1997) postmaterialism dimension emphasizes the relevance of the cultural context for explaining how individuals act in relation to their environment.

In extending on the theory of planned behavior and the VBN theory, we show the relevance of social psychological constructs that capture the way people feel and think about the environment and that these constructs matter for their actions. However, although in other works values remain at the level of the individual, we conceptualize the influence of the context at a national-cultural level to further the claim that cultural circumstances work at an aggregate level as well as at an individual level. By doing this, we propose that a meaningful context for individuals' environmental attitudes and behaviors is not only driven by socioeconomic logic but also by the imperatives of cultural values.

The extensive, 27-country sample enabled the analysis of a complex, multistage mediation model. Although previous studies have already found some support for Ajzen's (1991) theory of planned behavior in the environmental context, our study is the first to truly test the mediation effects hypothesized. Our findings provide strong, cross-national validation to the planned behavior perspective of proenvironmental behavior whereby behavioral intentions

mediate the relationship between proenvironmental attitudes and behaviors. Furthermore, we add to empirical applications of the VBN theory by demonstrating the role of country-level values rather than personal values. Contrary to previous works, most of which have focused on a particular type of behavior, our analyses provide support for the model across a variety of proenvironmental behaviors, which goes to further validate the model. In addition, we improve on existing research by preferring SEM to simple regression techniques, thereby establishing mediation more properly.[8]

As demonstrated, our mediation model was almost fully supported: Country-level postmaterialism values anteceded respondents' environmental concern—environmental concern, perceived threat, and perceived behavioral control (i.e., attitudes) were all significantly related to willingness to sacrifice for the environment (i.e., behavioral intention)—which in turn anteceded the three proenvironmental behaviors: recycling, refraining from driving, and environmental citizenship. The results also demonstrate that beyond the mediations suggested in the model, both harmony and postmaterialism have a direct influence on proenvironmental behaviors. In other words, country-level values are associated with proenvironmental behaviors notwithstanding their indirect effect through the shaping of individuals' environmental concerns.

The mediated effect for harmony was opposite the expected direction, significant, and very weak. Despite positive direct relationships between harmony and two of the three proenvironmental behaviors, harmony also yielded a negative direct relationship with environmental citizenship behavior.[9] We are somewhat puzzled by these findings but can offer two speculative explanations. First, contrary to the ISSP data, in some countries, the harmony scores are based on relatively small (N~300) samples. More important, samples comprised students and teachers and were therefore not representative of the general population. This may impinge on the accuracy and sensitivity of the harmony measure. Second, it is possible that the measures we used for environmental concern and behavior do not capture those dimensions of environmentalism that may be specifically affected by harmony values. Several works in progress are being conducted to expand the samples that form the basis for Schwartz's cultural value scores. Future works that use data from these expanded samples, together with measurement of a wider array of environmentalism manifestations, may shed light on the relationship between harmony and environmental concern and behavior.

We wish to point out two shortcomings of the analysis presented here. First, despite a wide range of countries that allows for an interesting cross-national analysis, the data we use do not provide a truly cross-cultural framework that includes representatives of various cultural, political, and the

economic axes of differentiation (e.g., developing countries, postcommunist countries). Second, despite our theoretical underpinnings, the data cannot demonstrate true causality. To accomplish this, data on variables from different stages in our model would have to be collected at different points in time. A research design, tailored for the specific purpose of validating our model, will enable us to assert the causal links we propose.

Implications of our model pertain to the question "What does environmentally friendly behavior depend on and how can it be influenced?" (Sjoberg, 1989; Stern, 1992). Social scientists, resource managers, ecologists, and policy makers try to understand what antecedes proenvironmental behaviors. Among the various factors that have been posited as contributing to such behaviors, in this article, we emphasize environmental values. Values depict ways of seeing the world and dealing with it (Corraliza & Berenguer, 2000). Contrary to attitudes, which are more content and situation specific, values are conceptualized as deeply embedded and trans-situational guides (Rohan, 2000), and as such, they present a fundamental antecedent of behavior. For example, viewing values as an overarching factor supports a view of environmental behavior as part of individuals' lifestyles. Because lifestyles and behavior involve an expression of values, to change one's lifestyle one would first have to address the values that underlie them. A number of field studies show that consumer policy can empower consumers to change lifestyles by reducing external and personal constraints that make changes toward a more sustainable lifestyle difficult (Thogersen, 2005). However, other works show that efforts at increasing environmentally friendly behavior often fail because they overlook the role of values and the opportunity to show the link between behavior (e.g., recycling) and value fulfillment (Smallbone, 2005).

Perhaps the main practical implication of our results pertains to environmental education. The main focus of environmental education programs has been to change environmental behavior through increasing environmental knowledge. Our results suggest that cultural value orientations, independent of knowledge, need to be targeted as the basis of environmental programs. Environmental education involves developing values, attitudes, knowledge, and problem-solving orientations. It emerges through broad community introspection into the values and ethical issues that it desires to nurture (Pooley & O'Connor, 2000); thus, we argue, it is highly dependent on particular and country-specific value orientations.

APPENDIX
Countries Included in the Data Set and Sample Sizes

Country	*Sample Size*
Austria	1,011
Bulgaria	1,013
Canada	1,115
Chile	1,503
Czech Republic	1,244
Denmark	1,069
East Germany	527
Finland	1,528
Great Britain	972
Ireland	1,232
Israel	1,205
Japan	1,180
Latvia	1,000
Mexico	1,262
Northern Ireland	745
Netherlands	1,609
New Zealand	1,112
Norway	1,452
Philippines	1,200
Portugal	1,000
Russia	1,705
Slovenia	1,077
Spain	958
Sweden	1,067
Switzerland	1,006
United States	1,276
West Germany	974

NOTES

1. Schwartz (in press) infers cultural value orientations by averaging the value priorities of individuals. He uses a 56-item value survey on which respondents are asked to rate the importance of the various values "as a guiding principle in MY life."

2. It should be noted that an extensive body of literature has debated and modified the arguments put forth by the postmaterialism thesis in regards to environmental issues (e.g., Brechin & Kepmton, 1994; Dunlap & Mertig, 1995, 1997; Guha & Martínez Alier, 1997).

3. For a critical view of the theoretical validity of the aggregation of postmaterialism, see Kidd and Lee (1997).

4. Because this study employs secondary data, which was not specifically tailored to meet our theoretical perspective, our model does not include Ajzen's subjective norms variable. However, our inclusion of country-level values provides us with an estimate of objective norms.

5. In addition to attitudinal antecedents, it is also important to consider the influence of individuals' opportunity structure. For example, limited access to recycling facilities could hinder individuals' inclination to recycle, notwithstanding their attitudes toward recycling. Such opportunity structures lie outside the scope of this article, and we therefore excluded respondents who reported not having access to recycling and those who reported not having a car.

6. For further information on response rates and sampling methods in each country, please see http://www.za.uni-koeln.de/data/en/issp/codebooks/s3440cdb.pdf.

7. Both value constructs (i.e., harmony and postmaterialism) could not be included in these analyses because they are at the country level.

8. For a discussion of the advantages of structural equation modeling (SEM) over regression analyses for the test of mediation, see Frazier, Tix, and Barron (2004).

9. These results cannot be explained due to a confounding effect caused by the relationship between harmony and postmaterialism, as the two were uncorrelated.

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