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How does Schwartz's theory of human values affect the proenvironmental behavior model?

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Abstract

Purpose – The diversity of perspectives means that one can find many factors and models of proenvironmental behavior. However, they typically suffer from limitations and varying degrees of validity in specific contexts, suggesting that today the prime goal should be to learn and improve the models which have been already developed. In this study, the authors build on the model for predicting proenvironmental behavior developed by Oreg and Katz-Gerro (2006), namely one of the most comprehensive cross-national proenvironmental behavior models and one of the few not to be limited to either a local or single-country context or specific proenvironmental behavior.

Design/methodology/approach – By using the statistical matching technique, the authors merged data from two existing databases without common identifiers – the International Social Survey Program (environmental module) and the European Social Survey (Round 5). The resulting multinational data concerning 9,710 observations enabled a replication with extensions of Oreg and Katz-Gerro's (2006) proenvironmental behavior model that incorporates newly added Schwartz's theory of human values. To achieve the study's main objective, that is, to present improvements to the original model of proenvironmental behavior, the authors used structural equation modeling (SEM) procedures to estimate four competing models in the *R* program.

Findings – This study implies that Schwartz's individually measured motivational types of values (benevolence [BE], universalism [UN], self-direction [SD]) are predictors of people's proenvironmental behavior, while his conceptualization of post-materialism yields a better model fit than Inglehart's country-level post-materialism scores. The results also corroborate previous findings that post-materialist values can stimulate proenvironmental behaviors through attitudes, perceived behavioral control and intentions. The present study reveals that proenvironmental attitudes did not change substantially in the 10-year period, even though the world's environmental and sustainability challenges have largely increased. Surprisingly, the mean value of several of the perceived threat variables even decreased.

Originality/value – The authors externally validate one of the most comprehensive proenvironmental behavior models by reproducing it using new multinational large-sample data with nearly 10,000 observations collected 10 years later. The most significant addition to the original model introduced in the current study is the inclusion of Schwartz's motivational types of values, which are measured at the individual level, namely BE, UN and SD. The authors also extend the model by adding proenvironmental behavior measures and group the construct into three latent variables: saving natural resources, green purchasing and environmental activism.

Keywords Proenvironmental behavior, Post-materialism, Schwartz's values, Statistical matching, Replication study

Paper type Research paper

Introduction

Over the last decade, economic activity has come at the expense of the environment. In the field of environmental psychology, there is a great need to study what drives humans to care

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for the environment in order to formulate effective environmental protection policies and marketing strategies (Obery and Bangert, 2017).

To understand the concept of proenvironmental behavior, defined as an individual's conscious effort to minimize the negative impact his or her action/s may have on the environment (Wray-Lake *et al.*, 2010), scholars have examined different factors and their relationships. Studies clearly present the role of attitudes, values, beliefs, knowledge, personality and skills in explaining environmental behavior (Biswas and Roy, 2015; Obery and Bangert, 2017). Other constructs like collective efficacy (Chen, 2015; Neamtu *et al.*, 2014), emotions (Rees *et al.*, 2015), mindfulness (Panno *et al.*, 2018), environmental consciousness (Garvey and Bolton, 2017), perceived behavioral control (Hosta and Zabkar, 2020) and social influence (Axsen and Kurani, 2014) are also shown to be related to proenvironmental behavior.

Oreg and Katz-Gerro (2006) developed one of the most comprehensive cross-national proenvironmental behavior models and one of the few not to be limited to either a local or single-country context or one specific proenvironmental behavior. The core of the Oreg and Katz-Gerro model suggests that behavioral intentions (i.e. willingness to make sacrifices for the environment) mediate the relationship between environmental attitudes and proenvironmental behaviors. The antecedents of behavioral intentions are perceived behavioral control, environmental concern and perceived threat. The model's biggest contributions are the inclusion of Schwartz's country-level harmony dimension and Inglehart's post-materialism index as the antecedents of environmental concern (i.e. attitude).

Contemplating the significance impact of Oreg and Katz-Gerro's (2006) paper, the purpose of our research is to replicate and extend their model by reproducing it using new multinational large-sample data with nearly 10,000 observations collected 10 years later. In so doing, we attempt to

(1) Externally validate and generalize their findings by employing the same measurement in a similar population (i.e. direct replication; model 1) and

(2) Improve it by adding proenvironmental behaviors using Schwartz's individual-level value types to substitute the country-level post-materialism index (i.e. extension; model 4).

Our position is that Schwartz's individually measured motivational types of values predict people's proenvironmental behavior in greater detail and thus more precisely than Inglehart's country-level post-materialism scores originally used in Oreg and Katz-Gerro's (2006) paper. A total of two main reasons explain the importance of including validated and theoretically reasoned typologies of values as part of explaining proenvironmental behavior. First, several studies contend that Schwartz's values may be used to predict variables such as attitudes, intentions or behavior (Beckers *et al.*, 2012; Thøgersen and Ölander, 2002). According to Stern (2000), the incorporation of values into the model improves its predictive power and allows it to be applied to different contexts. Second, the number of value types is relatively small compared to other antecedents of behavior, thereby providing an efficient instrument for interpreting the diversity of individuals, groups, nations and cultures (De Groot and Steg, 2008).

Scholars consistently emphasize the value of replication studies for estimating the power of existing models, increasing their generalizability, comparing empirical results and for a detailed understanding of boundary conditions (Durand *et al.*, 2017; Lee *et al.*, 2019). With unprecedented global environmental challenges on the rise, this need is quite pronounced in environmental psychology research (Ito *et al.*, 2020; Stöckli *et al.*, 2016). Therefore, the goal of the current paper is to advance what is known about factors influencing three specific proenvironmental behaviors (saving natural resources, green purchasing, environmental activism) by promoting and further improving the theoretical development of Oreg and Katz-Gerro (2006), which integrates multiple theoretical streams into a single theoretical approach.

Theoretical background

Multiattribute models have enjoyed a lot of popularity in psychological research (Li *et al.*, 2019). Our study is based on Oreg and Katz-Gerro's (2006) cross-national model of proenvironmental behavior. In line with Oreg and Katz-Gerro, our paper chiefly focuses on the mediating model which suggests that behavioral intentions mediate the relationship between environmental attitudes as influenced by human values and proenvironmental behavior. Besides replicating Oreg and Katz-Gerro's baseline model (model 1), we propose three revisions of the model (presented in Appendix) to isolate the effect and significance of all the extensions needed to make the models comparable. Our hypothesized model (model 4) in Figure 1 includes Schwartz's individual-value types, new latent variable attitudes and additional items measuring proenvironmental behavior compared to the original Oreg and Katz-Gerro's model.

Schwartz (1994, p. 21) defines values as "desirable transsituational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity." His theory of basic values (Schwartz, 1994) is among the leading theories in sociopsychological disciplines and used in several behavioral studies on general or specific proenvironmental behavior (e.g. Thøgersen and Ölander, 2002; Puska, 2019, Van Riper *et al.*, 2019). Studies have shown that Schwartz's value structure framework can also include Inglehart's dimensions: materialist values correspond to the security and power value types, whereas post-materialist values, which by definition attach importance to care for the well-being of all people and for nature, are captured within universalism and self-direction (Beckers *et al.*, 2012; Schwartz, 1994).

A more proenvironmental value orientation leads to proenvironmental attitudes, which in turn foster sustainable behaviors (Soyez *et al.*, 2009; Stern *et al.*, 1998). Previous studies indicate that among Schwartz's values, in particular, it is the universalism (UN) and benevolence (BE) values which entail acceptance of others as equals and concerns for their welfare and interests that are related to various kinds of environmentally friendly behavior (Grankvist and Biel, 2001; Stern, 2000; Thøgersen and Ölander, 2002). As UN and self-direction (SD) values are both associated to the measure of post-materialism (Schwartz, 2003; Wilson, 2005), we have also added the latter, which stresses one's own independent thought and action (Schwartz, 2003). Following Oreg and Katz-Gerro (2006), harmony is included as

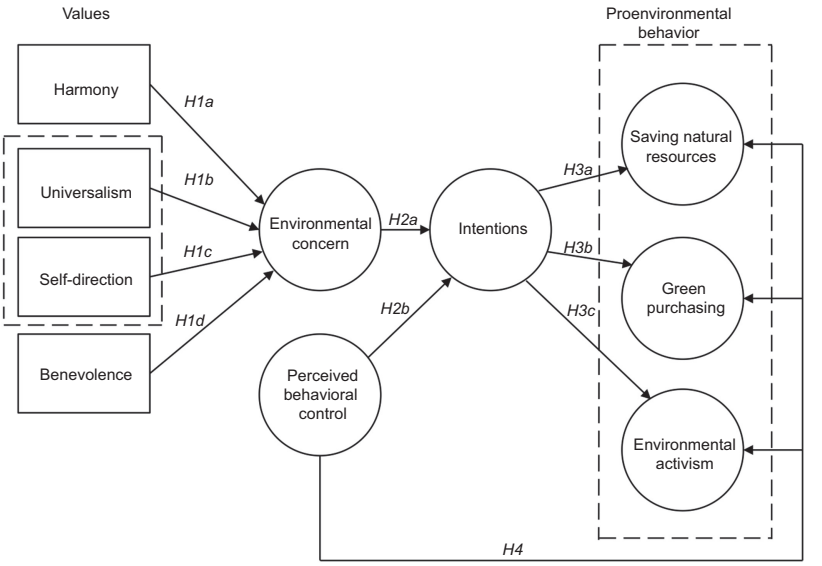


Figure 1.
Hypothesized model (model 4)

well since this dimension refers to fitting into environment by definition and includes unity with nature and protecting the environment (Schwartz, 1999). As elaborated in the next paragraph, proenvironmental attitude is represented by environmental concern; therefore, the following hypotheses were postulated:

H1a. An individual's SD value positively affects their environmental concern.

H1b. An individual's UN value positively affects their environmental concern.

H1c. An individual's BE value positively affects their environmental concern.

H1d. An individual's harmony value positively affects their environmental concern.

Apart from values, our models also contain the following variables: environmental concerns, perceived threats to the environment and perceived behavioral control. Environmental concerns have several dimensions, including beliefs about interconnections between the biophysical environment and humanity, compromises between economic growth and environmental protection, willingness to pay higher prices or willingness to devote time to environmental activism, waste separation, cycling and similar (Marquart-Pyatt, 2012). Dunlap and Jones (2002) define environmental concern as the degree to which people are aware of environmental problems, support efforts to solve them and are willing to help resolve these problems personally. If people notice the harmful environmental effects of industrialization, urbanization or economic development in their surroundings, they express their concerns about the environment (Pisano and Lubell, 2017). On the other hand, the second division of environmental attitudes separates general views from specific views. The former assess environmental problems, while the latter evaluate certain environmentally friendly products or behaviors (Nguyen *et al.*, 2016). Oreg and Katz-Gerro (2006) apply a similar classification by distinguishing perceived general threats from perceived specific threats based on an individual's ability to control. Perceived threats are closely related to environmental concern, together representing attitude variables, which according to extensive theoretical and empirical evidence antecede behavioral intentions (e.g. Ajzen and Fishbein, 1980; Ajzen, 1991; De Leeuw *et al.*, 2015; Scalco *et al.*, 2017).

H2a. An individual's environmental concern positively affects their intentions.

The term perceived behavioral control is defined as an individual's belief in his/her ability to successfully carry out certain behavior (Ajzen, 1991). The construct of perceived behavioral control is similar to and partly derives from the concept of self-efficacy (Bandura, 1982) in which the individual's motivation for behavior depends on their expectations regarding of their own efficiency. Ajzen (1991) proposed that perceived behavioral control moderates the relationship between intention and behavior. While behavioral intentions are often perceived as a good indicator of behavior in empirical research, this only holds true in circumstances in which individuals truly have full volitional control over their actions, which is, however, usually not the case (Ajzen, 1991; Jackson, 2005). All else equal, an individual's high level of perceived control over a specific proenvironmental behavior should strengthen his intention to perform this behavior. Besides its mediating effect, perceived behavioral control is also believed to be in a direct relationship with behavior. When perceived behavioral control is veridical, it provides useful information about the actual control an individual can exercise in the specific situation (Ajzen, 1991). Therefore, a direct link between the perceived behavioral control and all three types of studied proenvironmental behavior was hypothesized as well.

H2b. An individual's perceived behavioral control positively affects their intentions.

Finally, intentions and perceived behavioral control induce proenvironmental behavior (Maki and Rothman, 2017; Yadav and Pathak, 2016). Compared to the original Oreg and

Katz-Gerro's model (2006), we included several more questions relating to proenvironmental behavior (i.e. buying fruit and vegetables without pesticides or chemicals, reducing energy or fuel use at home for environmental reasons, saving or reusing water for environmental reasons, avoiding buying certain products for environmental reasons, membership in a group to preserve the environment) and grouped the construct into three latent variables measuring environmentally responsible behavior: saving natural resources, green purchasing and environmental activism.

H3a. An individual's proenvironmental intentions positively affect their proenvironmental behavior related to saving natural resources.

H3b. An individual's proenvironmental intentions positively affect their proenvironmental behavior related to green purchasing.

H3c. An individual's proenvironmental intentions positively affect their proenvironmental behavior related to environmental activism.

H4. An individual's perceived behavioral control positively affects their proenvironmental behavior.

Materials and methods

Data collection

We rely on individual-level data collected through international questionnaire surveys: the International Social Survey Program (ISSP Research Group, 2012) and the European Social Survey (ESS Round 5, 2010). The data contain information on 9,710 individuals from 15 European countries, Russia and Israel. In the replication study (model 1), we assigned a country's harmony scores obtained from Schwartz (2008) to all individuals within a given country. We used statistical matching to integrate Schwartz's motivational types of values into the improved models for predicting proenvironmental behavior, allowing us to merge the latest available data (for 2010) from two databases – the ISSP environmental module and ESS Round 5. We combined the two databases with the nearest neighbor distance hot deck method from StatMatch (D'Orazio, 2017). We describe the technique in more detail in the next subsection.

Statistical matching

The aim of statistical matching is to identify and merge records related to similar individuals in order to investigate relationship among variables which are observed in different data sets. As such, it makes more efficient use of existing data sets and reduces the costs of data collection, making it popular among researchers as well as national statistics offices (e.g. Gómez-Ortiz *et al.*, 2017; Ogorevc *et al.*, 2020; Bordt *et al.*, 1990).

Statistical matching is similar to the imputation of missing values in the data set, with the difference being that in statistical matching, the values of items that are estimated and inserted in are not observed in the same, but a related data set. Statistical matching may thus be seen as an imputation from a donor to a recipient data set. Since ISSP 2010 contains more of the necessary variables, we chose it to be the recipient, whereas ESS 2010 served as a donor data set for items to measure UN, SD and BE. In total, five variables are common to the two databases, and we used them as matching variables (country, gender, years of education, birth year and agreement with the statement "that modern science will solve our environmental problems with little change to our way of life"). Following D'Orazio *et al.* (2006), we assess the quality of the statistical matching procedure by comparing the descriptive statistics of items measuring UN, SD and BE in the synthetic and donor (ESS) data sets in Table 1.

Construct	Variable	*N*	Mean	St. dev	Min	Max	Included in models[4]			
Post-materialism										
	Universalism (UN)[1] – based on questions regarding human values: important that people are treated equally and have equal opportunities; important to understand different people; important to care for nature and environment	9,710	0.6	0.6	0.616	2.667		2	3	4
	Self-direction (SD)[1] – based on questions regarding human values: important to think new ideas and being creative; important to make own decisions and be free	9,710	0.4	0.8	−2.905	3.333		2	3	4
Post-materialism (Oreg and Katz-Gerro, 2006) (/)										
	Highest priority in country: give people a greater say in important environmental decisions (Q3a/2)[2] and highest priority in country: protect freedom of speech (Q3a/4)[2]	9,710	0.4	0.3	0.000	1.000	1			
Harmony (/)										
	Harmony[3]: fitting into the social and natural world, trying to appreciate and accept rather than to change, direct or exploit	9,710	4.3	0.3	3.280	4.620	1	2	3	4
Benevolence (/)										
	Benevolence (BE)[1] – based on questions regarding human values: important to help people and care for others well-being; important to be loyal to friends and devote to people close	9,710	0.7	0.7	−2.429	2.905		2	3	4
Environmental concern ($\alpha = 0.59$, $\omega = 0.61$)										
	Worry about future environment (Q10a)[2]	9,710	0.5	0.3	0.000	1.000	1	2	3	4
	Worry: progress harming the environment (Q10c)[2]	9,710	0.6	0.3	0.000	1.000	1	2	3	4
Perceived threat (general) ($\alpha = 0.73$, $\omega = 0.71$)										
	How dangerous for the environment – air pollution caused by industry (Q14b)[2]	9,710	0.7	0.2	0.000	1.000	1	2	3	4
	How dangerous for the environment – pesticides and chemicals used in farming (Q14c)[2]	9,710	0.7	0.2	0.000	1.000	1	2	3	4
	How dangerous for the environment – a rise in world temperatures caused by climate change (Q14e)[2]	9.710	0.7	0.2	0.000	1.000	1	2	3	4
	How dangerous for the environment – modifying the genes of certain crops (Q14f)[2]	9,710	0.6	0.3	0.000	1.000	1	2	3	4
	How dangerous for the environment – nuclear power stations (Q14g)[2]	9,710	0.7	0.3	0.000	1.000	1	2	3	4
Perceived threat (specific) (/)										
	How dangerous for the environment – air pollution caused by cars (Q14a)[2]	9,710	0.6	0.2	0.000	1.000	1	2	3	4
Perceived behavioral control ($\alpha = 0.58$, $\omega = 0.58$)										
	To do about the environment: too difficult (Q13a)[2]	9,710	0.6	0.3	0.000	1.000	1	2	3	4
	No point unless others do the same (Q13d)[2]	9,710	0.6	0.3	0.000	1.000	1	2	3	4

(*continued*)

Table 1.
Means and standard deviations of the items used in the structural equation model

Construct	Variable	*N*	Mean	St. dev	Min	Max	Included in models[4]			
Intentions/Willingness to sacrifice (α = 0.84, ω = 0.85)										
	Protect the environment: pay much higher prices (Q12a)[2]	9,710	0.5	0.3	0.000	1.000	1	2	3	4
	Protect the environment: pay much higher taxes (Q12b)[2]	9,710	0.4	0.3	0.000	1.000	1	2	3	4
	Protect the environment: cut your standard of living (Q12c)[2]	9,710	0.5	0.3	0.000	1.000	1	2	3	4
Recycling (/)										
	Effort: sort glass for recycling (Q20a)[2]	9,710	0.8	0.3	0.000	1.000	1			
Refraining from driving (/)										
	Cut back on driving a car for environmental reasons (Q20c)[2]	9,710	0.3	0.3	0.000	1.000	1			
Environmental citizenship (Oreg and Katz-Gerro, 2006) (α = 0.53, ω = 0.58)										
	Last five years: signed a petition (Q22a)[2]	9,710	0.2	0.4	0.000	1.000	1	2	3	4
	Last five years: given money to an environmental group (Q22b)[2]	9,710	0.2	0.4	0.000	1.000	1	2	3	4
	Last five years: taken part in a protest demonstration (Q22c)[2]	9,710	0.1	0.3	0.000	1.000	1	2	3	4
Saving natural resources (α = 0.71, ω = 0.73)										
	Effort: sort glass for recycling (Q20a)[2]	9,710	0.8	0.3	0.000	1.000		2	3	4
	Cut back on driving a car for environmental reasons (Q20c)[2]	9,710	0.3	0.3	0.000	1.000		2	3	4
	Reduce the energy or fuel at home for environmental reasons (Q20d)[2]	9,710	0.5	0.3	0.000	1.000				4
	Save or reuse water for environmental reasons (Q20e)[2]	9,710	0.4	0.3	0.000	1.000				4
Green purchasing (α = 0.61, ω = 0.3)										
	Buying fruit and vegetables without pesticides or chemicals (Q20b)[2]	9,710	0.4	0.3	0.000	1.000				4
	Avoid buying certain products for environmental reasons (Q20f)[2]	9,710	0.4	0.3	0.000	1.000				4
Environmental activism (α = 0.61, ω = 0.64)										
	Member of a group to preserve the environment (Q21)[2]	9,710	0.1	0.2	0.000	1.000				4
	Last five years: signed a petition (Q22a)[2]	9,710	0.2	0.4	0.000	1.000				4
	Last five years: given money to an environmental group (Q22b)[2]	9,710	0.2	0.4	0.000	1.000				4
	Last five years: taken part in a protest demonstration (Q22c)[2]	9,710	0.1	0.2	0.000	1.000				4

Note(s): [1] Source: ESS. [2] Source: ISSP. [3] Source: Schwartz (2008). [4] The number indicates in which of model 1–model 4, the variable is included. Statistical units are individuals. Cronbach's α and McDonald's ω values are shown in parentheses. For a detailed description of the variables, see the ISSP and ESS websites
https://zacat.gesis.org/webview/index.jsp?object=http://zacat.gesis.org/obj/fStudy/ZA5500
http://nesstar.ess.nsd.uib.no/webview/index.jsp?v=2&submode=abstract&study=http%3A%2F%2F129.177.90.83%3A80%2Fobj%2FfStudy%2FESS5e03.4&mode=documentation&top=yes

Table 1.

Measures

In total, we employed 31 items from the ISSP and ESS databases to replicate and construct the proenvironmental behavior models. The items for measuring Schwartz's motivational types of values (BE, UN, SD) came from the ESS database, while the other variables, namely the attitudes, intentions, perceived behavioral control and proenvironmental behavior, originated from the ISSP database. Schwartz (2008) was a source of the country harmony scores.

With regard to Schwartz's values, individuals and cultural groups often differ in their use of the response scale. It is therefore necessary to correct for individual differences in use of the response scale before performing the analyses. Guided by Schwartz (2009), we centered Schwartz's values by taking the means of the items included in each value and subtracted the mean score over all 21 value items. The measure of Oreg and Katz-Gerro's (2006) post-materialism construct was the same as in the original study. Country-level harmony scores were obtained from Schwartz (2008). All predictors of proenvironmental behavior, except Schwartz's values and harmony, were rescaled between 0 and 1, where 0 indicates the minimum and 1 the maximum of the underlying Likert scale.

Concerning attitudes, we again followed Oreg and Katz-Gerro's (2006) approach, where proenvironmental attitudes consist of environmental concern and perceived threat. Facing the same data constraints, we measure environmental concern with questions about personal worry. According to Van der Linden (2017), if the research goal is to understand how concern relates to behavior and it is impossible to construct multidimensional scales, personal worry is an appropriate indicator for concern.

The information on proenvironmental behavior (in model 4) in the survey relates to saving natural resources, green purchasing and environmental activism. The following items were the basis for the saving natural resources construct: waste recycling, passenger car usage, energy savings and water savings. Buying fruit and vegetables without pesticides and chemicals and avoiding certain products for environmental reasons served as measures of green purchasing behavior. Finally, membership in an environmental organization, signing an environmental petition, donations to an environmental organization and participation in environmental protests all relate to the environmental activism construct. Operationalization of all the other variables, namely proenvironmental attitudes and behavioral intentions, is based on the study by Oreg and Katz-Gerro (2006).

The descriptive statistics are summarized in Table 1. As some data were missing in the ISSP data set, we eliminated those observations. The final data set used in the estimations thus encompasses 9,710 observations. The deletion of records with missing data did not impair the descriptive statistics of the observed variables.

Results

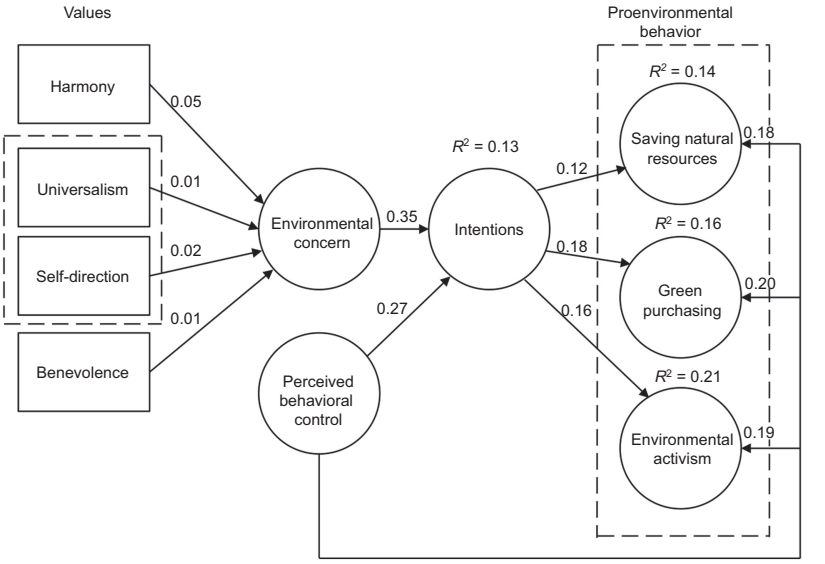
To achieve the study's main objective, that is, to present improvements to the original model of proenvironmental behavior, we used structural equation modeling (SEM) procedures to estimate four competing models in the *R* program (R Development Core Team, 2018):

(1) Model 1: Oreg and Katz-Gerro's original model of proenvironmental behavior (Figure A1);

(2) Model 2: The first revised model of proenvironmental behavior, in which Schwartz's individual-level value types substitute the country-level post-materialism index (Figure A2);

(3) Model 3: The second revised model of proenvironmental behavior joins specific threats, general threats and environmental concerns to form a new latent variable, i.e. proenvironmental attitude, and adds the direct effect of perceived behavior control on proenvironmental behaviors (Figure A3);

(4) Model 4: The most comprehensive model of proenvironmental behavior, including Schwartz's individual-value types, new latent variable attitudes and additional items measuring proenvironmental behavior (Figure 2).



Note(s): Solid lines indicate statistically significant estimates at the level of 5%, while dashed lines indicate non-significant results (at the level of 5%)

Figure 2.
Results for the hypothesized model of proenvironmental behavior (model 4)

Following Anderson and Gerbing (1988), we employed a two-step approach to analyze the measurement model and then the structural model. We used a maximum likelihood estimation procedure.

Measurement model analysis

Prior to estimating the structural model, we conducted confirmatory factor analysis (CFA). Table 2 presents its goodness-of-fit measures pertaining to the four models together with the recommended criteria. The CFA results indicate a satisfactory fit for all four models. In our case, the root mean square error of approximation (RMSEA) is 0.05 or below for all four models, with the lowest value for model 4. Likewise, the standardized root mean residual (SRMR) values are below 0.05 for all four models. This also satisfies Hu and Bentler's (1999) two-index combination rule, which requires an RMSEA of 0.06 or lower and an SRMR of 0.08 or lower. Although the values of the comparative fit index (CFI) are just above the recommended criteria, we follow Hair *et al.* (2014) who note there is no "magic" value which distinguishes an acceptable from an unacceptable model. In addition, they indicate that cutoff values of 0.95 on key goodness-of-fit measures are unrealistic in large samples and models with a large number of measured variables and parameter estimates.

Further, based on a comparison of Akaike's information criterion (AIC) and consistent version of AIC (CAIC) among models 1–3 (see Table 3, model 4 cannot be compared since it includes different outcome variables), we can identify model 3 as the preferred model because the lower AIC (CAIC) measure reflects the model with the better fit (Westland, 2016). Finally, internal reliability, indicated as Cronbach's α for each construct, is higher than 0.60 or close to acceptable (Nunnally and Bernstein, 1994; Sekaran and Bougie, 2013). The values close to the threshold reflect the fact that the constructs are composed of a small number of variables (Table 1) and that the psychological constructs are fairly unstable. We also report McDonald's (1999) coefficient ω since it is a more general form of reliability (e.g. Trizano-Hermosilla and Alvarado, 2016; Padilla and Divers, 2016).

Fit index	Recommended criteria	Model 1	Model 2	Model 3	Model 4
Chi square (p-value)	Significant p-values expected Hair *et al.* (2014)	4,329 ($p < 0.001$)	2,876 ($p < 0.001$)	6,207 ($p < 0.001$)	4,744 ($p < 0.001$)
Degrees of freedom		146	137	249	24
RMSEA	<0.08 MacCallum *et al.* (1996)	0.05	0.05	0.05	0.04
CFI	>0.90 Hair *et al.* (2014)	0.90	0.93	0.90	0.92
SRMR	<0.08 Hu and Bentler (1999)	0.05	0.03	0.05	0.04
AIC	Smaller value indicates a better model	99,860	44,329	14,252	48,697
CAIC	Smaller value indicates a better model	10,510	44,926	14,874	49,392

Table 2.
Confirmatory factor analysis results of model fit

Structural model analysis

Given that our primary interest is making predictions about proenvironmental behavior, we compare models on the basis of R^2 for equations describing proenvironmental behavior. Differences in R^2 between models were tested with a *z*-test on Fisher values. In model 1, the R^2 for refraining from driving, recycling and environmental citizenship are 0.06, 0.05 and 0.15, respectively. When we substitute the country-level post-materialism index with Schwartz's individual-level value types, the R^2 for equations describing proenvironmental behavior do not change. However, changes in model 3 increase the R^2 of refraining from driving, recycling and environmental citizenship to 0.07 ($p = 0.108$), 0.09 ($p < 0.001$) and 0.21 ($p < 0.001$). Even more variation in proenvironmental behavior is explained by our model 4, which is the most advanced. Comparing model 4 with model 3, differences in R^2 are significant for saving natural resources ($p < 0.001$) and green purchasing ($p < 0.001$) but not significant for environmental activism ($p = 0.773$).

Next, we compared the path coefficients. Figure 2 shows that all of the relationships in the hypothesized model of proenvironmental behavior (model 4) are significant and in the expected direction, except for general threats which have no significant relationship with intentions: all human values are significantly and positively related to environmental concern; the four attitudes are significantly and positively related to behavioral intentions and, finally, intentions are significantly and positively associated with the three studied proenvironmental behaviors: saving natural resources, green purchasing and environmental activism. Overall, most of the hypotheses are supported by our results.

Discussion and conclusion

Theoretical implications

This paper aims to advance the theory of proenvironmental behavior by investigating data on values, attitudes, perceived behavioral control, intentions and behavior merged from two existing databases without any common identifiers – the ISSP and the ESS, relating to 2010 as the latest publication year. This large-*N* study replicates the work of Oreg and Katz-Gerro (2006) and provides a reliable basis for generalizing these phenomena cross-nationally. In a nutshell, the study's findings are not only consistent with those of Oreg and Katz-Gerro (2006) but also further verify and develop the theory of proenvironmental behavior by including Schwartz's value types.

The current study may be characterized as a replication with extensions and, as such, offers several theoretical contributions. One benefit of our replication is that it validates the results and tests the generalizability of existing empirical findings regarding the values–attitudes–intentions–behavior connection. We apply the measurement instrument and statistical analysis methods used in the original study to explore whether the results from the year 2000 coincide or conflict with the results obtained in the current study (model 1). Like the original study, in this paper, we support the view that psychological factors shape the

Table 3. Structural equation modeling results of model fit

Fit index	Model 1	Model 2	Model 3	Model 4
Chi square (*p*-value)	7,013 ($p < 0.001$)	7,246 ($p < 0.001$)	6,847 ($p < 0.001$)	9,052 ($p < 0.001$)
Degrees of freedom	178	214	212	330
RMSEA	0.06	0.06	0.06	0.05
CFI	0.84	0.84	0.85	0.85
SRMR	0.07	0.07	0.06	0.06
AIC	158,420	9,129	8,734	13,223
CAIC	16,276	9,554	9,176	13,763

individual's proenvironmental actions, thereby adding confidence to the original findings. The examined relationships proved to be somewhat stronger in more recent years. A comparison of the basic descriptive statistics of the attitude variables used in Oreg and Katz-Gerro (2006) and in the present study reveals that proenvironmental attitudes did not change substantially in the 10-year period, even though the world's environmental and sustainability challenges have largely increased. Altering the behavior of the individual at a faster pace should become a policymaking priority.

Apart from testing the existing theory 10 years later, in the replication study, we have introduced the following variations by way of extensions. The first and perhaps most significant variation is in the values construct. The improved model incorporates Schwartz's theory of human values measured on an individual level so that it may act as a better substitute for the country-level post-materialism index. To isolate the effect and significance of this extension, we separately evaluate model 1 and model 2. Comparing the model fits of those two models reveals that, relative to the value constructs at the country level (i.e. Inglehart's post-materialism index), individual-level values are better predictors of environmental attitudes. Moreover, the findings indicate that self-transcendence primarily guides environmentally friendly individuals. In addition to Schwartz's post-materialist values (UN and SD), the suggested improved model includes BE and thereby captures the most important human values in order of priority (Schwartz, 2005a, b; Soyez, 2012). As defined by Schwartz (1992, 1994), UN and BE are both concerned with the transcendence of selfish interests and enhancement of others. Therefore, our results indicate, we may expect consumers with strong altruistic values to behave in an environmentally friendly way. If we further develop the discussion by adding in the pattern of conflict and compatibility among value priorities, i.e. the bipolarity of dimensions (Schwartz, 1994), we can argue that egoistic values, namely seeking personal success for oneself and dominance over others (power and achievement), are less likely to be associated with proenvironmental behavior. This is in line with an alternate conception of Stern and his colleagues (Stern and Dietz, 1994; Dietz *et al.*, 1998; Stern *et al.*, 1998). Accordingly, we may speculate on the positive effects of altruistic (and biospheric) values on one's behavior, even in the context of different theories.

Collectively, values, environmental concern and perceived behavioral control were found to exert a positive influence over green behavioral intentions. Concerns regarding natural environment translate into intentions if consumers have better control and overcome difficulties in performing the intended environmental behaviors. In general, people tend to engage in activities in which they feel competent and confident, while they tend to avoid behaviors they perceive as exceeding their skills and capabilities (Ajzen, 1991). Today's consumers have the power to make decisions and are intrinsically motivated to engage in specific activities when their feeling (perception) of being able to achieve a desired outcome is present. Consumers achieving the desired outcomes are likely to continue performing the activities and recommend them to others. Our findings also suggest that perceived behavioral control not only has a significant indirect impact on different proenvironmental behaviors through intentions but also has a significant direct impact on these behaviors.

In addition, our results indicate that consumers who have higher levels of environmental concern, which reflects the consumers' awareness and consideration of environmental issues, would have higher intention to perform specific environmentally friendly action. This aspect implies that policymakers should prioritize policies and strategies that influence consumers' positive disposition toward environmentally friendly practices that reduce their adverse environmental impact. Some of these strategies include supporting businesses with environmentally friendly practices, promoting waste sorting and recycling and improving public transportation and cycling infrastructures.

Schwartz's value theory incorporation in the model was enabled by merging two large databases without common identifiers using the statistical matching technique. A fundamental issue of this technique is that it relies on an untestable assumption about the relationship between variables that are observed in disjoint data sets. More specifically, it is assumed that the relationship between variables observed only in the ESS and that observed only in the ISSP can be entirely explained by the values of the variables observed in both data sets. If the assumption does not hold, the results based on the matched data set will be unreliable. As this assumption cannot be directly verified, we validated the technique's usefulness and reliability by comparing the results of a replication study (model 1) – based on a matched data set – with the original results – based on a single data set. The conclusions of this replication study are very similar to those of the original study. We therefore argue that such an approach to constructing a database using multiple, high-quality data sources brings a significant advantage for scholars from the financial, time and quality perspectives.

Another contribution of this paper with regard to Oreg and Katz-Gerro's (2006) study is the different approach taken to measuring post-materialist values. Previous studies show that Schwartz's value structure framework can also include Inglehart's dimensions: materialist values correspond to the security and power value types, whereas post-materialist values, which by definition attach importance to care for the well-being of all people and for nature, are captured within UN and SD (Beckers *et al.*, 2012; Schwartz, 1994). According to our results, Schwartz's conceptualization of post-materialism has a better model fit than to Inglehart's country-level post-materialism scores. The difference corresponds to the distinct operationalization of the two constructs measuring the same phenomenon: Oreg and Katz-Gerro (2006) used country-level scores derived by averaging individuals' post-materialism scores within each country. Nevertheless, in accordance with the several existing studies (e.g. Pisano and Lubell, 2017; Thøgersen and Ölander, 2002), our findings indicate that self-expression and quality of life are important antecedents of the individual's moral attitudes, while we also corroborate the validity of Schwartz's portrait values questionnaire (PVQ) for causal analyses.

One final difference concerns the types of environmental behavior we are examining. First, our results can be further generalized since the model includes additional proenvironmental behavior, i.e. green purchasing. The findings imply that intentions are better at explaining saving natural resources than recycling, a construct from the original study. Second, the current study includes twice as many variables for measuring different types of proenvironmental behavior as the original one and thereby improves the study's reliability. Finally, our findings suggest that all three relationships between intentions and behaviors are significant. Since intentions play an important role in predicting behaviors, all three levels of practice, academia and policymakers should focus on those factors that trigger a specific intention: sociodemographic aspects, attitudes, lifestyle, values, price, taste, health, habit, likes and dislikes, to name just a few of the more important ones (Gifford and Nilsson, 2014).

Managerial implications

Given the findings, it is reasonable to ask how we can motivate individuals to behave in an environmentally friendly way. From a practical standpoint, the improved model of proenvironmental behavior offers several marketing insights into the versatility of individuals' values for monitoring and researching proenvironmental behavior. Our results confirm that individuals who score high on post-materialism and BE hold more positive attitudes to sustainable practices. In relation to Schwartz (1994), high universalists will act sustainably for internal personal reasons, whereas benevolent individuals protect the environment for altruistic reasons (e.g. caring for others). In a study by Soyez (2012), it was

argued that individuals from collectivistic societies, who focus on collective achievement and interpersonal relationships (Hofstede, 2001), are motivated to enhance the welfare of people within the group (i.e. they score high on BE). Soyez (2012) also showed that individuals in individualistic societies seek to protect nature and enhance the welfare of all people (i.e. they score high on UN). Accordingly, the value of sustainable living in individualistic societies may be promoted through welfare-related institutions by informing consumers of their effectiveness (e.g. raising awareness of household-carbon-footprint calculations), environmentally friendly product and service availability and best practices. In collective societies, on the other hand, consumers tend to rely more on informal channels and word of mouth. Due to the group members' frequent contacts, their information tends to spread fast and marketers should thus encourage the circulation of the desired information and assure a timely response to the consumer. State-of-the-art research knowledge on proenvironmental behavior in different societies/cultures is particularly needed by companies wishing to develop and promote sustainable products and services globally.

Limitations and future research

The path from awareness of the importance of protecting the environment to actual proenvironmental behavior is long and complex. There is a proven gap between awareness, attitudes and behavior: a large share of people do not transform their values, beliefs, attitudes or intentions into appropriate action, into proenvironmental behavior (Ertz and Sarigöllü, 2019). In other words, the difference between declarative and actual sensitivity to sustainable issues is considerable (Bergin-Seers and Mair, 2009). Public opinion polls frequently encounter the tendency of individuals providing socially desirable responses to create a positive image of themselves. Therefore, future studies might avoid questionnaires that rely on subjective self-reporting of proenvironmental behavior by using more objective measures like the amount of waste generated to estimate pollution-reduction behaviors. Behavior that is self-reported is not necessarily the same as actual behavior (Huffman *et al.*, 2014).

There are several other possible explanations for the attitude–behavior gap, with one being indicated by the comparison of our results with the Oreg and Katz-Gerro (2006) study. As mentioned, perceived environmental threats have not significantly risen in the last 10 years, although proenvironmental behavior has. The reasons for this might lie in contextual factors: a person who is concerned about the environment today has many more opportunities and finds it easier to transform their concern into actions than they did 10 years ago (e.g. more accessible recycling or improved public transport options). This conclusion is in harmony with the authors who stress the importance of the context-related/situational factors with respect to the effect of individual-related factors (Kostadinova, 2016). To at least partially control for contextual factors, we excluded certain respondents from our study (e.g. respondents who reported not having access to recycling, not owning a car), although opportunities for environmental behavior may still vary significantly among studied individuals. Unfortunately, due to data limitations, contextual factors lie beyond the scope of this study.

A significant problem inherent to proenvironmental behavior studies is the complexity entailed. Proenvironmental behavior is influenced by many different factors that arise from both individuals themselves and the surrounding environment. Some factors influence broader social groups (e.g. green tax reform, waste sorting), while others only impact specific individuals (e.g. fuel poverty). Therefore, future studies still have considerable room available to improve such models by integrating different individual (psychosocial and sociodemographic) factors and refined theories (e.g. Schwartz's refined value theory) (Schwartz *et al.*, 2012). More effective understanding of how people think, feel and react regarding environmental issues can facilitate crucial contributions to determining their

motivations and behavioral responses in trying to protect the natural environment. Further, similar longitudinal studies across different countries are needed to track changes in people's behavior through time. It would be particularly interesting to know how economic prosperity and downturn affect the values people across globe hold and thus, proenvironmental behavior.

Individuals reduce their environmental impacts in many ways. Typical examples of proenvironmental behaviors are reusing/recycling, buying organic food and energy-efficient home appliances and public transport use. Some individuals go even further in their behavior by engaging in social and political movements (protests, participation in environmental groups, etc.). The current study improves the generalizability of the existing models by adding several types of behavior, although room for improvement remains in future studies by including additional proenvironmental behaviors (e.g. related to energy) that are equally if not even more important for environmental protection. However, we must acknowledge that studying unstable psychological constructs, using preexisting general questionnaires and merging data sets all distort the results, which contribute to the "poor to acceptable" observed reliability, low factor loadings and explanatory power of partial regression models. One way to explain additional variance of proenvironmental behavior is, for example, to incorporate additional constructs from past research, such as warm glow (Hartmann *et al.*, 2017a, b) or psychological empowerment (Hartmann *et al.*, 2017a, b).

Despite all the acknowledged shortcomings, we show how the replicated model of Oreg and Katz-Gerro (2006) behaves with new data, confirm previous findings, upgrade the theory on large-sample data with individually measured Schwartz values (UN, SD, BE) and add new determinants of proenvironmental behavior that call for further confirmation based on purposeful data in future studies. Hopefully, current and future advances in the field of environmental psychology will enable improvements to be made to individuals' lives in terms of behaviors that are sustainable for both humans and the planet.

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Appendix

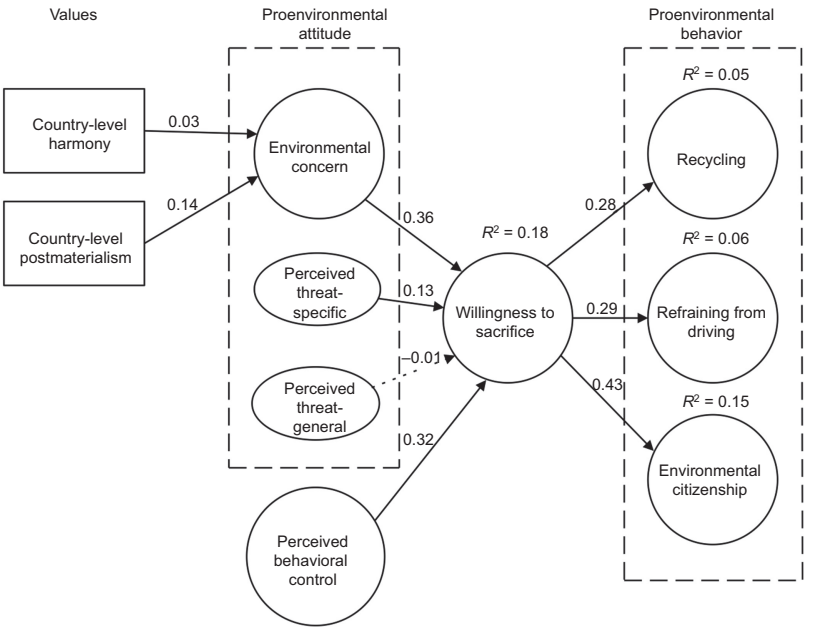
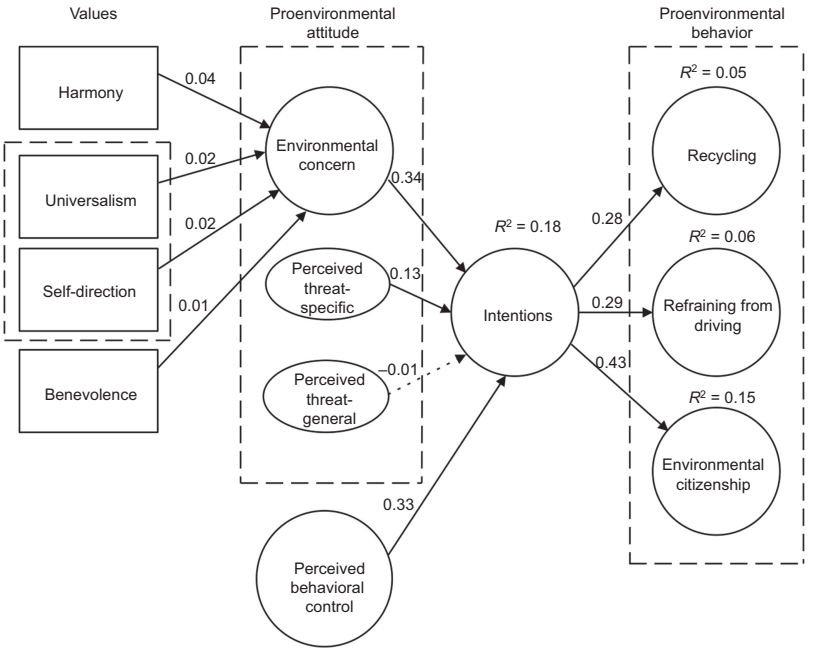


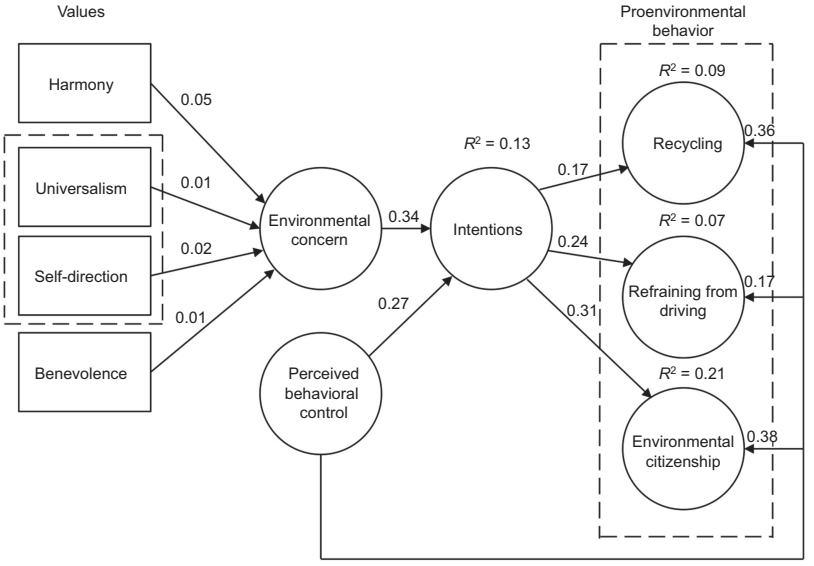
Figure A1.
Results of replicating the model for predicting proenvironmental behavior (Oreg and Katz-Gerro, 2006) (model 1)

Note(s): Solid lines indicate statistically significant estimates at the level of 5%, while dashed lines indicate non-significant results (at the level of 5%)



Note(s): Solid lines indicate statistically significant estimates at the level of 5%, while dashed lines indicate non-significant results (at the level of 5%)

Figure A2.
Results for the first revised model of proenvironmental behavior (model 2)



Note(s): Solid lines indicate statistically significant estimates at the level of 5%, while dashed lines indicate non-significant results (at the level of 5%)

Figure A3.
Results for the second revised model of proenvironmental behavior (model 3)