Journal of Environmental Psychology 38 (2014) 288–297

Contents lists available at ScienceDirect

Journal of Environmental Psychology

journal homepage: www.elsevier.com/locate/jep

Understanding the internal processes of behavioral engagement in a national park: A latent variable path analysis of the value-belief-norm theory

Carena J. van Riper [b,*], Gerard T. Kyle [a]

[a] Human Dimensions of Natural Resources Laboratory, Department of Recreation, Park, & Tourism Sciences, Texas A&M University, USA
[b] Department of Recreation, Sport, and Tourism, College of Applied Health Sciences, University of Illinois at Urbana-Champaign, USA

ARTICLE INFO

Article history:
Available online 29 March 2014

Keywords:
Pro-environmental behavior
Public land management
Structural equation modeling

ABSTRACT

Theoretical advances in research on the antecedents of human behavior have offered promising explanations for why people choose to undertake environmentally friendly action. This investigation provides further insight on the psychological processes driving self-reported behavioral engagement among visitors to Channel Islands National Park in the United States. We used latent variable structural equation modeling to test the hypothesized structure stipulated by the value-belief-norm (VBN) theory of environmentalism. Biospheric-altruistic values geared toward non-human species and concern for other people positively predicted environmental worldview and pro-environmental behavior, whereas egoistic values negatively influenced moral norm activation. Consistent with previous research, findings also showed that belief structures and personal moral norms gave rise to conservation behaviors reported by visitors to the park.

Published by Elsevier Ltd.

1. Introduction

Over the past four decades, social psychological theories have advanced knowledge of human behaviors that benefit and promote environmental sustainability. Investigations of attitude-behavior correspondence have gained particular traction in the context of natural resources management given their potential for guiding intervention strategies that influence biological diversity and human well-being (Schultz, 2011). A stronger understanding of the psychological factors that lead people to care more or less about the environment can inform conservation efforts via insight on stakeholder responses to policy change, technological advancements, and outreach activities (Heberlein, 2012). Although much progress has been made to explain the (dis)association between internal processes – values, beliefs, norms – and behavioral engagement, more remains to be learned about how to translate these variables into action. A substantive body of work has established only weak linkages between environmental attitudes and reported engagement (Bamberg & Möser, 2007; Oskamp & Schultz, 2005; Vining & Ebreo, 2002), indicating a need for additional research to examine the theoretical relations among antecedent variables, and in turn, identify the facets of cognition and affect that can be targeted to effectively shape behavior that minimizes environmental degradation (De Groot & Steg, 2009; Joireman, Lasane, Bennett, Richards, & Solaimani, 2001).

Past research has indicated there are several ways to capture the variance in behavioral predictions. Psychometrically, refinements in model measurement have provided more accurate assessments of attitude-behavior congruence (Fishbein & Ajzen, 1975; Kaiser & Gutscher, 2003). That is, behavioral models typically reliant on linear combinations of observed measures can be improved with more precise statistical techniques such as latent variable modeling (Kaiser, Hubner, & Bogner, 2005; Oreg & Katz-Gerro, 2006). Compatibility among measures is another methodological consideration (Ajzen & Fishbein, 2005). Studies have shown that general attitudes coupled with general behaviors carry positive, moderate correlations (Tarrant & Cordell, 1997), whereas specific attitudes and specific behaviors yield stronger associations and more accurate predictions (Oskamp & Schultz, 2005). In addition to maintaining similar levels of specificity in item measurement, the wording of survey items warrants careful consideration to improve the reliability of measures. Shared method variance exaggerates the strength of associations between behavior and antecedent

* Corresponding author. Department of Recreation, Sport, and Tourism, College of Applied Health Sciences, University of Illinois at Urbana-Champaign, 1206 South Fourth St., Champaign, IL 61820, USA. Tel.: +1 802 881 2631.
E-mail address: carena.j.vanriper@gmail.com (C.J. van Riper).

http://dx.doi.org/10.1016/j.jenvp.2014.03.002
0272-4944/Published by Elsevier Ltd.

variables owing to similarities in item appearance rather than actual similarities among constructs (Kaiser, Schultz, & Scheuthle, 2007). Thus, potential method effects should be minimized to effectively determine the explanatory power of models predicting human behavior.

In the present study we examine the psychological factors that energize self-reported behaviors benefiting natural and cultural resources of Channel Islands National Park located in the southwestern United States. Building on a well-established literature in environmental psychology, we test the value-belief-norm (VBN) theory of environmentalism (Stern & Dietz, 1994; Stern, Dietz, Abel, Guagnano, & Kalof, 1999), which suggests that overt responses to feelings of moral obligation can be expected when positively influenced by values beyond self-interest and belief structures. Using latent variable modeling techniques, we examine the integrity of measurement (i.e., reliability and validity) and relations among variables stipulated by this model to determine how internal processes shape outdoor recreationists' reported behaviors. In the following subsections, we review VBN theory and the processes driving behavior that it hypothesizes. The final subsection summarizes our study objectives.

2. Literature review

2.1. Engagement in pro-environmental behavior

We define behavior as an intent-oriented action performed as a function of internal processes (Stern, 2000). In the context of environmentalism, behaviors are further considered to be efforts that "minimize the negative impact of one's actions on the natural and built world" (Kollmuss & Agyeman, 2002, p. 240), and can be broadly investigated under the rubric of "pro-environmental behavior" (PEB) that is socially motivated (e.g., Heberlein, 1972) rather than strictly a function of self-interest (e.g., Ajzen, 1985). There are a number of ways to organize measures of pro-environmental behavior. Stern (2000) posited that actions beneficial for the environment relate to either "private sphere" (e.g., purchasing clean energy products for a household) or "public sphere" activities (e.g., supporting environmental policies that ultimately shape the context in which choices are made) that directly and indirectly contribute to environmental change, respectively. These two forms of behaviors do not measure *actual* engagement but can be assessed using measures of self-reported activities and/or intentions as proxies.

Studies of intent-oriented pro-environmental behaviors have spanned multiple topics. Several examples of past research include studies of: (a) curbside, central location, and public recycling (Guagnano, Stern, & Dietz, 1995; Porter, Leeming, & Dwyer, 1995; Schultz, Oskamp, & Mainieri, 1995), (b) littering (Cialdini, Reno, & Kallgren, 1990; Heberlein, 1972), and (c) support for environmental protection (Guagnano, 1995; Halpenny, 2010; Stern, Dietz, & Black, 1985). In this literature, the relationship between antecedents and reported engagement has been examined across environmental problems and research contexts (Poortinga, Steg, & Vlek, 2004). Multiple factors external to an individual (e.g., persuasion, regulations, incentives) have influenced the strength of this relationship by constraining and/or promoting individual actions (Stern, 2000). As such, investigating a range of behaviors that can achieve conservation objectives in different settings will lend insight on the capacity of places such as protected areas to inspire and educate stakeholders.

2.1.1. Personal norms and beliefs

As an extension of Schwartz's (1977) norm-activation model (NAM), the VBN theory (Stern et al., 1999) hypothesizes that reported behavior is shaped by personal norms. Although norm construction is learned from social interaction, decisions about whether or not to engage are processed at the individual level on the bases of cognition and affect. Sanctions from other people also influence personal norms by generating temporary feelings of moral obligation that reinforce sources of pressure external to the individual (Cialdini, 2003; Heberlein, 1977). Consequently, conformity with a particular personal norm can be supported by pride, security, or self-esteem, whereas rejection of that norm may result in responses such as guilt and worry (Schwartz, 1973). For example, in response to normative pressures an individual may feel inclined to undertake a pro-environmental behavior such as disposing of waste that may lead to unintended environmental consequences. In this case, negative sanctions may create dissonance if opposing actions (e.g., littering) are displayed, thus, activating a response.

To influence pro-environmental behavior, personal norms can be activated or deactivated by two related belief structures including ascription of responsibility and awareness of consequences (Schwartz, 1968, 1977). Both of these constructs are considered cognitive preconditions to moral norm activation according to the "causal chain" posited by the NAM and VBN models. The original propositions of these models assume that awareness is necessary for an individual to recognize the importance of their contributions to avert negative consequences for non-human species and other human beings, which in turn are expressed by feelings of moral obligation (Schwartz, 1977). For example, an individual may deny responsibility to find trash and/or recycling receptacles to throw away food, because s/he assumes that a sufficient number of other people are engaging in this activity (Bamberg & Schmidt, 2003) or because the potential contribution is thought to be negligible (Montada & Kals, 2000). Similarly, if this individual were unfamiliar with environmental impacts that would arise if s/he did not throw away food that may cause the spread non-native plants and/or habituate animals, then the associated response to norms would be negated. In other words, pro-environmental behavior that is consistent with normative pressures will likely be performed when an individual feels responsible for and is aware of consequences that can arise from action and/or inaction.

2.1.2. Environmental worldviews

According to the VBN theory, measures of norms and beliefs are preceded by a construct that reflects environmental worldviews and/or general beliefs about the perceived relationship between people and the environment. Worldviews are more general than norms, in that they encompass broader dispositions that are not specific to one particular area (Stern, Dietz, & Guagnano, 1995). This construct is represented by the New Ecological Paradigm (NEP) scale (Dunlap & Van Liere, 1978; Dunlap, Van Liere, Mertig, & Jones, 2000), which has received considerable attention over the past several decades. The NEP scale is theoretically related to principles about living in harmony with or having mastery over natural and social worlds (Schwartz, 1994, 1999). That is, NEP worldviews are situated along a continuum anchored by biocentric beliefs oriented toward environmental protection and anthropocentric beliefs geared toward people taking precedent over nature (Hawcroft & Milfont, 2010; Schultz & Zelezny, 1999). Previous research has demonstrated that the NEP scale is a reliable and valid measure of environmental worldview (Dunlap, 2008) and that it is a strong predictor of pro-environmental behavior (Dunlap et al., 2000).

The NEP scale has appeared in a variety of forms over the history of its use. The original scale contained 12 survey items that tapped three facets of belief structure, including the balance of nature, limits to growth, and human rights to rule over the rest of nature (Dunlap & Van Liere, 1978). The scale was later revised to include a

more balanced number of positively and negatively worded survey items, and limit outdated language (Dunlap et al., 2000). There are numerous interpretations of the NEP scale's dimensionality, in that past research has identified up to five different facets of human–environment relations (Amburgey & Thoman, 2012; Hunter & Rinner, 2004; Nooney, Woodrum, Hoban, & Clifford, 2003). A six-item scale has also been used in past research (Knight, 2008; Pierce, Steger, Steel, & Lovrich, 1992), which includes an equal number of survey items representing the three facets of the original NEP scale and serves as a relatively parsimonious model of environmental worldview (Milfont & Duckitt, 2004). The abbreviated, six-item NEP scale was used in the present study.

2.1.3. Environmental values

Belief structure and feelings of moral obligation are affected by value systems that serve as guiding principles in life and define people's relationships with the physical world (Stern et al., 1999). Empirical measures of value have been characterized as desirable end states and enduring beliefs (Rokeach, 1973) that transcend specific situations and shape reported behavior (Schwartz & Bilsky, 1994). Previous research has measured values that range from ecocentrism to anthropocentrism (Vaske & Donnelly, 1999), drawn ties between concepts of value and measures of environmental concern (Schultz, 2001), and theorized about the genetic roots of value orientations (Kellert & Wilson, 1993). Consistent among these conceptualizations is the suggestion that values are stable cognitive structures that form early in life, arise from acculturation, and remain relatively immutable over short time periods (Dietz, Fitzgerald, & Shwom, 2005).

The base of the VBN model is centered on values that explain environmentalism, which are represented to varying degrees in all individuals. Past research has suggested there are three tenets of environmental value (Stern et al., 1999; Stern, Dietz, & Kalof, 1993). First, biospheric values are centered on non-human species and the biosphere. Environmental protection carries relative weight in decision-making among individuals that embody this value. Altruism constitutes a second value for individuals concerned about human welfare. Finally, egoistic values are related to self-interest, in that individuals who wish to achieve this endpoint act favorably toward environmental preservation if they believe their personal well-being is threatened and act unfavorably if there are high (figurative) individual costs.

Although a tripartite conceptualization of environmental values has been well-established in past research (Stern et al., 1999) the dimensionality of this construct has been operationalized in different ways (e.g., Steg, Perlaviciute, van der Werff, & Lurvink, 2014). For example, Stern and Dietz (1994) posited that morality played equally important roles in the activation of biospheric and altruistic values on the basis of ethical considerations for non-human species (Leopold, 1970) and other people (Heberlein, 1977). This logic and past empirical findings have supported a two-dimensional structure of values whereby biospheric and altruistic principles form a single category (Norlund & Garvill, 2002; Schultz et al., 2005; Stern & Dietz, 1994). This conceptualization – namely, that of "biospheric-altruistic" and "egoistic" orientations – aligns with past research that has categorized values on axes of motivation (Schwartz, 1994). In this light, biospheric-altruistic values fall into a higher order category of self transcendence whereby the well-being of humanity *and* the environment take precedent over or are equal to self consideration. Egoistic values on the other hand are encompassed by a broader category of self-enhancement motivations primarily concerned with authority and power. Biospheric-altruistic and egoistic values are expected to positively and negatively influence environmentalism, and in turn, feelings of moral obligation that antecede pro-environmental behavior (Karp, 1996; Norlund & Garvill, 2002; Stern, Kalof, Dietz, & Guagnano, 1995).

2.2. The current study

The purpose of this study was to explore the psychological processes underlying pro-environmental behavior (PEB) as hypothesized by Stern et al.'s (1999) VBN theory. Through the use of structural equation modeling, we tested whether reported behavior would be performed when an individual felt they ought to take action (PN), believed they could make a difference/others were not performing needed behaviors (AR), considered environmental conditions to be problematic (AC), and positively or negatively evaluated human–environment interactions (NEP) in response to the attitude objects of non-human species (biospheric-altruistic value) and individual interests (egoistic value) (see Fig. 1). We identified linkages among various constructs in the VBN model based on past research suggesting values lead to worldviews, flow through AC and AR, and then predict PN as a direct antecedent to PEB. The hypothesized paths in our model were also based on the notion that feelings of moral obligation result from environmental values and worldviews (Dietz et al., 2005; Dunlap et al., 2000; Stern, Kalof, et al., 1995). Thus, we did not test for relationships among all antecedent variables, rather, only those supported in past research (de Groot & Steg, 2009).

3. Methods

3.1. Study area

This research was conducted within an ecoregion including two (Anacapa and Santa Cruz) of five protected islands and surrounding waters in Channel Islands National Park (CINP), located approximately 15 miles off the coast of southern California. The CINP ecoregion is an ecologically defined area that plays a relatively important role in the provision of recreational opportunities, in that these two CINP islands accommodate the highest levels of visitation within the park. The islands can be viewed from the mainland, and although they are proximate to densely populated southern California, their isolated location provides suitable habitat for over 2000 species of marine and terrestrial organisms, many of which are listed as threatened or endangered by the U.S. Fish and Wildlife Service and found nowhere else on earth (NPS, 2006). The United States National Park Service (NPS), The Nature Conservancy, and National Oceanic Atmospheric Administration, as well as other organizations actively manage, restore, and monitor the recovery of organisms in response to pressures such as invasive species, habitat destruction, and predation (Davis, 2005).

The CINP ecoregion contributes to local economies, human health and well-being, and increases knowledge of resources through tourism and recreational activities. Of the 300,000 people that annually visit the park's mainland educational center, only 10% go to the islands. This proportion of visitors uses public transportation provided by an external contractor that works in cooperation with the NPS. Although the majority of on-site visitors can be identified through their use of public transportation, there are several other important modes of use within the CINP such as private boating, consumptive activities (e.g., lobster diving, spear fishing), and diving operations (LaFranchi & Pendleton, 2008). Water-based activities are spread across nearly 100 miles of coastline surrounding the two islands. Commercial fisheries and the energy industry also maintain a presence outside of the park's marine reserve networks, primarily in the Santa Barbara Channel that lies adjacent to this ecoregion. Aboriginal populations (i.e., Chumash Native Americans) and scientists that undertake

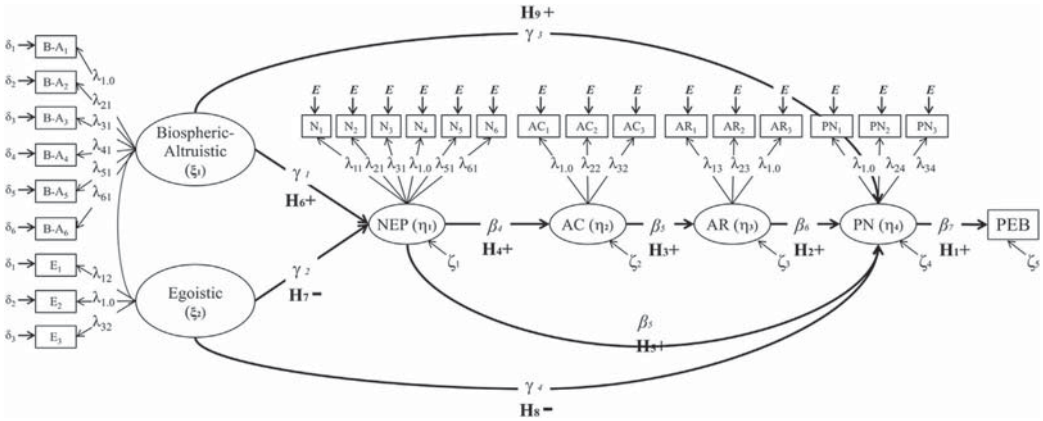

Fig. 1. Hypothesized model of the theoretical relations among factors that lead to engagement in pro-environmental behavior.

investigations spanning the natural and social sciences further reflect the breadth of human use accommodated within the park.

3.2. Data collection and sampling design

Data were collected via an on-site self-administered survey during a time period (June–August, 2012) selected to reflect visitation during the high use season. Potential respondents over the age of 18 were approached at random by trained survey administrators and asked to participate in the study. For groups, the individual with the most recent birthday completed the survey to minimize potential group leader bias (Battaglia, Link, Frankel, Osborn, & Mokdad, 2008). The survey schedule was stratified by day of the week to obtain a representative sample of visitors to the CINP ecoregion that accessed the islands and adjacent waters using public transportation during the time period of the study (Bernard, 2000). Segments of the park's constituency such as private boaters were not necessarily included in the sample due to challenges surrounding access to the islands' coastlines. Using ASUS Transformer TF3000T tablets and offline software (DroidSurvey, version 1.4.1), English versions of the survey were administered at multiple locations, though primarily on Santa Cruz Island to reflect the flow of visitation and owing to difficulties transporting the survey team between the two islands. Decisions about data collection and the sampling design were made in consultation with NPS staff and were informed by preliminary on-site visits to the park in August, 2011 and April, 2012. Contact logs were used to monitor response rates and calculate potential non-response bias, none of which were detected on the bases on gender ($\chi^2 = 0.07$) and group size ($t = -0.92$, $df = 373$). In total, this sampling method yielded 359 completed surveys and a response rate of 95%.

3.3. Survey sample

The gender distribution of survey respondents was nearly equal with 48% male and 52% female. The majority (84%) was White and well-educated with 76% reporting having obtained at least a four-year college degree. Half of the survey sample earned over $100,000 before taxes on an annual basis. The average age was 43.3 ($SD = 14.3$) and number of people per household was 2.9 ($SD = 1.3$). Respondents did not report extensive previous experience at the park, in that most (80%) had visited only one island and over half (61%) were visiting for the first time. These concerns were identified in consultation with park staff through preliminary data collection. The average group size was 6.7 ($Median = 4$, $SD = 11.8$) and respondents engaged in various activities such as hiking (39%), kayaking (15%), and camping (15%).

3.4. Survey measures

Scales for the constructs of pro-environmental behavior, personal norms, ascription of responsibility, and awareness of consequences were created to represent NPS managers' primary concerns about sustainable use of resources within the CINP including: 1) the spread of non-native plants and animals, 2) impacts on cultural resources such as archaeological sites and historic structures, and 3) degradation of natural resources within marine protected areas. These issues were identified in consultation with park staff through discussions and preliminary data collection. The reliability estimates (Cronbach's alpha) of scaled items ranged from .66 to .88 (Cortina, 1983). All factor loadings exceeded .40 (Hair, Anderson, Tatham, & Black, 1998).

3.4.1. Engagement in pro-environmental behavior

This study examined intent-oriented actions that Stern (2000) termed public-sphere behaviors. Nine survey items presented on

Table 1
Scaled items measuring reported behavior.

		Percent
Pro-environmental behavior (summative score (SD))		*4.79 (2.23)*
PEB_1	Volunteer at Channel Islands National Park to remove non-native species	7.7
PEB_2	Support and/or accept policies that protect the marine environment	62.3
PEB_3	Clean equipment (e.g., wash hulls of boats, shake tents, pick seeds from shoe laces) to prevent the spread of exotic species	32.6
PEB_4	Use boot scraping stations to prevent the spread of non-native plants	22.9
PEB_5	Read a newsletter, magazine or other publication about the human history of Channel Islands National Park	52.9
PEB_6	Support the reintroduction of native species (e.g., island foxes) on Channel Islands National Park	63.9
PEB_7	Properly dispose of waste (e.g., apple cores) that may cause the spread of non-native plants	83.9
PEB_8	Support policies that protect historic and cultural resources	75.2
PEB_9	Encourage other visitors to not disturb archeological artifacts on Channel Islands National Park	77.7

Note. Respondents could check all that applied so column total may not equal 100%.

Table 2
Scaled items measuring factors that lead to engagement in pro-environmental behavior.

		λ	M	SD
Personal norms[a] $\alpha = .662$			*4.40*	*0.64*
PN_1	I feel morally obliged to minimize human impact on marine resources within the CHIS	.68	4.31	0.86
PN_2	I would feel guilty if I were responsible for the spread of non-native plants across the CHIS	.66	4.39	0.86
PN_3	I feel a sense of personal obligation to not damage historic structures on CHIS, regardless of what others do	.59	4.54	7.81
Ascription of responsibility[a] $\alpha = .744$			*3.59*	*0.93*
AR_1	I feel jointly responsible for the spread of non-native species	.50	3.31	1.28
AR_2	I feel jointly responsible for damage to cultural resources	.55	3.35	1.18
AR_3	I am jointly responsible for environmental impacts to marine life	.77	4.06	1.03
Awareness of consequences[b] $\alpha = .850$			*3.96*	*1.05*
AC_1	The spread of non-native plants and animals on CHIS	.76	4.05	1.17
AC_2	Damage to cultural resources including historic structures and archaeological artifacts on CHIS	.77	3.70	1.25
AC_3	Human impact on the marine environment on CHIS	.91	4.11	1.18
New Ecological Paradigm[a] $\alpha = .764$			*3.95*	*0.71*
NEP_1	We are approaching the limit of the number of people the earth can support	.49	3.76	1.09
NEP_2	When humans interfere with nature if often produces disastrous consequences	.58	4.03	0.97
NEP_3	Plants and animals have as much right as humans to exist	.70	4.11	1.06
NEP_4	The earth is like a spaceship with very limited room and resources	.62	3.74	1.01
NEP_5	The balance of nature is very delicate and easy to upset	.59	4.02	0.95
NEP_6	Humans were meant to rule over the rest of nature[d]	.62	3.90	1.20
Biospheric-altruistic[c] $\alpha = .875$			*7.32*	*1.35*
$B\text{-}A_1$	Unity with nature: fitting into nature	.79	7.21	1.80
$B\text{-}A_2$	Protecting the environment: preserving nature	.86	7.60	1.51
$B\text{-}A_3$	A world of beauty: beauty of nature and the arts	.76	7.55	1.53
$B\text{-}A_4$	A world at peace: free of war and conflict	.70	7.34	1.90
$B\text{-}A_5$	Equality: equal opportunity for all	.65	7.21	1.83
$B\text{-}A_6$	Social justice: correcting injustice, care for others	.64	7.14	1.84
Egoistic[c] $\alpha = .666$			*4.88*	*1.57*
E_1	Authority: the right to lead or command	.58	5.08	2.13
E_2	Social power: control over others, dominance	.93	3.77	2.20
E_3	Influential: having an impact on people and events	.43	6.05	2.04

[a] Mean scores are on a scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).
[b] Mean scores are on a scale ranging from 1 (Not at all a Problem) to 5 (A Very Serious Problem).
[c] Mean scores are on a scale including 1 (Opposed to my Values) and ranging from 2 (Not at all Important) to 9 (Of Supreme Importance).
[d] Reverse coded survey items.

a dichotomous (yes/no) scale were included in the survey questionnaire to measure reported engagement over the previous 12 months (see Table 1). Given that no standard measure of pro-environmental behavior existed, the survey items developed for this study were based on the three issues of greatest management concern noted above, including invasive species, damage to cultural resources, and marine impacts. Although select respondents may not have had opportunities to engage in activities that required use and/or ownership of equipment, all self-reported behavioral items reflected park-specific issues (Halpenny, 2010) and were considered plausible by managers of the CINP. Other considerations that guided the creation of items included the range of potential behaviors and congruence between internal processes and subsequent actions (Norlund & Garvill, 2002; Oskamp & Schultz, 2005; van Riper, Kyle, Sutton, Yoon, & Tobin, 2013; Steg, Dreijerink, & Abrahamse, 2005; Stern et al., 1999). A composite score was created based on the summation of all reported behaviors performed by survey respondents in the previous year.

3.4.2. Personal norms and beliefs

Multiple item scales were used to measure personal norms, ascription of responsibility, and awareness of consequences, all of which were comprised of three survey items about invasive species, cultural resource impacts, and environmental degradation in the marine environment. These constructs reflected feelings of moral obligation, perceived responsibility for negative consequences, and the extent to which these impacts were occurring on the CINP (see Table 2). Personal norms and ascription of responsibility were measured on five point Likert-type scales ranging from "Strongly Disagree" to "Strongly Agree." Both norms ($\alpha = .68$) and responsibility ($\alpha = .68$) maintained acceptable internal consistency (Cortina, 1983). Awareness of consequences was measured along a five point Likert-type scale that ranged from "Not at all a Problem" to "A Very Serious Problem" ($\alpha = .85$).

3.4.3. Environmental worldviews

Environmental worldviews were measured using Dunlap et al.'s (2000) six-item, abbreviated NEP scale (see Table 2). Survey respondents were asked to indicate their level of agreement on a five-point scale ranging from 1 "Strongly Disagree" to 5 "Strongly Agree." Given that dimensionality of the NEP remains contested (Amburgey & Thoman, 2012; Hunter & Rinner, 2004; Noe & Hammitt, 1992; Nooney et al., 2003), analyses were performed inductively beginning with a principal components analysis (PCA) (tests conducted in SPSS version 21). Results from the PCA using varimax rotation illustrated that all survey items loaded on a single factor that accounted for 43.72% of variance in the sample data. A single dimensional conceptualization of the NEP aligns with past work suggesting environmental worldviews are situated along a continuum ranging from high to low degrees of environmentalism (Dunlap & Van Liere, 1978; Dunlap et al., 2000; Hawcroft & Milfont, 2010; Schultz, 2001).

3.4.4. Environmental values

We drew the environmental value survey items from Schwartz's (1994) Value Inventory Scale to represent two dimensions that were conceptually and empirically supported in past research (Norlund & Garvill, 2002; Schultz et al., 2005; Stern & Dietz, 1994). These dimensions reflected biospheric-altruistic (items BA_1–BA_6) and egoistic values (items E_1–E_3) (see Table 2). Respondents were asked to report the extent to which value types were viewed as guiding principles in life. Our response scale ranged from 0 "Not at

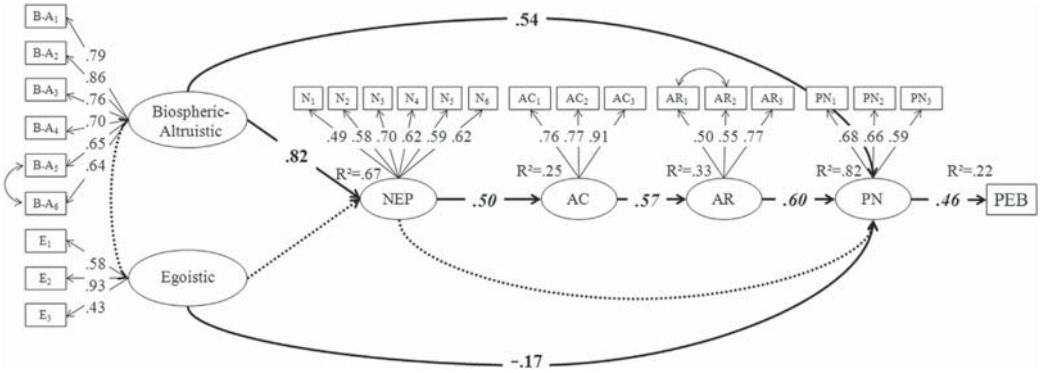

Fig. 2. Results from a latent variable path analysis of the value-belief-norm theory of environmentalism. Dotted lines indicate non-significant relationships.

all Important" to 7 "Of Supreme Importance" and provided an option (−1) for participants to indicate they were opposed to the value (Schwartz, 1994). All data were included in the analysis, in that the scale was re-coded to range from 1 to 9.

4. Results

We used structural equation modeling to test the measurement properties of our scales along with the hypothesized relations among antecedents of pro-environmental behavior (PEB) (Anderson & Gerbing, 1988) using Mplus version 7 (Muthén & Muthén, 2012) (see Fig. 2). We accounted for missing data (16% MCAR) using a full information maximum likelihood procedure in Mplus and analyzed a positive definite covariance matrix using a maximum likelihood estimation procedure. Model fit was assessed using a χ^2 value, though given this statistic's sensitivity to sample sizes larger than 200 (Kline, 2011) other fit statistics were referenced, including the root mean square error (RMSEA) $\leq$0.07 (Steiger, 2007), comparative fit index (CFI) $\geq$0.90 (Bentler, 1990), and standardized root mean square residual (SRMR) $\leq$0.07 (Hu & Bentler, 1999).

Our measurement model adequately fit the data and provided a basis to determine the construct validity and reliability of the survey measures. Given adequate fit of the measurement model to the sample data ($\chi^2 = 424.39$; $df = 24$; RMSEA = 0.05; CFI = 0.93; SRMR = 0.06), estimation of a structural model was warranted to determine the predictive validity of the latent constructs. Results supported the hypothesized relationships ($\chi^2 = 506.62$, $df = 264$; RMSEA = 0.05; CFI = 0.91; SRMR = 0.07) (see Table 3). Modification indices indicated that model fit could be significantly improved by permitting covariance between two sets of error terms falling within similar dimensions (T5 with T6; AR1 with AR2) ($\Delta\chi^2 = 83.76$; $\Delta df = 2$). The model was respecified under the assumption that error among the items could be attributed to method-related effects in the sample data (Byrne, Shavelson, & Muthén, 1989). That is, the items we allowed to covary had common sources of error rooted in measurement concerns such as similar language among survey items.

Table 3
Summary of fit indices that examined the hypothesized factor structures among variables predicting pro-environmental behavior.

	χ^2	df	RMSEA	CFI	SRMR
Measurement model	424.39	235	0.05	0.93	0.06
Structural model	506.62	264	0.05	0.91	0.07

Consistent with H_1, H_2, H_3, and H_4, we found positive, direct effects of PN on PEB ($\beta = 0.46$, $t = 8.28$), AR on PN ($\beta = 0.60$, $t = 7.08$), AC on AR ($\beta = 0.71$, $t = 8.44$), and NEP on AC ($\beta = 0.50$, $t = 9.51$) (see Table 4). In other words, as general belief structures representing an environmental worldview were rated more favorably, respondents reported heightened awareness of environmental problems, ascribed responsibility to take action, and moral inclinations that in turn led to associated actions undertaken in the previous year. H_5, examining the direct effect of NEP on PN, was rejected ($\beta = 0.26$, $t = 1.93$). As predicted, tests of H_6 confirmed that biospheric-altruistic value orientations increased the likelihood that respondents would positively evaluate human–environment interactions ($\gamma = .82$, $t = 23.91$). Egoistic values had no influence on NEP (H_7; $\gamma = -.10$, $t = -1.64$). However, as hypothesized in H_8, egoism had a negative direct effect on PN ($\gamma = -.17$, $t = -2.81$). The expected pattern of relations emerged between biospheric-altruistic values and PN (H9) ($\gamma = .54$, $t = 8.07$). Overall, the correlations among variables supported the direction of effects postulated by the VBN model.

5. Discussion

Based on the tenets proposed by Stern et al.'s (1999) VBN theory, we tested a latent variable structural equation model of the psychological antecedents to pro-environmental behavior within the Channel Islands National Park ecoregion. We observed support for this framework's potential to combine theoretical understandings of moral norm activation (Schwartz, 1977), belief structures (Dunlap et al., 2000), and environmental values (Schwartz, 1994). Our data suggest that attitude-behavior correspondence in the context of this research can be understood on the basis of internal

Table 4
Estimates of the final structural model of the value-belief-norm theory of environmentalism.

Dependent variables	Predictors	γ	β	SE	t-Value	R^2
PEB	PN		.46	.06	8.28	.22
PN	AR		.60	.09	7.08	.82
AR	AC		.57	.07	8.44	.33
AC	NEP		.50	.05	9.51	.25
PN	NEP		.26	.14	1.92[a]	
NEP	Biospheric-altruistic	.82		.03	23.91	.67
NEP	Egoistic	−.10		.06	−1.64[a]	
PN	Biospheric-altruistic	.54		.07	8.07	
PN	Egoistic	−.17		.06	−2.81	

[a] non-significant values at $p \leq 0.05$.

processes girding intent-oriented behaviors that benefit the environment.

Our research results indicated a clear pattern of effects that can be referenced to "improve" stakeholders' decisions about minimizing environmental impact on the CINP. As predicted, reported behaviors related to management concerns were most likely to occur when expressions of norms that obligated action and/or inaction were activated. Specifically, personal moral norms were directly increased by the extent to which respondents considered biospheric-altruistic values to be guiding principles in life and felt responsible for minimizing environmental change. On the other hand, higher levels of egoistic value decreased the likelihood that normative pressures would lead to reported behavioral engagement. We also found that internal attribution of responsibility was positively predicted by respondents' awareness of impacts on natural and cultural resources, which was positively associated with environmental concerns that emerged from biospheric-altruistic values geared toward non-human species and other people.

5.1. Engagement in pro-environmental behavior

In this study we responded to a call for research to be conducted across a range of behaviors that directly and indirectly affect environmental quality (Poortinga et al., 2004). Individual's decisions to undertake actions relevant to the CINP ecoregion were conceptualized as public sphere behaviors that held potential to shape policies and management practices, consequently influencing broad drivers of environmental change (Stern, 2000). Our model carried moderate predictive power, in that personal norms accounted for 22% variance in our self-reported behavioral indicator. These findings align with past research showing that sets of VBN variables capture between 19% and 35% sample variance depending on the type of pro-environmental behavior examined (Stern et al., 1999). Emergent patterns may be attributable to the diversity and ease of performing different actions. It could be that some activities (e.g., volunteering at the park) were too costly and/or worked in conjunction with external factors (e.g., average income, state of residence) whereas others (e.g., supporting decisions about marine reserve design) may have been relatively common within the CINP. Overall, correlations between reported behaviors and our measures of internal processes reflected the importance of natural areas for generating feelings of environmentalism. Future research should continue to distinguish among forms of pro-environmental behaviors, and particularly in natural areas, develop context-specific measures that reflect management concerns about ecological and socio-cultural integrity (Halpenny, 2010; Ramkissoon, Smith, & Weiler, 2012).

5.1.1. Personal norms and beliefs

Activated personal norms were experienced as feelings of moral obligation that played important roles in the performance of PEB (Heberlein, 2012). A total of 82% variance in personal norms was accounted for by direct effects from ascription of responsibility and biospheric-altruistic values. The correlations we observed in these data were supported by past research (Norlund & Garvill, 2002; Stern et al., 1999) and the proportion of explained variance in our model was comparatively high. Steg et al. (2005), for instance, found that the preceding VBN variables – values, environmental worldviews, awareness, and responsibility – accounted for 49% variance in personal norms. Additionally, Bamberg and Möser (2007) conducted a meta-analysis across 46 independent studies of pro-environmental behavior and showed that four variables including awareness and responsibility accounted for 58% variance in personal norms. Past research suggests that models of self-reported behavior are influenced by multiple internal factors such as knowledge, motivations, and attitudes (Kollmuss & Agyeman, 2002), as well as circumstances external to an individual including infrastructure, economic pressures, and institutions (Guagnano et al., 1995; Steg & Vlek, 2009; Turaga, Howarth, & Borsuk, 2010). Although we did not incorporate these measures of internal and external factors, our findings illustrate that ascribed responsibility and biospheric-altruistic values carry potential for anticipating norm construction that likely stems behaviors reflective of CINP management concerns.

Consistent with propositions from the norm activation model, as survey respondents expressed higher levels of awareness that resource conditions were under threat and were willing to assume individual responsibility to prevent impacts, they felt obliged to engage in pro-environmental behavior. This portion of our model illustrated moderate predictive power of awareness leading to responsibility (33% variance) and NEP leading to awareness (25% variance), despite different levels of specificity between our NAM variables and the preceding, more cognitively stable measures of environmental worldview and value orientation (Dietz et al., 2005). Our findings align with Stern et al. (1999) who reported a relatively high R^2 value of .48 for awareness of consequences using the same predictors. However, these authors excluded measures of ascribed responsibility from their analysis, as have several others testing adaptations of the VBN model (e.g., Norlund & Garvill, 2002; Raymond, Brown, & Robinson, 2011). Although important contributions have been made using VBN as a guide, future research should be inclusive of ascribed responsibility because this construct represents an important piece of the social psychological puzzle surrounding behavioral engagement (Schwartz, 1977). A wealth of past research has shown that feelings of responsibility are conceptually distinct from other behavioral antecedents, and that individuals will not likely act in accordance with norms if they do not recognize the problems incurred from environmental degradation *and* take it upon themselves to seek a solution (Black, Stern, & Elworth, 1985; De Groot & Steg, 2009; de Ruyter & Wetzels, 2000). Future research including considerations of responsibility will also dovetail with and maintain possibilities for comparisons across research guided by the NAM and VBN models.

5.1.2. Environmental worldviews

In line with the VBN theory, we argue that personal norms, ascribed responsibility, and awareness of consequences are preceded by more general beliefs that can be assessed using the six-item NEP scale (Dunlap et al., 2000). Within the CINP ecoregion, we found that biocentric-oriented survey respondents with high NEP scores were more likely to assume responsibility, recognize impacts incurred from inaction, and report engagement in pro-environmental behavior (Poortinga et al., 2004; Wynveen, Kyle, & Sutton, in press). High levels of variance accounted for in NEP by biospheric-altruistic values (67% in the current study) have also been reported in previous research (Steg et al., 2005). These results confirm that broad conceptualizations of human–environment interactions are cognitive preconditions to norm activation and can be seen as a link between underlying value systems and belief structures such as awareness of consequences and ascribed responsibility (Stern, Dietz, et al., 1995).

5.1.3. Environmental values

Environmental values were represented by two dimensions that reflected humanistic tendencies (biospheric-altruistic value) and aspects of self-interest (egoistic value). This conceptualization of variables is supported by past research (Karp, 1996; Norlund & Garvill, 2002; Schultz & Zelezny, 1999; Schwartz, 1994; Stern & Dietz, 1994). Our results indicate that altruism toward non-

human species and other people are indistinguishable bases for the factors that drive pro-environmental behavior. This finding suggests that consequences for the environment and people give equal traction to the performance of individual reported behaviors. Much of the current environmental rhetoric (e.g., "ecosystem services" (Millennium Ecosystem Assessment, 2005)) justifies environmental protection by focusing relatively more attention on ramifications for people. To move environmentalism into a moral realm, our research suggests that problems need to be framed in a way that blends ethical considerations of impacts on the environment *and* the resultant effects for society.

5.2. Limitations and opportunities for future research

Much can be gleaned from the sequence of behavioral antecedents examined in this study, though several limitations warrant consideration. First, with regard to the chain of causality implied by the VBN theory, our use of cross sectional data allows us only to falsify hypotheses derived from the theory. Our use of structural equation modeling examines the congruence between the predicted variance–covariance matrix (Σ) and the sample (S) variance–covariance, where the structure of Σ is derived from theory. The resulting fit indices provide insight on the degree of congruence and the plausibility of the hypothesized model and theory. Our findings imply that the tenets of the VBN theory are plausible despite our use of cross-sectional data (Bollen, 1989; Kline, 2011). Ultimately, however, the tenability of the theory will emerge over time through testing with an array of research designs that include experimentation and the collection of longitudinal data.

The observed patterns in our data might also be attributable to the setting in which our research was conducted. Survey respondents that visited the park via public transportation were presented with multiple opportunities for learning about environmental management challenges. On-site interpretation (e.g., educational exhibits) largely facilitated by the NPS and volunteer-led tours shaped the visitor experience in a particular way and likely increased knowledge and awareness of management concerns (Powell & Ham, 2008). The intensity of interpretation, along with visitor characteristics and the nature of the site (Hughes & Morrison-Saunders, 2005), may have caused temporarily heightened levels of awareness that conditioned visitors to be concerned with specific kinds of impacts while visiting the park. However, pronounced biospheric-altruistic values were reported indicating stable and positive environmental orientations unlikely to change outside of the park context. Additionally, our testing of the VBN model using data drawn from a specific context offers a critical examination of the theory (and its hypotheses) and helps to define the boundaries of its propositions (Kyle, Graefe, Manning, & Bacon, 2004).

Broader representation of the CINP constituency and American public would provide a stronger basis for generalizing research findings. Although we offer a perspective on the predictive relations among factors that lead to reported behavioral engagement among on-site visitors, decision-makers should take caution when applying these results to frame widespread interventions. Multiple interest groups, not all of which were represented in the sampling design, have a stake in CINP resource management activities. For example, access to the CINP waters is almost exclusively maintained by a relatively small group of private boaters. Past research suggests the individuals that pursue water-based activities are residents of Santa Barbara County, fall within a socio-economic bracket amenable to expensive storage and maintenance fees of vessels, and maintain commitment to visiting the islands given the need for crossing ten miles of open ocean to visit the park (LaFranchi & Pendleton, 2008). This stakeholder group may have different environmental orientations and preferences than on-site visitors given their different socio-demographic traits (Oskamp & Schultz, 2005) and proximity to the park (Yoon, Kyle, van Riper, & Sutton, 2013). To better understand the tendencies of the entire CINP constituency, future research should cross-validate our findings and explore other segments of the survey population.

The conclusions drawn from this study could have been drawn using alternate methodological and theoretical frames. Advances in environmental psychology have established several promising avenues for predicting individual human behavior. For example, under assumptions of rationality, the theory of planned behavior (TPB) (Ajzen, 1985) could have guided this investigation and provided valuable insights on behavioral intentions and tendencies. Although this approach may have accounted for relatively high levels of explained variance via measures of intention (Kaiser et al., 2005), the inclusion of personal moral norms in the current study (as opposed to a focus on self-interest) showed strong predictive power across the antecedents of pro-environmental behavior. In response to an expressed need for research to consider the predictive power of multiple theoretical frames (Bamberg & Möser, 2007), results from our latent variable model can be more easily considered alongside TPB-related research findings. That is, this paper moves beyond the aggregated measures of antecedents often tested in VBN models and considers unobserved relations among variables. Thus, this study accounts for measurement error that may otherwise go undetected (Kaiser et al., 2007).

6. Implications for behavior change

We share implications emanating from this research to illustrate how managers and policymakers can activate behaviors that are beneficial for the CINP ecoregion. This information can guide intervention strategies that promote biological diversity and carries potential to be well-received by stakeholders in industrialized nations (Gardner & Stern, 1996; Steg & Vlek, 2009). The theoretical underpinnings of our model suggest that less stable determinants of environmentalism can be influenced to yield behavior change (Dietz et al., 2005). Our data indicate that public land management agencies will see more immediate results from outreach efforts that target variables farther down the "causal chain," namely variables within the NAM. That is, rather than attempting to tap values or worldviews, the most effective means for promoting pro-environmental behavior is via personal norms (Heberlein, 2012). On-site education and outreach efforts should be maintained and/or implemented to stimulate responses to environmental consequences and prevent responsibility denial by activating feelings of moral obligation among the environmentally conscious and affluent people that visit the CINP ecoregion. Decision-makers should also focus their efforts on preventing the deactivation of norms that create behavioral regularities and drive individual expectations.

Our research results provide guidance for on-site management interventions. Specifically, public land managers that oversee areas such as the CINP can consider adopting three approaches outlined by Heberlein (2012). First, "technological" changes to the biophysical world may involve creating more durable structures that are less susceptible to deterioration, which would effectively circumvent changes to behaviors such as damaging historic artifacts. Second, "structural" management tactics may involve expanding marine reserve networks or other policies that impose regulations on resource extraction. Finally, "cognitive" changes require decision-makers to have knowledge of attitudes, and on the CINP, may involve interpretive signage or educational messages about how to properly dispose of waste that exacerbates biological invasions. Cognitive solutions are most common and require

understandings of the internal processes highlighted in this study. However, this tactic will fail if implemented alone (McGuire, 1986). Technological, structural, and cognitive fixes are complementary approaches to shaping behavior and should be carefully executed and combined with other techniques to equip decision-makers with the tools for designing outreach strategies informed by visitor behavioral patterns.

7. Conclusion

Environmental psychology scholarship has provided insightful explanations of why internal processes do or do not give rise to behavioral engagement. This latent variable path analysis of the full VBN theory of environmentalism further advances theoretical understandings of the configuration and measurement properties of variables in this model. Investigations of small but important self-reported, context-specific behaviors performed by park visitors and the relations among antecedents to engagement will help to sustain special places such as the CINP that protect biological diversity, contribute to local economies, and support human well-being. The implications emanating from our research can guide management interventions that aim to encourage pro-environmental behavior in economically-developed nations.

Acknowledgments

We are grateful for the survey respondents that shared their knowledge and perspectives. We would also like to extend thanks to Russell Galipeau, Kate Faulkner and Yvonne Menard with the National Park Service for technical support throughout field work. Dustin Green, Travis Peters, and Michael Patillo assisted with data collection, and Drs. Stephen Sutton, Christian Brannstrom, and Amanda Stronza, offered conceptual guidance. This research was partially funded by the Human Dimensions of Natural Resources Laboratory (203903-90710) and is based on the first author's doctoral work as part of the Applied Biodiversity Sciences NSF-IGERT Program at Texas A&M University.

References

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl, & J. Beckmann (Eds.), *Action-control: From cognition to behavior* (pp. 11–39). Heidelberg: Springer.

Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracín, B. T. .Johnson, & M. P. Zanna (Eds.), *The handbook of attitudes* (pp. 173–221). Mahwah, NJ: Lawrence Erlbaum.

Amburgey, J. W., & Thoman, D. B. (2012). Dimensionality of the New Ecological Paradigm: Issues of factor structure and measurement. *Environment and Behavior, 44*, 1–22.

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103*, 411–423.

Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology, 27*, 14–25.

Bamberg, S., & Schmidt, P. (2003). Incentives, morality, or habit? Predicting students' car use for university routes with the models of Ajzen, Schwartz, and Triandis. *Environment and Behavior, 35*, 264–285.

Battaglia, M. P., Link, M. W., Frankel, M. R., Osborn, L., & Mokdad, A. H. (2008). An evaluation of respondent selection methods for household mail surveys. *Public Opinion Quarterly, 72*, 459–469.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*, 238–246.

Bernard, H. R. (2000). *Social research methods: Quantitative and qualitative approaches*. Thousand Oaks, CA: Sage Publications.

Black, J. S., Stern, P. C., & Elworth, J. T. (1985). Personal and contextual influences on household energy adaptations. *Journal of Applied Psychology, 70*, 3–21.

Bollen, K. A. (1989). *Structural equations with latent variables*. New York, NY: John Wiley.

Byrne, B. M., Shavelson, R. J., & Muthén, B. (1989). Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. *Psychological Bulletin, 105*, 456–466.

Cialdini, R. B. (2003). Crafting normative messages to protect the environment. *Current Directions in Psychological Science, 12*, 105–109.

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology, 58*, 1015–1026.

Cortina, J. M. (1983). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology, 78*, 98–104.

Davis, G. E. (2005). National Park stewardship and 'vital signs' monitoring: A case study from Channel Islands National Park, California. *Aquatic Conservation: Marine and Freshwater Ecosystems, 15*, 71–89.

De Groot, J. I. M., & Steg, L. (2009). Morality and prosocial behavior: The role of awareness, responsibility, and norms in the norm activation model. *The Journal of Social Psychology, 149*, 425–449.

Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental values. *Annual Review of Environment and Resources, 30*, 335–372.

Dunlap, R. E. (2008). The New Environmental Paradigm Scale: From marginality to worldwide use. *The Journal of Environmental Education, 40*, 3–18.

Dunlap, R. E., & Van Liere, K. D. (1978). The "New Environmental Paradigm": A proposed measuring instrument and preliminary results. *Journal of Environmental Education, 9*, 10–19.

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues, 56*, 425–442.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Gardner, G. T., & Stern, P. C. (1996). *Environmental problems and human behavior*. Boston: Allyn and Bacon.

Guagnano, G. A. (1995). Locus of control, altruism and agentic disposition. *Population and Environment, 17*, 63–77.

Guagnano, G. A., Stern, P. C., & Dietz, T. (1995). Influences on attitude-behavior relationships: A natural experiment with curbside recycling. *Environment and Behavior, 27*, 699–718.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis* (5th ed.). Upper Saddle River, NJ: Prentice Hall.

Halpenny, E. A. (2010). Pro-environmental behaviours and park visitors: The effect of place attachment. *Journal of Environmental Psychology, 30*, 409–421.

Hawcroft, L. J., & Milfont, T. L. (2010). The use (and abuse) of the new environmental paradigm scale over the last 30 years: A meta-analysis. *Journal of Environmental Psychology, 30*, 143–158.

Heberlein, T. A. (1972). The land ethic realized: Some social psychological explanations for changing environmental attitudes. *Journal of Social Issues, 28*, 79–87.

Heberlein, T. A. (1977). Norm activation and environmental action: A rejoinder to R. E. Dunlap and K. D. Van Liere. *Journal of Social Issues, 33*, 207–211.

Heberlein, T. A. (2012). *Navigating environmental attitudes*. New York, NY: Oxford University Press.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55.

Hughes, M., & Morrison-Saunders, A. (2005). Influence of on-site interpretation intensity on visitors to natural areas. *Journal of Ecotourism, 4*, 161–177.

Hunter, L. M., & Rinner, L. (2004). The association between environmental perspective and knowledge and concern with species diversity. *Society and Natural Resources, 17*, 517–532.

Joireman, J. A., Lasane, T. P., Bennett, J., Richards, D., & Solaimani, S. (2001). Integrating social value orientation and the consideration of future consequences within the extended norm activation model of proenvironmental behaviour. *British Journal of Social Psychology, 40*, 133–155.

Kaiser, F. G., & Gutscher, H. (2003). The proposition of a general version of the theory of planned behavior: Predicting ecological behavior. *Journal of Applied Social Psychology, 33*, 586–603.

Kaiser, F. G., Hubner, G., & Bogner, F. X. (2005). Contrasting the Theory of Planned Behavior with the Value-Belief-Norm model in explaining conservation behavior. *Journal of Applied Social Psychology, 35*, 2150–2170.

Kaiser, F. G., Schultz, P., & Scheuthle, H. (2007). The theory of planned behavior without compatibility? Beyond method bias and past trivial associations. *Journal of Applied Social Psychology, 37*, 1522–1544.

Karp, D. G. (1996). Values and their effect on pro-environmental behavior. *Environment and Behavior, 28*, 111–133.

Kellert, S. R., & Wilson, E. O. (1993). *The biophilia hypothesis*. Washington D.C.: Island Press.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York, NY: The Guilford Press.

Knight, A. J. (2008). "Bats, snakes and spiders, Oh my!" How aesthetic and negativistic attitudes, and other concepts predict support for species protection. *Journal of Environmental Psychology, 28*, 94–103.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior. *Environmental Education Research, 8*, 239–260.

Kyle, G., Graefe, A., Manning, R., & Bacon, J. (2004). Effects of place attachment on users' perceptions of social and environmental conditions in a natural setting. *Journal of Environmental Psychology, 24*(2), 213–225.

LaFranchi, C., & Pendleton, L. (2008). *Private boating and boater activities in the Channel Islands: A spatial analysis and assessment*. Report prepared for The Resources Legacy Fund Foundation and The National Marine Sanctuary Program.

Leopold, A. (1970). *A Sand County almanac: With essays on conservation from Round River*. New York: Ballantine Books.

McGuire, W. J. (1986). *The myth of massive media impact: Savagings and salvagings*. In *Public communication and behavior* (Vol. 1) (pp. 173–257).

Milfont, T. L., & Duckitt, J. (2004). The structure of environmental attitudes: A first- and second-order confirmatory factor analysis. *Journal of Environmental Psychology, 24*, 289–303.

Millennium Ecosystem Assessment. (2005). *Ecosystems and human well-being: Health synthesis*. Washington D.C.: Wold Health Organization.

Montada, L., & Kals, E. (2000). Political implications of psychological research on ecological justice and proenvironmental behaviour. *International Journal of Psychology, 35*, 168–176.

Muthén, L. K., & Muthén, B. O. (2012). *Mplus user's guide* (7th ed.). Los Angeles, CA: Muthén & Muthén.

Noe, F. P., & Hammitt, W. E. (1992). Environmental attitudes and the personal relevance of management actions in a park setting. *Journal of Environmental Management, 35*, 205–216.

Nooney, J. G., Woodrum, E., Hoban, T. J., & Clifford, W. B. (2003). Environmental worldview and behavior: Consequences of dimensionality in a survey of North Carolinians. *Environment and Behavior, 35*, 763–783.

Norlund, A. M., & Garvill, J. (2002). Value structures behind proenvironmental behavior. *Environment and Behavior, 34*, 740–756.

NPS. (2006). *Mediterranean coast network – Vital signs monitoring plan*. Natural Resources Technical Report NPS/MEDN/NRTR—2007/001. Thousand Oaks, CA: National Park Service.

Oreg, S., & Katz-Gerro, T. (2006). Predicting proenvironmental behavior cross-nationally: Values, the theory of planned behavior, and value-belief-norm theory. *Environment and Behavior, 38*, 462–483.

Oskamp, S., & Schultz, P. W. (2005). *Attitudes and opinions* (3rd ed.). Mahwah, NJ: Erlbaum.

Pierce, J. C., Steger, M. E., Steel, B. S., & Lovrich, N. P. (1992). *Citizens, political communication, and interest groups: Environmental organizations in Canada and the United States*. Westport, CT: Praeger.

Poortinga, W., Steg, L., & Vlek, C. (2004). Values, environmental concern, and environmental behavior: A study into household energy use. *Environment and Behavior, 36*, 70–93.

Porter, B. E., Leeming, F. C., & Dwyer, W. O. (1995). Solid waste recovery: A review of behavioral programs to increase recycling. *Environment and Behavior, 27*, 122–152.

Powell, R. B., & Ham, S. H. (2008). Can ecotourism interpretation really lead to pro-conservation knowledge, attitudes and behaviour? Evidence from the Galapagos Islands. *Journal of Sustainable Tourism, 16*, 467–489.

Ramkissoon, H., Smith, L. D. G., & Weiler, B. (2012). Relationships between place attachment, place satisfaction and pro-environmental behaviour in an Australian national park. *Journal of Sustainable Tourism, 21*, 434–457.

Raymond, C. M., Brown, G., & Robinson, G. M. (2011). The influence of place attachment, and moral and normative concerns on the conservation of native vegetation: A test of two behavioural models. *Journal of Environmental Psychology, 31*, 323–335.

van Riper, C. J., Kyle, G. T., Sutton, S. G., Yoon, J. I., & Tobin, R. C. (2013). Australian residents' attitudes toward pro-environmental behaviour and climate change impacts on the Great Barrier Reef. *Journal of Environmental Planning and Management, 56*, 494–511.

Rokeach, M. (1973). *The nature of human values*. New York, NY: Free Press.

de Ruyter, K., & Wetzels, M. (2000). With a little help from my fans – Extending models of pro-social behavior to explain supporters' intentions to buy soccer club shares. *Journal of Economic Psychology, 21*, 387–409.

Schultz, P. W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology, 21*, 327–339.

Schultz, P. W. (2011). Conservation means behavior. *Conservation Biology, 25*, 1080–1083.

Schultz, P. W., Gouveia, V. V., Cameron, L. D., Tankha, G., Schmuck, P., & Franěk, M. (2005). Values and their relationship to environmental concern and conservation behavior. *Journal of Cross-Cultural Psychology, 36*, 457–475.

Schultz, P. W., Oskamp, S., & Mainieri, T. (1995). Who recycles and when? A review of personal and situational factors. *Journal of Environmental Psychology, 15*, 105–121.

Schultz, P. W., & Zelezny, L. (1999). Values as predictors of environmental attitudes: Evidence for consistency across 14 countries. *Journal of Environmental Psychology, 19*, 255–265.

Schwartz, S. H. (1968). Words, deeds and the perception of consequences and responsibility in action situations. *Journal of Personality and Social Psychology, 10*, 232–242.

Schwartz, S. H. (1973). Normative explanations of helping behavior: A critique, proposal, and empirical test. *Journal of Experimental Social Psychology, 9*, 349–364.

Schwartz, S. H. (1977). *Normative influences on altruism*. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 10); (pp. 222–279). New York, NY: Academic Press.

Schwartz, S. H. (1994). Are there universal aspects in the structure and contents of human values? *Journal of Social Issues, 50*, 19–45.

Schwartz, S. H. (1999). A theory of cultural values and some implications for work. *Applied Psychology, 48*, 23–47.

Schwartz, S. H., & Bilsky, W. (1994). Toward a universal psychological structure of human values. *Journal of Personality Social Psychology, 53*, 550–562.

Steg, L., Dreijerink, L., & Abrahamse, W. (2005). Factors influencing the acceptability of energy policies: A test of VBN theory. *Journal of Environmental Psychology, 25*, 415–425.

Steg, L., Perlaviciute, G., van der Werff, E., & Lurvink, J. (2014). The significance of hedonic values for environmentally relevant attitudes, preferences, and actions. *Environment and Behavior, 46*, 163–192.

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology, 29*, 309–317.

Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. *Personality and Individual Differences, 42*, 893–898.

Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues, 56*, 407–424.

Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues, 50*, 65–84.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review, 6*, 81–97.

Stern, P. C., Dietz, T., & Black, J. S. (1985). Support for environmental protection: The role of moral norms. *Population and Environment, 8*, 204–222.

Stern, P. C., Dietz, T., & Guagnano, G. A. (1995). The New Ecological Paradigm in social-psychological context. *Environment and Behavior, 27*, 723–743.

Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behavior, 25*, 322–348.

Stern, P. C., Kalof, L., Dietz, T., & Guagnano, G. A. (1995). Values, beliefs, and proenvironmental action: Attitude formation toward emergent attitude objects. *Journal of Applied Social Psychology, 25*, 1611–1636.

Tarrant, M. A., & Cordell, H. K. (1997). The effect of respondent characteristics on general environmental attitude-behavior correspondence. *Environment and Behavior, 29*, 618–637.

Turaga, R. M. R., Howarth, R. B., & Borsuk, M. E. (2010). Pro-environmental behavior: Rational choice meets moral motivation. *Annals of the New York Academy of Sciences, 1185*, 211–224.

Vaske, J. J., & Donnelly, M. P. (1999). A value-attitude-behavior model predicting wildland preservation voting intentions. *Society & Natural Resources, 12*, 523–537.

Vining, J., & Ebreo, A. (2002). Emerging theoretical and methodological perspectives on conservation behavior. In R. B. Bechtel, & A. Churchman (Eds.), *Handbook of environmental psychology* (pp. 541–558). New York: Wiley.

Wynveen, C. J., Kyle, G. T., & Sutton, S. G. (2014). Environmental worldview, place attachment, and awareness of environmental impacts in a marine environment. *Environment and Behavior* (in press).

Yoon, J., Kyle, G. T., van Riper, C. J., & Sutton, S. G. (2013). Testing the effects of constraints on climate change–friendly behavior among groups of Australian residents. *Coastal Management, 41*, 457–469.