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The Awareness of Consequences Scale: An Exploration, Empirical Analysis, and Reinterpretation[1]

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The value–belief–norm model assumes that egoistic, social-altruistic, and biospheric value orientations causally influence how people cognitively structure beliefs regarding adverse environmental consequences. Empirical studies have administered the Awareness of Consequences (AC) scale to differentiate between these 3 orientations. We report an analysis that challenges previous work in the field. Evidence is presented that indicates the AC scale should be reinterpreted as a measure of beliefs supporting environmental action and beliefs supporting environmental inaction. The beliefs supporting environmental action appear to be differentiable according to beliefs in the positive consequences from environmental protection and the seriousness of environment harm. This has major implications for the value–belief–norm model and its application.

Climate change; biodiversity loss; pollution of air, water, and soil; and resource shortages are some of the environmental challenges of the 21st century. Tackling ecological problems implies modifying a range of human behaviors conducted by the whole spectrum of societal actors from the

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individual citizen to corporations and governments. A variety of motives may stimulate or prevent action. Theoretical models can help identify key drivers and obstacles to achieving behavioral change. Policy-relevant behavioral models provide a descriptive account of the interactions between variables and are subject to empirical testing. Developing such models has been the aim of social psychologists working on environmental problems. Psychometric scales are then typically employed to measure attitudes and beliefs, which are sometimes connected to foundational values. Such attitudes and beliefs are regarded as key explanatory variables for human behavior.

Since Heberlein (1981) noted the need for understanding how people cognitively organize beliefs and feelings about environmental issues, there has been a growth in environmental-attitude/behavior research resulting in a range of models (Ajzen, 1991; Grob, 1995; Homburg & Stolberg, 2006; Ohtomo & Hirose, 2007). However, developing environmental scales is difficult because environmental issues are inherently complex, and involve multiple perspectives and plural values (Spash, 2000c). Some studies (Hawcroft & Milfont, 2010; Milfont & Duckitt, 2004) have challenged the interpretation of two widely employed scales, the New Environmental Paradigm (NEP; Dunlap & Van Liere, 1978; Dunlap, Van Liere, Mertig, & Jones, 2000) and the Ecocentric and Anthropocentric Environmental Attitude scale (Thompson & Barton, 1994), alongside several less popular scales.

The current study critically investigates environmental scales arising from the value–belief–norm (VBN) model of Stern and colleagues (Stern, 2000; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). Stern, Dietz, and Kalof (1993) integrated assumptions made by several other theories into a broader behavioral framework of environmental intentions, which developed into the VBN. This has become one of the most popular and prominent behavioral models in environmental psychology (De Groot & Steg, 2007, 2008; Kaiser, Hübner, & Bogner, 2005; Nordlund & Garvill, 2003; Oreg & Katz-Gerro, 2006; Steg & De Groot, 2008; Steg, Dreijerink, & Abrahamse, 2005).

The VBN model proposes that value orientations influence various environmental perceptions and behavior. It outlines three value orientations related to the ego, social-altruism, and the biosphere (Stern, Dietz, & Guagnano, 1995), which are expected to be distinguishable, although correlated (Stern et al., 1993). The value orientations are hypothesized to directly influence the ways in which people formulate and structure environmental beliefs (Stern, 2000). Psychological scales have been developed to measure the models' proposed environmental beliefs. These scales have then been administered in studies that examine various environmental behaviors, such as political action and willingness to pay for environmental improvements. There have also been attempts to use the value-orientation-based belief

Table 1

Examples of Awareness of Consequences and Environmental Concern Scales Items

Awareness of Consequences Scale	Environmental Concern Scale
Egoistic items • Environmental protection will provide a better world for me and my children. • Protecting the environment will threaten jobs for people like me. *Social/altruistic items* • Environmental protection will help people have a better quality of life. • The effects of pollution on public health are worse than we realize. *Biospheric items* • Over the next several decades, thousands of species will become extinct. • Claims that current levels of pollution are changing earth's climate are exaggerated.	*Egoistic items* I am concerned about environmental problems because of the consequences for: • My lifestyle • My health *Social/altruistic items* I am concerned about environmental problems because of the consequences for: • All people • People in the community *Biospheric items* I am concerned about environmental problems because of the consequences for: • Birds • Plants

scales to interpret contingent valuation on the basis of whether people are egoistically, altruistically, or biospherically motivated (see reviews in Spash, 2000b, 2006).

However, studies attempting to demonstrate that people cognitively differentiate between beliefs about egoistic, social-altruistic, and biospheric consequences have given mixed empirical results. Two approaches have been employed: the Environmental Concern (EC) scale, and the AC scale. Table 1 displays examples of EC and AC questions used to create the scales. Applications using the EC scale have provided supporting evidence that people do cognitively construct their environmental concerns consistent with the three VBN value orientations (Hansla, Gamble, Juliusson, & Gärling, 2008; Milfont, Duckitt, & Cameron, 2006; Schultz, 2000, 2001; Schultz, Shriver, Tabanico, & Khazian, 2004; Snelgar, 2006), while those employing the AC scale have reported poor subscale reliabilities, theoreti-

cally inconsistent subscale correlations, and poor dimensionality (Gärling, Fujii, Gärling, & Jakobsson, 2003; Hansla et al., 2008; Joireman, Lasane, Bennett, Richards, & Solaimani, 2001; Stern et al., 1993; Stern, Dietz, Kalof, & Guagnano, 1995).

Whether the AC scale is a good measure of the three underlying value orientations has been questioned (Snelgar, 2006; Spash, 2006). Even Stern and colleagues (Stern, Dietz, & Guagnano, 1995; Stern, Dietz, Kalof et al., 1995) have concluded that the AC scale measures only a single General Awareness of Consequences (GAC) construct. However, no study has yet investigated the possibility that the AC scale may be measuring an alternative cognitive process for explaining behavior.

This paper aims to do so by reanalyzing previously reported data. Across two studies, three samples (*N*s = 572, 511, and 531) were collected in face-to-face interviews with members of the general public in the United Kingdom (UK) as part of ongoing work relating to economic valuation of the environment using contingent valuation (Spash, 2000a, 2006; Spash et al., 2009). Previously published results from the first study (see Spash, 2006) were interpreted as consistent with a separation between *selfish-altruism* (the concept of altruism found in mainstream economics), where gain to others is of direct benefit to the individual, and *social-altruism*, where benefiting others is an end in itself. The AC social-altruistic scale can then be seen as a mixture of items from these two categories. The evidence supported the idea of selfish-altruism being related to egoism, while social-altruism was associated with biospherism; that is, a two-factor solution. This paper reanalyzes data from the first Spash (2006) study, and analyzes new data from a second study. The results reported here indicate that AC scale factors are not oriented toward the self, others, or the biosphere. It is also proposed that the AC scale does not simply measure a one-factor solution. Therefore, interpreting the content and meaning of the scale requires reconceptualizing the model.

Awareness of Consequences Theory and Measurement

Stern et al.'s (1993) social psychological theory is based on assumptions that originate from Schwartz's (1977) norm activation model. The norm activation model describes altruistic behavior as the result of an individual being explicitly aware of consequences in terms of the social harm of not performing a particular behavior and that the individual accepts responsibility for performance of that behavior. Awareness of consequences combined with accepting responsibility increases the probability that a person will feel morally obliged to act. The VBN model changes Schwartz's definition in two ways. First, the *awareness of harmful consequences* construct, which originally

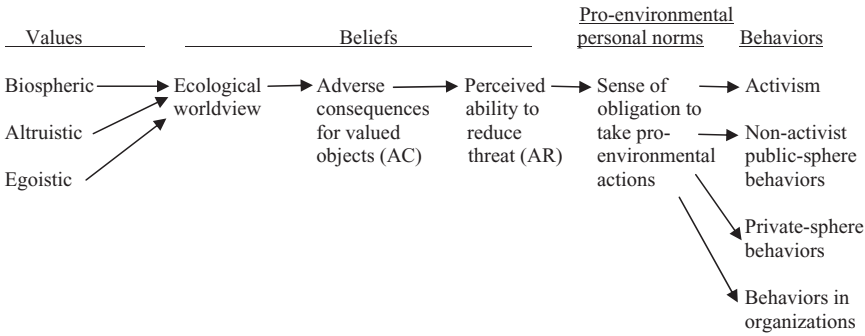

Figure 1. Value–belief–norm model (adapted from Stern, 2000).

described an explicit awareness of consequences, is extended to include beliefs about potential future world states. For example, an individual may interpret the AC item "Thousands of species will die within the next decade" to be a prediction of a future state that may or may not happen. Second, an individual's awareness of adverse consequences is assumed to be organized around the three value orientations pertaining to oneself, other humans, and nonhumans. A diagrammatic depiction of the VBN model is presented in Figure 1.

Stern et al. (1993) described the three value orientations as logically distinct relationships concerning self-interest, altruism toward other humans, and altruism toward other species and the biosphere. *Value orientations* are defined as being guiding principles regarding states or outcomes that are desirable or appropriate (Rokeach, 1973; Schwartz, 1992; Stern et al., 1999). VBN theory posits that an individual's value orientation causally influences his or her beliefs relating to adverse consequences, because factual information congruent with an individual's value orientation is given more weight than value-incongruent information (Stern, 2000; Stern & Dietz, 1994; Stern et al., 1999). That is,

> A strong value orientation may lead someone to seek information selectively or to attend selectively to information about the consequences of an environmental condition for particular valued objects, and therefore to develop beliefs about those consequences that will guide action. (Stern & Dietz, 1994, p. 68)

Thus, an individual is assumed to be more receptive to certain information, depending on their value orientation, which then causally influences their beliefs. At the same time, Stern, Dietz, and Guagnano (1995) noted that beliefs can be judged according to criteria of truthfulness, because "beliefs . . .

are in principle vulnerable to empirical challenge" (pp. 727–728). This second possibility, however, has not been formally included in the VBN model.

In defining attitudes, the theory of planned behavior (Ajzen, 1991) also refers to the concept of beliefs. *Attitudes* are described as comprising an assessment of outcome desirability and of the subjective probability that a behavior will produce a certain outcome. Ajzen referred to the pragmatic subjective probability component of an attitude as being a belief. In contrast, the VBN lacks a formal process by which factual information can influence beliefs regarding adverse environmental consequences. The theorized VBN link between value orientations and beliefs may be weakened by believable freely available information, which proves incompatible with an individual's value orientation. For example, the mass media may convince an individual that many species may die in the near future, even if that person has a weak biospheric value orientation.

The environmental concern construct can be distinguished from beliefs about adverse environmental consequences. EC has been defined as being rooted in feelings of interconnectedness and empathy with regard to others or the natural environment (Schultz, 2000, 2001). Value orientations may bias information processing via an affective or emotive process that ultimately influences what an individual is concerned about, rather than what the individual factually believes. Under such circumstances, the EC construct would be expected to have a closer relationship with egoistic, altruistic, and biospheric orientations than beliefs concerning factual statements about the environment.

Whether people cognitively differentiate their environmental concerns and beliefs based on Stern et al.'s (1993) proposed value orientations is a hypothesis open to empirical investigation. The EC scale constructed by Schultz (2000) has produced the most supportive results. As displayed in Table 1, the EC scale employs the statement "I am concerned about environmental problems because of consequences for '_____.'" Respondents are then asked to rate nouns such as *me*, *my health*, *people in the community*, *future generations*, *plants*, *trees*, and *whales*. EC studies have reported exploratory and confirmatory analyses that support the hypothesized factor structure, as well as strong subscale reliabilities and reasonably interpretable correlations between subscales (Hansla et al., 2008; Milfont et al., 2006; Schultz, 2000, 2001; Schultz et al., 2004; Snelgar, 2006). Such results provide evidence that people do differentiate adverse environmental concerns according to the proposed value orientations.

The items in the AC scale seem to have been designed based on a factual cause-and-consequence formula. Each item is a statement proposing that a cause (e.g., pollution, environmental protection) will affect a target; that is, either oneself (ACego), others (ACsoc), or the biosphere (ACbio). For

example, a biospheric item might be related to the problem of tropical deforestation, with the consequences being for the Earth as a whole, producing an item statement "Tropical rain forests are essential to maintaining a healthy planet Earth." The wording of items is generally kept simple, and there appears to be a desire for some variety of positively and negatively phrased questions on each AC category to construct the overall scale. Yet, within this structure, alternative interpretations of an item seem possible and the task facing a respondent can involve unforseen complexities. Respondents may then interpret the AC items and cluster them based on alternative and unexpected criteria.

Closed-ended questionnaire items must present participants with a restricted representation of an issue. Wording and framing of items are well known influences on how people interpret the meaning of a questionnaire (Tversky & Kahneman, 1981; Wang, Simons, & Bredart, 2001). Linguistic and cognitive scientists (Croft & Cruse, 2004; Lakoff, 1987; Pinker, 1998, 2007) have also noted that some variations of a statement or sentence will result in a listener or reader extracting precisely the same meaning, while others, with seemingly subtle sentence variations, can result in the recipient forming radically different interpretations. Similarly, item sequence, the response scale, and the overall questionnaire format can influence responses (Schwarz, 1999, 2007a, 2007b; Schwarz & Bohner, 2001; Schwarz & Strack, 1991). Hence, constructing an instrument that successfully differentiates between VBN value orientations requires more than simply designing a set of items that mention consequences affecting egoistic, social, or biospheric targets. In particular, an individual may fail to cognitively construct an interpretation based on his or her value orientations if confronted by items that appear to be factual statements.

Table 2 displays subscale reliabilities reported by a variety of published studies (Gärling et al., 2003; Hansla et al., 2008; Joireman et al., 2001; Snelgar, 2006; Stern et al., 1993; Stern, Dietz, Kalof et al., 1995). These show weak to moderate results. Early on, Stern et al. (1993) reasoned that moderate reliabilities might be a result of too few items being administered. However, both Gärling et al. and Hansla et al. had to remove an item from each scale in order to improve reliability, while Joireman et al. reported only moderate reliabilities despite having four- to five-item scales. Most studies conclude that a better set of items would improve reliability. That quest is undoubtedly, in turn, responsible for the variety found in published versions of the scale.

Several versions (i.e., using different items) of the AC scale have reported an assortment of measurement problems, including confusing correlation patterns with other scales, which suggest that the questionnaire might have low construct validity. Schwartz's (1992) self-enhancement scale has been

Table 2

Published Reliability Statistics for Awareness of Consequences Subscales

	Awareness of Consequences Scales		
	ACego	ACsoc	ACbio
Cronbach's α			
Hansla et al. (2008)	.64 (2 items)	.56 (2 items)	.56 (3 items)
Snelgar (2006)	.30 (4 items)	.56 (5 items)	.46 (4 items)
Gärling et al. (2003)	.45 (2 items)	.42 (2 items)	.54 (2 items)
Joireman et al. (2001)	.67 (4 items)	.76 (5 items)	.65 (4 items)
Theta reliability			
Stern et al. (1993)	.66 (3 items)	.62 (3 items)	.56 (3 items)
Stern, Dietz, Kalof et al. (1995)	.77 (2 items)	.71 (2 items)	.73 (4 items)

proposed as a measure of egoistic value orientation, while the self-transcendence scale has been proposed as a measure of social-altruistic and biospheric value orientations combined as one factor. Schwartz's self-transcendence and self-enhancement scales have been found to correlate negatively, which suggests that ACego scales should be negatively correlated with ACsoc and ACbio measures. However, studies have regularly reported positive correlations between all AC subscales (Joireman et al., 2001; Snelgar, 2006; Stern et al., 1993). The exception is Hansla et al. (2008), who found that administering a questionnaire including only negatively framed AC items produced a pattern consistent with the ACego scale being negatively correlated with the other two subscales. Of greater concern to the construct validity of the AC scale is the finding that the ACego scale fails to correlate positively with Schwartz's self-enhancement scale (Stern, Dietz, Kalof et al., 1995) or the EC egoistic scale (Snelgar, 2006).

There have also been contradictory claims concerning the dimensionality of the AC scale. Snelgar (2006) has criticized studies (Stern et al., 1993; Stern, Dietz, Kalof et al., 1995) employing a theta scaling procedure because this avoids dimensionality tests. There is no agreement as to how many dimensions the AC scale measures, although the original goal was to assess beliefs relating to the three value orientations. Another major problem has been the high correlation between subscales. Subscales are reported to share the same variance as follows: 18.50% to 36.00% for Stern et al. (1993); 29.16% to 38.44% for Joireman et al. (2001); and 8.24% to 14.98% for Snelgar (2006).

While Stern et al. (1993) foresaw the potential for significant correlations between the three AC beliefs, the amount of shared variance is worrisome. Stern et al. took the high correlation between the subscales as an indication that "value orientations may be part of a single perceptual package" (p. 340). This conclusion has been supported by studies where principal components analysis (PCA) yielded a one-factor solution (Stern, Dietz, & Guagnano, 1995; Stern, Dietz, Kalof et al., 1995). The authors concluded that, rather than being a measure of the three value orientations, the AC scale measures a single construct: the aforementioned GAC. Spash (2006), however, found a three-factor solution with the first loading most on egoistic and social items, the second on social and biospheric, and the third combining all three value orientations. Snelgar (2006) found that from two to five factors could be extracted using principal axis factoring, both with varimax and direct oblimin rotations, and also PCA. She concluded, "No clear structure was obtained with any of these analyses. Thus, it is not appropriate to attempt to label any of the factors/components" (p. 91).

Doubts that the scales accurately measure three distinctive elements has led to calls for improvement by varying the number of items (Stern et al., 1993) or administering negative items only (Hansla et al., 2008). However, Snelgar (2006), who presented a thorough investigation of the measurement properties of the AC questionnaire, provided the most pessimistic prognosis. Her conclusion is that the EC scale is a better instrument and should be used in preference to the AC scale. However, another possibility is that the AC items are being cognitively categorized using criteria fundamentally different from the value orientation system hypothesized by VBN authors.

Alternative Interpretations

A range of researchers have so far expressed concern about the state of the AC questionnaire. If the questionnaire is found to elicit a response pattern that is incompatible with the VBN, this may prove to be a valuable insight into how people cognitively organize environmental beliefs. Noting that respondents fail to adopt the desired response pattern leaves two investigative strategies. One approach is to scrap the scale, start afresh, and aim to measure the theoretical model employing many more new items or a different response scale. The other approach requires investigating why the scale proves a poor measure of the proposed model (Schwarz, 2007b). This would include looking for unexpected questionnaire response patterns that explain how people are constructing their environmental attitudes and beliefs. A response pattern that is consistently found—even when questionnaire context, participant demographics, and response scale are varied—would indicate that an alternative interpretation of the scale is required.

Previous studies have provided some clues for alternative cognitive processes that could account for AC scale responses. Spash (2006) found a factor combining equal loadings across all three value orientations. This was interpreted as "an anti-environmental sentiment or lack of worry over possible environmental problems and a concern about the potential negative personal consequences of environmental protection" (p. 611). The implication drawn is that negative egoistic attitudes failed to form part of the egoistic scale and seemed to separate out. Hansla et al. (2008) found that AC subscale correlations demonstrated a different pattern when using only the items phrased in terms of negative outcomes. These results suggest that respondents may sort negative environmental consequences into a distinctive perceptual category and positive consequences into a separate category. Furthermore, Snelgar (2006)—after pointing out that VBN theory is based on the assumption that environmental action is motivated by beliefs that environmental consequences will be adverse—commented that

> The beliefs part of the theory can also be considered in terms of perceived costs and benefits for valued objects. Behavioral intention will be influenced by the perceived costs and benefits of a particular environmental action for each set of valued objects, weighted according to the individual's relative value orientations. (p. 88)

The PCA matrix reported by Snelgar (2006) also suggests that people might differentiate between the positive and negative consequences of not taking environmental action.

Indeed, there is strong empirical evidence that people are very sensitive as to whether statements are framed positively or negatively. The theory of planned behavior, which is a consequentialist theory, suggests that people naturally ascribe a positive or negative value to their attitudes (Ajzen, 1991). Prospect theory (Kahneman & Tversky, 1979) argues that individuals construct a reference point and then treat gains differently from losses. This is supported by the endowment effect (Kahneman, Knetsch, & Thaler, 1990, 1991), and the economic literature contrasting willingness to pay for environmental improvements with willingness to accept compensation for environmental damages (Knetsch, 1994, 2005). A plethora of framing studies—such as Tversky and Kahneman's (1981) Asian disease problem—suggest that choices can depend on whether the task is perceived in terms of gains or losses.

Regulatory focus theory (Higgins, 1987, 2000) suggests that people differentiate between the pursuit of gains and the avoidance of losses, and employ distinctive strategies to deal with each of these situations. Framing in terms of gains evokes a *promotion focus* that leads to growth-related strategies that strive to obtain an ideal goal. Framing in terms of losses can form

a *prevention focus*, resulting in strategies to increase personal security in "what ought to be." Thus, a set of statements mentioning positive or negative consequences for the environment may evoke the distinction between individuals' promotion or prevention stance (Semin, Higgins, Gil de Montes, Estourget, & Valencia, 2005), rather than the categories suggested by the VBN model.

Another possible criterion that respondents might employ to categorize AC questionnaire items is whether the items mention environmental protection, which implies that the environment is being proactively safeguarded by human action. Some AC items imply environmental action (e.g., "Environmental protection is beneficial to my health"), while others do not (e.g., "The effects of pollution on public health are worse than we realize"; "Claims that we are changing the climate are exaggerated"). Anderson (2003) argued that the psychological literature has often ignored fundamental differences between action and inaction and that, other things being equal, people generally prefer no change. He referred to the principle of conservation of energy as an explanation. For example, the option of environmental protection may involve inconvenience and monetary losses that are less salient under inaction. A range of psychological literature has found that people prefer to do nothing, as opposed to performing an action; for example, status quo bias (Samuelson & Zeckhauser, 1988), omission bias (Ritov & Baron, 1990, 1992), inaction inertia (Tykocinski, Pittman, & Tuttle, 1995), and choice deferral (Dhar, 1996).

In summary, no one has yet provided good evidence that the AC scale is a measure of Stern et al.'s (1993) hypothesized structure. The AC scale has been described as providing a one-factor solution (Stern, Dietz, & Guagnano, 1995; Stern, Dietz, Kalof et al., 1995) or as being a poor scale (Snelgar, 2006). Yet, the AC scale may still be able to provide some insight into how people construct their environmental beliefs. There is strong empirical research suggesting people cognitively differentiate between positive and negative outcomes, as well as being sensitive to whether a proposal implies action or inaction.

In order to explore whether the AC scale is a measure of an alternative cognitive process, the research reported next compares three public samples collected in the context of willingness to pay surveys and a convenience sample collected by Snelgar (2006). These data sets vary by the context in which the AC scale was administered, as well as sample size, population characteristics, item presentation order, and response scale. Bryman (1988) noted that linking concepts to measurement can often be a much more inductive exercise than implied by the classical social science model. In this vein, the approach of the current paper is both exploratory and inductive, while drawing upon a confirmatory analysis.

Data and Method

In order to analyze the psychometric properties of the AC scale, we utilized three data sets that were collected as part of research on the contingent valuation of environmental proposals. Two of these data sets were collected as part of the same study (i.e., Spash Study 1), but were differentiated based on whether the AC items were presented sequentially or mixed with other questions.[3] We will refer to the other study as *Spash Study 2*. In all three of the contingent valuation samples, the respondents were (a) members of the general public in the UK approached at home by an independent market research company; (b) recruited via a stratified random sampling procedure; and (c) verbally administered the AC questions in a face-to-face interview. These surveys were designed and all related research coordinated by Spash and funded as part of European Community projects (see Footnote 1).

These surveys included 13 AC items designed by Stern and colleagues taken from the following studies: Stern et al. (1993); Guagnano, Dietz, and Stern (1994); Stern, Dietz, and Guagnano (1995); and Stern, Dietz, Kalof et al. (1995). In reviewing the literature, the number of distinct biospheric items was found to be limited to just three; therefore, an extra item was designed and added by Spash (2006; see Table 3, Item ACbio4). Similarly, Snelgar (2006) also designed an additional biospheric item (see Table 3, Item ACbio5). While the number of items employed seems small for measuring a multi-attribute scale, the work on AC scales has often used even fewer items than in the work by Spash (2006) and by Snelgar.

Spash Study 1: Random Condition and Non-Random Condition

The survey was conducted to assess the maximum amount people would personally be willing to pay each quarter on their electricity bill over the next year to restore biodiversity in the river Tummel and its surrounding area. In total, 1,069 residents from several Scottish regions participated in the study. The questionnaire contains 50 items, including the 13 AC items displayed in Table 3. Participants answered the AC questions on a 7-point Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Two conditions were administered in Spash Study 1. One group of participants was administered the AC items in a sequential, non-random order; while the other answered the AC items mixed in with other survey questions. These responses from these two conditions were analyzed separately because altering the order of questionnaire items can influence responses (Schwarz,

[3]See Spash (2006) for more information.

Table 3

Awareness of Consequences Scale Items in Recent Studies

	Administered		
	Spash 1	Spash 2	Snelgar (2006)
ACego1: Environmental protection will provide a better world for me and my children.	✔	✔	**X**
ACego2: Environmental protection is beneficial to my health.	✔	✔	✔
ACego3: Protecting the environment will threaten jobs for people like me.	✔	✔	✔
ACego4: Laws to protect the environment limit my choice and personal freedoms.	✔	✔	✔
ACego5: A clean environment provides me with better opportunities for recreation.	✔	✔	✔
ACsoc1: Environmental protection benefits everyone.	✔	✔	✔
ACsoc2: Environmental protection will help people have a better quality of life.	✔	✔	✔
ACsoc3: We don't need to worry much about the environment because future generations will be better able to deal with these problems than we are.	✔	✔	✔
ACsoc4: The effects of pollution on public health are worse than we realize.	✔	✔	✔
ACsoc5: Pollution generated here harms people all over the Earth.	✔	✔	✔
ACbio1: While some local plants and animals may have been harmed by environmental degradation, over the whole Earth, there has been little effect.	**X**	✔	✔
ACbio2: Over the next several decades, thousands of species will become extinct.	✔	✔	✔
ACbio3: Claims that current levels of pollution are changing Earth's climate are exaggerated.	✔	✔	✔
ACbio4: Tropical rain forests are essential to maintaining a healthy planet Earth.	✔	✔	**X**
ACbio5: Modern development threatens wildlife.	**X**	**X**	✔

1999; Schwarz, Strack, & Mai, 1991). The non-random condition consisted of 528 participants, and 511 of them answered all of the AC items. For the random condition, 541 participants were administered the survey, of which 531 participants successfully answered all of the AC items.

Spash Study 2

A survey was constructed to assess the maximum willingness to pay of individuals for converting a small area of Cambridgeshire farmland into a wetland ecosystem. The participants were 713 members of the public who were recruited from across the UK, with a national and regional sample split. The questionnaire contains 45 items. In total, 572 participants completed the 14 AC items that are shown in Table 3. Participants rated the items on a 4-point scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*).

Table 4 summarizes the design of the three samples, alongside the design reported by Snelgar (2006). Table 4 highlights the differences in (a) how the scale was administered to participants; (b) study context; (c) sample size; (d) response scale; and (e) whether the items were presented sequentially or mixed with non-AC questionnaire items. Table 4 also presents demographics (i.e., age, gender, education) for the three samples that were collected by Spash Study 1 and Spash Study 2.

The following criteria will be used to assess whether the AC scale demonstrates the pattern proposed by VBN theory: (a) correlations between subscales; (b) internal consistency; and (c) dimensionality. Any emergent pattern is assessed based on (a) interpretability; (b) correlations between new factors; (c) internal consistency; and (d) the results of a confirmatory factor analysis.

Results

Correlations between the subscales proposed by VBN authors are presented in Table 5. Note that the correlations between (a) egoistic and social subscales; and (b) egoistic and biospheric subscales are positive, rather than negative as VBN predicts. Indeed, all of the correlations are large and positive. The subscales share between 21% and 45% of the same variance, which suggests that the constructs are partially measuring the same construct, as proposed by the GAC interpretation.

We calculated Cronbach's alpha reliabilities. Table 6 displays Cronbach's alphas for the theoretical subscales for each of the three samples. The social subscale reported moderate reliability. The egoistic and biospheric subscales, however, reported poor reliability.

Table 4

Summary of the Design and Demographics of the Four Samples

	Spash Study 1: Random	Spash Study 1: Non-random	Spash Study 2	Snelgar study
Test type	Verbally administered	Verbally administered	Verbally administered	Pen-and-paper questionnaire
Sample	$N = 531$, Scotland	$N = 511$, Scotland	$N = 572$, UK national	$N = 101$, university
Context of administering AC scale	WTP survey for restoring biodiversity	WTP survey for restoring biodiversity	WTP survey for converting farmland to wetland	Undergraduate course activity
AC items sequential or randomized	Randomly mixed with other survey items	Sequentially administered	Randomly mixed with political action scale	Sequentially administered
Response scale	7-point scale	7-point scale	4-point scale	7-point scale
Age	60.6% ≤ age 44	59.1% ≤ age 44	57.6% ≤ age 44	Not reported
Gender	53.1% females	48.5% females	59.1% females	Not reported
Education	53.3% left school at age 16	51.5% left school at age 16	52.0% left school at age 16	100% undergraduate students

Note. AC = awareness of consequences; WTP = willingness to pay. For the Snelgar (2006) study, the institution was the University of Westminster.

Table 5

Pearson Bivariate Correlations Between Awareness of Consequences Subscales: Studies 1 and 2

	Egoistic and social	Egoistic and biospheric	Social and biospheric
Spash Study 1: Random	.66**	.46**	.63**
Spash Study 1: Non-random	.67**	.57**	.64**
Spash Study 2	.67**	.57**	.60**

**$p < .001$.

Table 6

Cronbach's Alphas for Awareness of Consequences Subscales: Studies 1 and 2

	Egoistic scale	Social scale	Biospheric scale
Spash Study 1: Random	.60	.70	.44
Spash Study 1: Non-random	.60	.72	.52
Spash Study 2	.56	.69	.53

Exploratory Analysis

In order to meet various referees' comments, we decided to conduct an exploratory analysis on the data sets collected from the two random and non-random conditions administered in Spash Study 1; and then to investigate any emergent patterns on the data collected from Spash Study 2 with a confirmatory factor analysis (CFA). The exploratory analysis employed a principal axis factor analysis (FA). As Stern and colleagues (Stern, Dietz, & Guagnano, 1995; Stern, Dietz, Kalof et al., 1995) proposed a single-factor GAC solution, which is supported by the correlations in Table 5, we employed a direct oblimin rotation because this rotation favors a one-factor solution.

Two principal axis factor analyses with direct oblimin rotations that were conducted on the two Spash Study 1 data sets were compared with the results of Snelgar's (2006) reported PCA with varimax rotation. Eigenvalue scores being greater than 1 was the criterion employed to select how many compo-

nents to extract from the PCA. An assessment of scree plots confirms that this approach was suitable. Table 7 presents the eigenvalues and percentage of variance explained for the Spash Study 1 FA. The non-random study reported a three-component solution, while the random study was found to be best described by a two-factor solution, although the percentage of variance explained in each study was low.

The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy is an index for comparing the magnitudes of the observed correlation coefficients to the magnitude of partial correlation coefficients. The results were .88 and .89, respectively, for the non-random and the random conditions. These high KMO indexes provide evidence that the AC items can be grouped into a smaller set of underlying factors. This contradicts Snelgar's (2006) conclusion that the AC scale has no clear factor structure.

In Table 8, the rotated component matrix from Snelgar's (2006) study and two rotated factor matrices from Spash Study 1 are presented alongside each other. All three rotated matrices clearly fail to illustrate the theoretical structure proposed by VBN authors. For example, in all four samples, Factor 1 contains a mixture of egoistic, social, and biospheric items. However, the combined rotated component matrix for the four studies does present a consistent loading pattern, but that is not a one-factor solution.

An inspection of Table 8 reveals two clusters of items that load on separate factors for all of the samples. In the non-random study and Snelgar's (2006) study, there is also some evidence that these two factors can be further divided. Studying Table 8 reveals that Items ACego3, ACego4, ACsoc3, ACbio1, and ACbio3 consistently loaded on a different factor from the rest of the items. We interpret these items as representing beliefs that are supportive of environmental inaction. All the other items represent beliefs that are supportive of environmental action. Furthermore, the non-random condition reported a three-factor solution, with some of the items referring to beliefs supportive of environmental action appearing on Factor 3. The factor loadings on Factor 3 of the non-random condition are only moderate in size, and these items were not separated from Factor 1 in the other studies.

As we are currently exploring the possibility of a new response structure for the AC scale, we believe that the results of the non-random study provide grounds for examining whether the factor on beliefs that are supportive of environmental inaction can be further divided. If further evidence were found to be supportive of this claim, we would interpret the divided factors to represent beliefs that "environmental protection has positive consequences" and "beliefs that the environment is being seriously harmed." In Snelgar's (2006) sample, beliefs that are supportive of environmental inaction were separated into two components. We interpret these factors as representing beliefs that "environmental protection has negative consequences" and

Table 7

Eigenvalues and Percentage of Variance Explained

	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
Study 1: Non-random						
Factor 1	5.14	39.57	39.57	4.70	36.18	36.18
Factor 2	1.51	11.64	51.21	0.83	6.40	42.57
Factor 3	1.16	8.90	60.11	0.65	5.00	47.57
Study 1: Random						
Factor 1	4.89	37.62	37.62	4.37	33.60	33.60
Factor 2	1.50	11.53	49.15	0.78	5.98	39.58

Table 8

Rotated Matrix for Spash and Snelgar Studies

	Spash Study 1 Factor analysis with quartimax rotation					Snelgar (2006) Principal components analysis with varimax rotation		
	Study 1: Non-random			Study 1: Random				
	1	2	3	1	2	1	2	3
ACego1	**.87**			**.78**				
ACego2	**.76**			**.67**		**.76**		
ACego5	**.71**			**.75**		.33		
ACsoc1	**.68**			**.70**		**.55**		.38
ACsoc2	**.78**			**.77**		**.61**	.41	
ACbio4	**.75**			**.64**				
ACego3		**.52**			.47			**.74**
ACego4		**.54**			**.57**			**.75**
ACsoc3		.46		–.36	.36		**.74**	
ACbio1							**.72**	
ACbio3		.35					**.72**	
ACsoc4	.49		.45	**.55**			.48	
ACsoc5	**.59**		**.51**	**.63**		**.65**		
ACbio2	.46		.45	**.53**		**.59**		
ACbio5						.48		

Note. Factor loadings < .30 are not reported.

"beliefs that the environment is not being seriously harmed." Therefore, although Table 7 shows only two- and three-factor solutions, we believe that there is evidence that responses to the AC scale are influenced by whether a statement implies action or inaction. There is also some indication that items that focus on the consequences of environmental action can be differentiated from beliefs about whether or not the environment is being harmed, although stronger additional evidence would be required to support this claim.

An inspection of Table 8 reveals two clusters of items that loaded on separate factors for all of the samples. In the non-random study and Snelgar's (2006) study, there is also some evidence that these two factors can be further divided. Studying Table 8 reveals that Items ACego3, ACego4, ACsoc3, ACbio1, and ACbio3 consistently loaded on a different factor from the rest of the items. We interpret these items as representing beliefs that are supportive of environmental inaction (BSEI). All of the other items represent "beliefs that are supportive of environmental action." Furthermore, the non-random condition reported a three-factor solution, with some of the items referring to beliefs supportive of environmental action (BSEA) appearing on Factor 3. The factor loadings on Factor 3 of the non-random condition are only moderate in size, and these items were not separated from Factor 1 in the other studies.

As we are currently exploring the possibility of a new response structure for the AC scale, we believe that the results of the non-random study provide grounds for examining whether the factor on beliefs that are supportive of environmental inaction can be further divided. If further evidence were found to be supportive of this claim, we would interpret the divided factors to represent "beliefs that environmental protection has positive consequence" and "beliefs that the environment is being seriously harmed." In Snelgar's (2006) sample, "beliefs that are supportive of environmental inaction" were separated into two components. We interpret these factors as representing "beliefs that environmental protection has negative consequences" and "beliefs that the environment is not being seriously harmed." Therefore, although Table 7 shows only two- and three-factor solutions, we believe that there is evidence that responses to the AC scale are influenced by whether a statement implies action or inaction. There is also some indication that items that focus on the consequences of environmental action can be differentiated from beliefs about whether or not the environment is being harmed, although stronger additional evidence would be required to support this claim.

The Appendix presents the items for each of the four proposed clusters. The "beliefs that environmental protection has positive consequences" and "beliefs that the environment is being seriously harmed" can be combined into a BSEA scale, while the "beliefs that environmental protection has

Table 9

Cronbach's Alphas for Newly Proposed Subscales

	Spash studies	
	Study 1: Non-random	Study 1: Random
BSEA scale	.88 (9 items)	.88 (9 items)
Environmental protection has positive consequences	.89 (6 items)	.87 (6 items)
Environment is being seriously harmed	.73 (3 items)	.68 (3 items)
BSEI scale	.56 (4 items)	.50 (4 items)
Environmental protection has negative consequences	.45 (2 items)	.44 (2 items)
Environment is not being seriously harmed	.40 (2 items)	.35 (2 items)

Note. BSEA = beliefs supportive of environmental action. BSEI = beliefs supportive of environmental inaction.

negative consequences" and "beliefs that the environment is not being seriously harmed" can be combined into a BSEI scale. We note here that there are three items that failed to load strongly onto our new interpretation. These are Items ACbio3, ACsoc4, and ACbio5, which have either low or inconsistent factor loadings and would be candidate items to be dropped from future work trying to develop the proposed scales.

Table 9 displays Cronbach's alphas for the newly proposed subscales. The scale on "environmental protection has positive consequences"—despite being a combination of egoistic, social, and biospheric items—demonstrates an excellent reliability coefficient. The BSEI items report poor reliabilities, similar to reliabilities for the egoistic and biospheric subscales (see Table 6).

Table 10 displays the bivariate correlations for the newly proposed subscales. In both samples, the scales on "environmental protection has positive consequences" and "the environment is being seriously harmed" reported large positive correlations, which is consistent with the argument that they form part of the higher order BSEA factor. The scales on "the environment is not being seriously harmed" and "environmental protection has negative consequences" also demonstrate positive correlations, which is consistent with their combination into the higher order BSEI factor. The scale on "environmental protection has positive consequences" correlated negatively

Table 10

Bivariate Correlations for Newly Proposed Subscales

	Spash studies	
	Study 1: Non-random	Study 1: Random
BSEA scale & BSEI scale	–.33**	–.30**
Environmental protection has positive consequences & Environment is being seriously harmed	.58**	.61**
Environmental protection has positive consequences & Environmental protection has negative consequences	–.17**	–.14**
Environmental protection has positive consequences & Environment is not being seriously harmed	–.35**	–.38**
Environment is being seriously harmed & Environmental protection has negative consequences	–.06	.02
Environment is being seriously harmed & Environment is not being seriously harmed	–.34**	–.30**
Environment is not being seriously harmed & Environmental protection has negative consequences	.36**	.29**

Note. BSEA = beliefs supportive of environmental action. BSEI = beliefs supportive of environmental inaction.
**$p < .001$.

with both the scales on "environmental protection has negative consequences" and "the environment is not being seriously harmed." The scale on "environmental protection has negative consequences" was negatively correlated with scale on "environmental protection has positive consequences," while only having an insignificant relationship with the scale on "the environment is being seriously harmed."

All of these correlations are theoretically consistent. Table 10 displays mostly moderate correlations that represent a significant improvement over the AC subscale correlations (between 0.67 and 0.46) as presented in Table 5.

The correlations between BSEA items and BSEI items are much smaller than the correlations between any of the AC subscales.

Confirmatory Analysis

We conducted a confirmatory factor analysis (CFA) on the Spash Study 2 sample to compare the alternative interpretation presented in the exploratory analysis section with the valuation orientation and GAC interpretations. A major strength of a CFA analysis is that it is able to account for the possibility that two scales (e.g., "environmental protection has positive consequences" and "the environment is being harmed") can be combined at a higher level (e.g., BSEA scale). Such a hierarchical relationship may be able to explain a significantly higher proportion of the variance than the principal axis FA conducted on the AC scale.

The CFA compares the GAC interpretation (Model 1); the value orientation interpretation (Model 2); the proposed two-factor beliefs supportive of environmental action/inaction interpretation (Model 3), outlined in the previous section; and the hierarchical interpretation outlined in the Appendix. Structural analysis was conducted in Amos 17.0 using the maximum likelihood method. Criteria usually thought to indicate an acceptable fit are as follows: ≤ 3 for χ^2/df; root mean square error of approximation (RMSEA) $\leq .60$; and the other fit indexes (normed fit index [NFI], Tucker–Lewis index [TLI], goodness-of-fit index [GFI], adjusted GFI [AGFI]) $\geq .95$ (Schreiber, Nora, Stage, Barlow, & King, 2006). The CFA conducted on the generally accepted EC scales, however, have reported CFA results of $\chi^2/df \leq 4$; RMSEA $\leq .90$; and the other fit indexes (NFI, TLI, GFI, AGFI) $\geq .90$ (see Milfont et al., 2006; Schultz, 2000, 2001; Snelgar, 2006). Nested models can also be compared with the chi-square difference test. Models that are not nested can be compared with the AIC and BIC statistics, where smaller AIC and BIC statistics represent a better model.

When analyzing the structural equation model (SEM) for the hierarchical model proposed in the Appendix, the second-order factor of "environment is being seriously harmed" was found to report a variance greater than 1, and one of the items on this second-order factor also reported a standardized coefficient greater than 1. Both of these improper solutions are examples of Heywood cases. One of the reasons why an SEM would report a Heywood case is that the model is structurally misspecified (Rindskope, 1984). This suggests that the BSEI scale should not be further divided into second-order factors. The hierarchal model (Model 4) is, therefore, presented as having second-order factors for the BSEA scale, but not for BSEI scale.

Table 11 displays the chi-square and fit index outcomes for each model. Figure 2 illustrates the estimated standardized regression weights and the

Table 11

Confirmatory Factor Analysis Measures of Fit for Four Proposed Theoretical Models

	χ^2	*df*	χ^2/df	RMSEA	NFI	TLI	GFI	AGFI	AIC	BIC
Model 1: One-factor GAC	481***	77	6.24	.10	.78	.78	.87	.83	537	658
Model 2: Stern three factors	456***	74	6.16	.10	.79	.78	.88	.83	518	653
Model 3: Revised two factor	287***	76	3.77	.07	.87	.88	.93	.90	345	471
Model 4: Revised hierarchical	202***	74	2.73	.06	.91	.93	.95	.93	264	399

Note. RMSEA = root mean square error of approximation; NFI = normed fit index; TLI = Tucker–Lewis coefficient; GFI = goodness-of-fit index; AGFI = adjusted GFI; AIC = Akaike's information criterion; BIC = Bayes' information criterion.
***$p < .0001$.

variance of each observed variable for Model 1. Figure 3 depicts Model 2, with this model also displaying correlations between the egoistic, social, and biospheric scales. While Model 2 was found to report a significantly better fit than Model 1, $\chi^2_{diff}(3) = 24.81$, $p < .001$, Table 11 demonstrates that both models report similarly poor fit indexes. An additional issue with Model 2 is that a Heywood case was reported, with the correlation between the egoistic scale and the social scale being greater than 1. This Heywood case provides further evidence against the value orientation model.

When compared to Model 1, both Model 3, $\chi^2_{diff}(1) = 193.89$, $p < .001$; and Model 4, $\chi^2_{diff}(3) = 278.40$, $p < .001$, were found to report much better fits. As Model 2 did not have a nested relationship with Models 3 or 4, the AIC and BIC statistics were used to compare these models. Table 11 shows that Model 3 (see Figure 4) and Model 4 (see Figure 5) both reported a lower AIC and BIC statistic than did Model 2, which indicates that these models provided a better fit. Furthermore, Model 4 was found to be a significant improvement over the two-factor Model 3, $\chi^2_{diff}(2) = 84.48$, $p < .001$. In fact, the fit indexes for Model 4 were found to be as good, if not better than the fit indexes reported in any of the studies that reported a CFA for the EC scale (Milfont et al., 2006; Schultz, 2000, 2001; Snelgar, 2006).

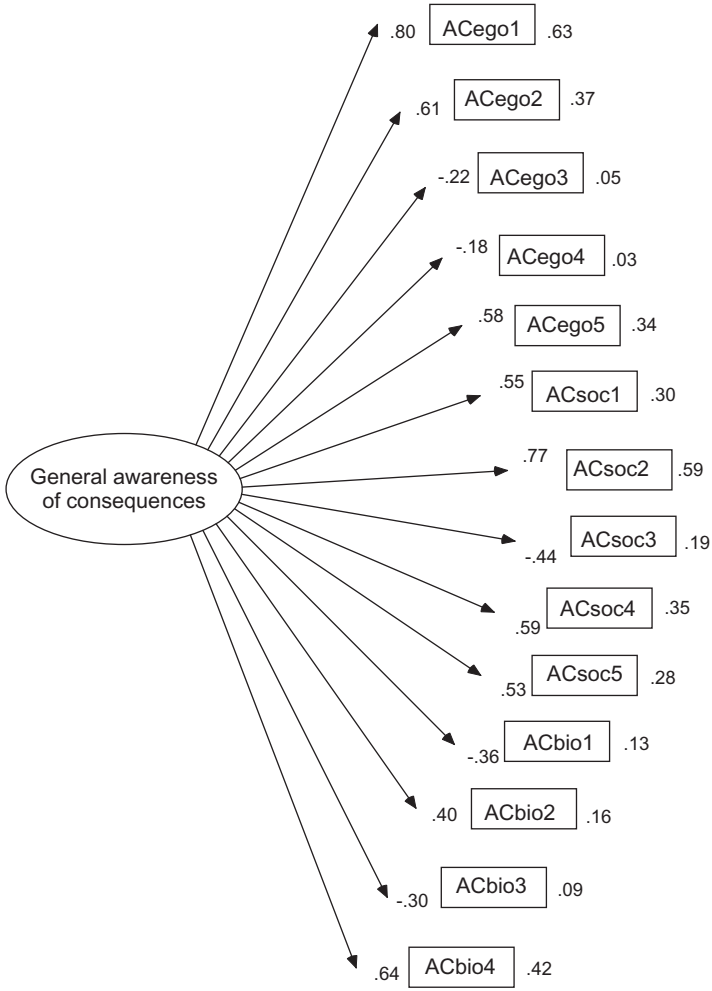

Figure 2. Model 1: General awareness of consequences, one-factor model (standardized estimates).

Discussion

Environmental psychologists investigate human behavior and how it might be changed to avoid environmental degradation. These constructs, when placed into behavior models, can feed into a policy process and influence regulatory design. Behavioral models are often general in nature and can be applied to a variety of topics, such as political action, recycling, and

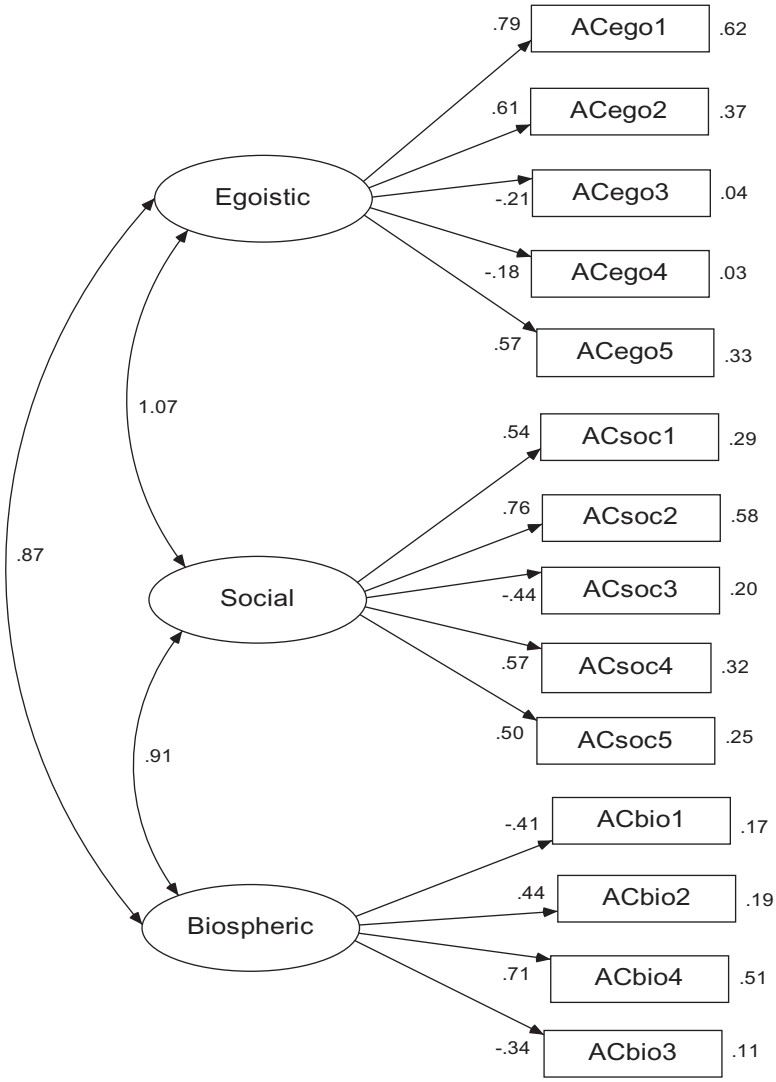

Figure 3. Model 2: Three-factor egoistic, social, and biospheric model (standardized estimates).

household water management. The potential for direct policy relevance relates to correctly understanding the key motive and barriers to human action. For some behavioral models, this requires outlining an empirically verifiable relationship between "held values" and other environmental cognitions.

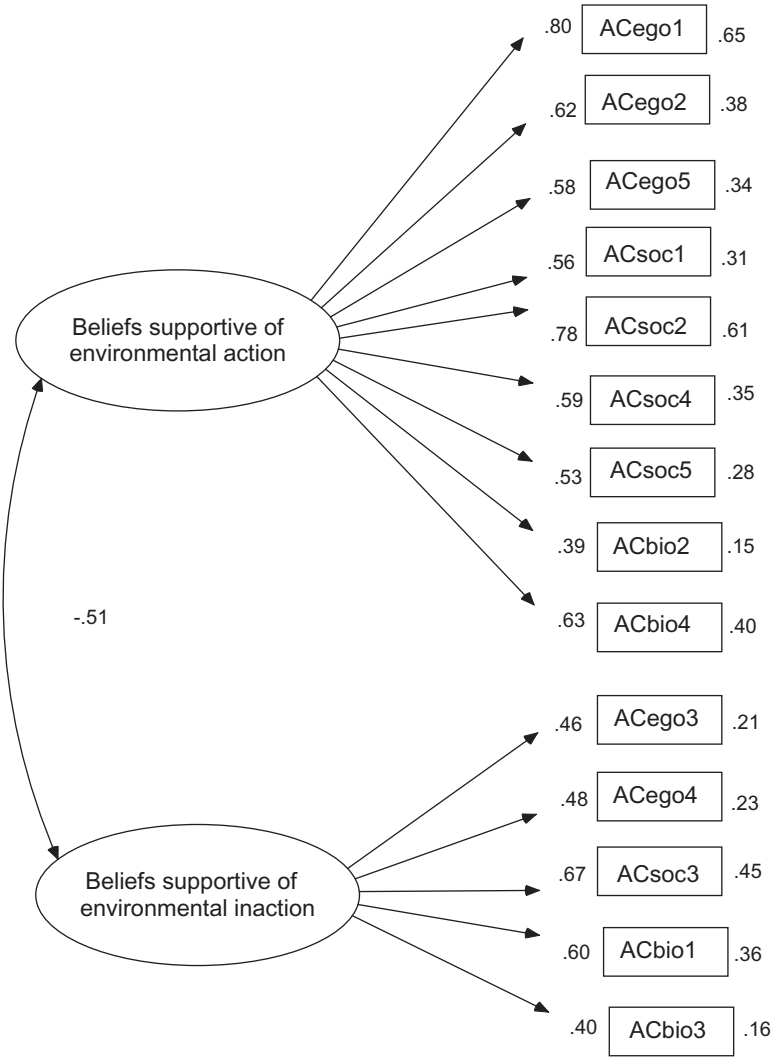

Figure 4. Model 3: Revised two-factor model (standardized estimates).

Stern et al. (1993) designed the AC scale in order to test the proposition that people cognitively differentiate between egoistic, social, and biospheric concerns when assessing beliefs about adverse general environmental consequences. The VBN model has made a significant contribution to the environmental-attitude/behavior literature. However, the results of the current study indicate that VBN value orientations are not influential in

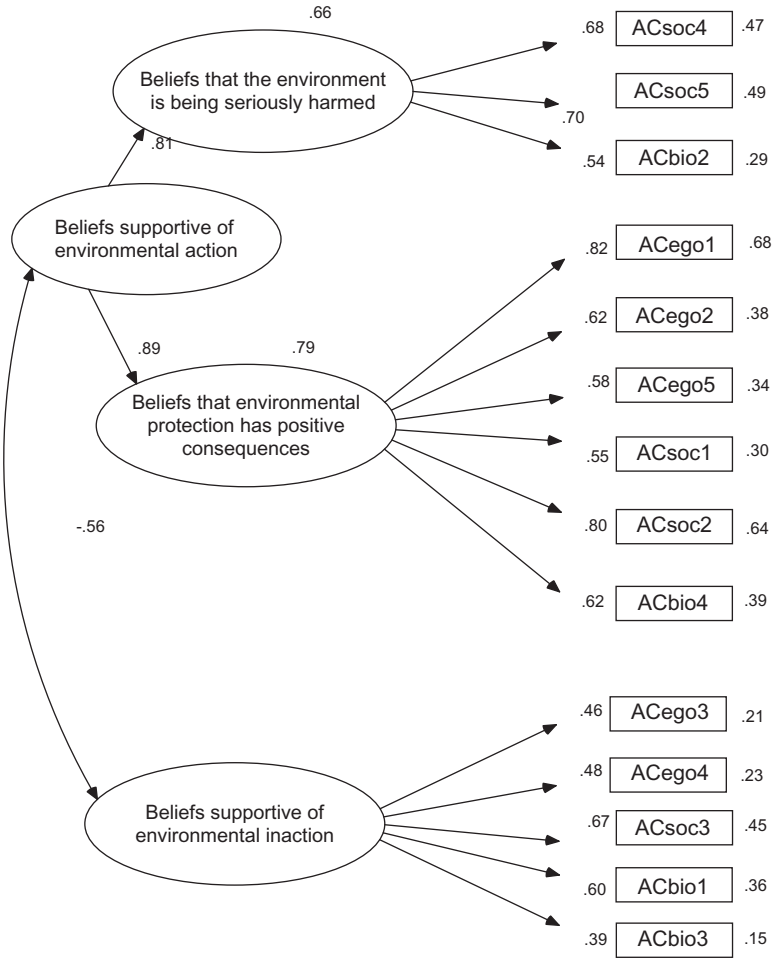

Figure 5. Model 4: Revised two-stage hierarchical model (standardized estimates).

organizing general beliefs about environmental consequences. AC items, which are representative of media statements and everyday comments—and, therefore, are of general public interest—do not seem to be cognitively organized according to the assumptions of the VBN model.

A questionnaire design that encourages participants to assess their beliefs on emotive and subjective criteria, such as the EC scale, would seem to be required in order to develop a scale that measures such constructs. If this is so, a scale trying to measure VBN value orientations based on general statements of awareness of consequences could not be improved by simply adding

more items or designing "better" items in the same mode. A more emotive approach would be required to increase the salience of an individual's value orientation on the construction of the belief, such as asking participants to assess their concerns about valued objects. In addition, value orientations may directly influence other emotional cognitions, such as environmental norms and expectations.

A revised model is proposed in Figure 6, which is consistent with empirical findings for the current study and those of Snelgar (2006). Based on the findings of both an exploratory and a confirmatory FA, "beliefs supportive of environmental action" appear to be influenced by egoistic, social, or biospheric concerns about environmental problems. Furthermore, they can be separated into "beliefs that the environment is being seriously harmed" and "beliefs about environmental protection having positive consequences." While the current study, unlike Snelgar's (2006), did not find that BSEI can be similarly separated into two components, we suggest that this relationship should be explored further.

A possible relationship is that biospheric concerns about environmental problems are negatively correlated with "beliefs that the environment is not being seriously harmed" (or BSEI, if no second-order factor is found). Social and egoistic concerns about the costs of conservation should be positively correlated with "beliefs that environmental action has negative consequences" (or BSEI, if no second-order factor is found). In future work, there needs to be some account taken of the relationships between environmental concern and environmental beliefs.

Our exploratory and confirmatory FA presents evidence that people have a tendency to differentiate between environmental action and inaction. There is also evidence that respondents differentiated between the environment being harmed and the benefits of environmental protection. An improved BSEI scale should be developed. The relative weakness of this scale is unsurprising, given that it arose from items designed for a different purpose (i.e., to measure AC beliefs). The BSEI scale could, therefore, be improved by dropping some items (e.g., ACbio3, ACsoc4), adapting others, and adding new items. This process would also benefit from working with a far greater number of items than has been typical in research on the AC scale. We note that the confirmatory analysis conducted on hierarchical Model 4, which is made up of items that could be refined, reported fit indexes on par, if not better than the indexes reported for the EC scale.

These findings also shed light on some of the measurement anomalies in the AC scale literature. Where subscale reliabilities have proven satisfactory, this may be because of a high proportion of environmental action items. Thus, the AC social subscale has four out of five of its items classified into the BSEA factor and was found to have higher reliabilities than the other

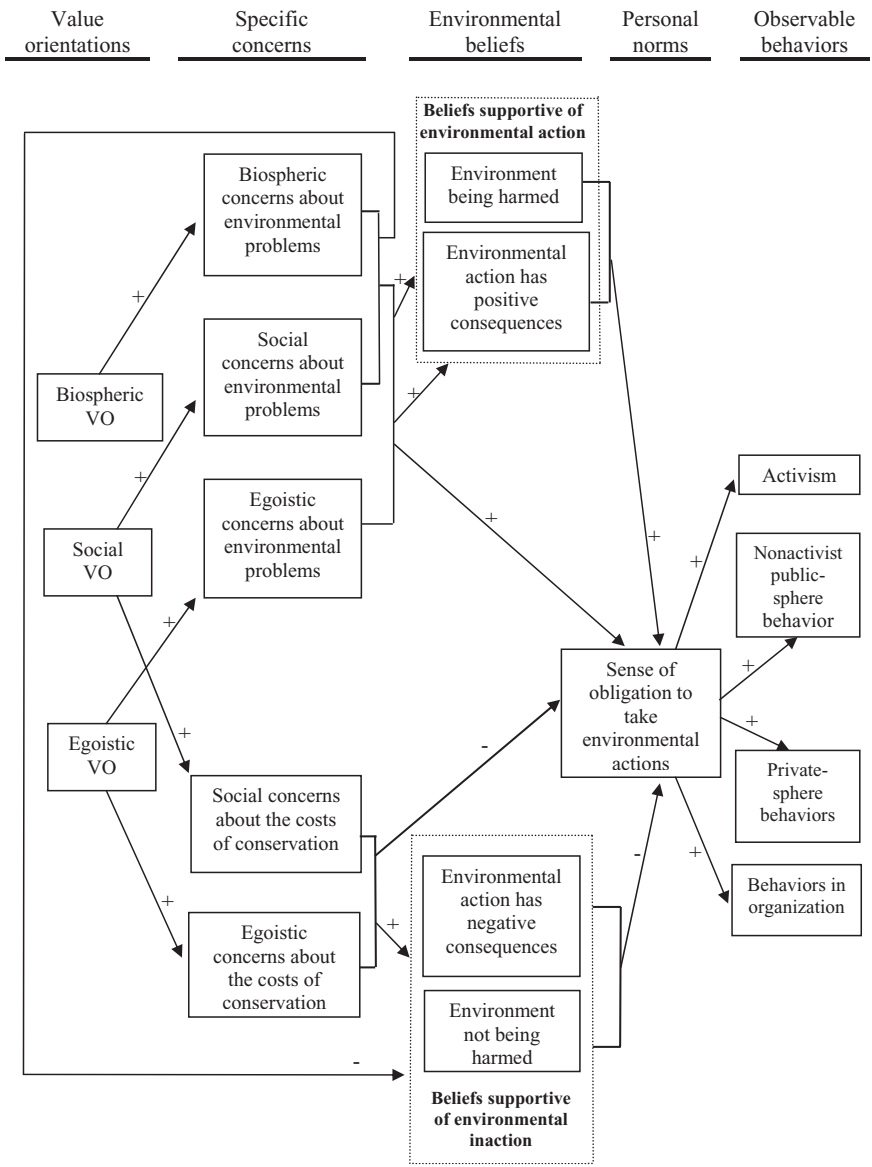

Figure 6. Revised model.

subscales. The fact that different concepts are being measured than those assumed by VBN theory also explains why the AC egoistic subscale has previously been found to be insignificantly correlated with the EC egoistic subscale and Schwartz's (1992) self-enhancement scale. This is also an alternative explanation—to the one-factor GAC interpretation—for the high correlations between the egoistic, social, and biospheric AC subscales.

The results presented here indicate that the scales being employed to measure egoistic, altruistic, and biospheric value orientations actually relate to beliefs about whether environmental action or inaction is required. "Beliefs supportive of environmental action" can be further classified into "beliefs that the environment is being seriously harmed" and "beliefs that environmental action has positive consequences." Improving a reinterpreted scale as a measure of these concepts seems worthwhile. This suggests a new relationship between environmental concerns and beliefs. A more sophisticated understanding of this relationship could aid environmental policy by supplying a new means of identifying motives behind and barriers to behavioral change.

References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Making Processes*, *50*, 179–211.

Anderson, C. J. (2003). The psychology of doing nothing: Forms of decision avoidance result from reason and emotion. *Psychological Bulletin*, *129*, 139–167.

Bryman, A. (1988). *Quantity and quality in social research* (Vol. 18). London: Unwin Hyman.

Croft, W. A., & Cruse, D. A. (2004). *Cognitive linguistics*. Cambridge, UK: Cambridge University Press.

De Groot, J. I. M., & Steg, L. (2007). Value orientations and environmental beliefs in five countries: Validity of an instrument to measure egoistic, altruistic, and biospheric value orientations. *Journal of Cross-Cultural Psychology*, *38*, 318–332.

De Groot, J. I. M., & Steg, L. (2008). Value orientations to explain beliefs related to environmental significant behavior: How to measure egoistic, altruistic, and biospheric value orientations. *Environment and Behavior*, *40*, 330–354.

Dhar, R. (1996). The effect of decision strategy on the decision to defer choice. *Journal of Behavioral Decision Making*, *9*, 265–281.

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.

Gärling, T., Fujii, S., Gärling, A., & Jakobsson, C. (2003). Moderating effects of social value orientation on determinants of proenvironmental behavior intentions. *Journal of Environmental Psychology*, *23*, 1–9.

Grob, A. (1995). A structural model of environmental attitudes and behavior. *Journal of Environmental Psychology*, *15*, 209–220.

Guagnano, G. A., Dietz, T., & Stern, P. C. (1994). Willingness to pay for public goods: A test of the contribution model. *Psychological Science*, *5*, 411–415.

Hansla, A., Gamble, A., Juliusson, A., & Gärling, T. (2008). The relationships between awareness of consequences, environmental concern, and value orientation. *Journal of Environmental Psychology*, *28*, 1–9.

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. (1981). Environmental attitudes. *Zeitschrift für Umweltpolitik*, *2*, 241–270.

Higgins, E. T. (1987). Self-discrepancy: A theory relating to self and affect. *Psychological Review*, *94*, 319–340.

Higgins, E. T. (2000). Beyond pleasure and pain. In E. T. Higgins & A. W. Kruglanski (Eds.), *Motivational science: Social and personality perspectives* (pp. 231–255). Philadelphia: Psychology Press.

Homburg, A., & Stolberg, A. (2006). Explaining pro-environmental behavior with a cognitive theory of stress. *Journal of Environmental Psychology*, *26*, 1–14.

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.

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1990). Experimental tests of the endowment effect and the coase theorem. *Journal of Political Economy*, *98*, 1325–1348.

Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). Anomalies: The endowment effect, loss aversion, and status-quo bias. *Journal of Economic Perspectives*, *5*, 193–206.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, *XLVII*, 263–291.

Kaiser, F. G., Hübner, 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.

Knetsch, J. L. (1994). Environmental valuations: Some problems of wrong questions and misleading answers. *Environmental Values*, *3*, 351–368.

Knetsch, J. L. (2005). Gains, losses, and the US–EPA economic analyses guidelines: A hazardous product? *Environmental and Resource Economics*, *32*, 91–112.

Lakoff, G. (1987). *Women, fire, and dangerous things: What categories reveal about the mind*. Chicago: CSLI.

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

Milfont, T. L., Duckitt, J., & Cameron, L. D. (2006). A cross-cultural study of environmental motive concerns and their implications for proenvironmental behavior. *Environment and Behavior*, *38*, 745–767.

Nordlund, A. M., & Garvill, J. (2003). Effects of values, problem awareness, and personal norm on willingness to reduce personal car use. *Journal of Environmental Psychology*, *23*, 330–347.

Ohtomo, S., & Hirose, Y. (2007). The dual-process of reactive and intentional decision-making involved in eco-friendly behavior. *Journal of Environmental Psychology*, *27*, 117–125.

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

Pinker, S. (1998). *How the mind works*. London: Penguin Group.

Pinker, S. (2007). *The stuff of thought*. London: Allen Lane.

Rindskope, D. (1984). Structural equation models: Empirical identification, Heywood cases, and related problems. *Sociological Methods and Research*, *13*, 109–119.

Ritov, I., & Baron, J. (1990). Reluctance to vaccinate: Omission bias and ambiguity. *Journal of Behavioral Decision Making*, *3*, 263–277.

Ritov, I., & Baron, J. (1992). Status quo and omission biases. *Journal of Risk and Uncertainty*, *5*, 49–62.

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

Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision making. *Journal of Risk and Uncertainty*, *1*, 7–59.

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *Journal of Educational Research*, *99*, 323–338.

Schultz, P. W. (2000). Empathizing with nature: The effects of perspective taking on concern for environmental issues. *Journal of Social Issues*, *56*, 391–406.

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

Schultz, P. W., Shriver, C., Tabanico, J. J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal of Environmental Psychology*, *24*(4), 31–42.

Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 10, pp. 221–279). San Diego, CA: Academic Press.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. P. Zanna (Ed.), *Advances in experimental social psychology*. (Vol. 25, pp. 1–65). Orlando, FL: Academic Press.

Schwarz, N. (1999). Self-reports: How the questions shape the answers. *American Psychologist*, *54*, 93–105.

Schwarz, N. (2007a). Attitude construction: Evaluation in context. *Social Cognition*, *25*, 638–656.

Schwarz, N. (2007b). Cognitive aspects of survey methodology. *Applied Cognitive Psychology*, *21*, 277–287.

Schwarz, N., & Bohner, G. (2001). The construction of attitudes. In A. Tesser & N. Schwarz (Eds.), *Blackwell handbook of social psychology: Intraindividual processes* (pp. 436–457). Malden, MA: Blackwell.

Schwarz, N., & Strack, F. (1991). Context effects in attitude surveys: Applying cognitive theory to social research. *European Review of Social Psychology*, *2*, 31–50.

Schwarz, N., Strack, F., & Mai, H. P. (1991). Assimilation and contrast effects in part–whole question sequence: A conversational logic analysis. *Public Opinion Quarterly*, *55*, 3–23.

Semin, G. R., Higgins, T., Gil de Montes, L., Estourget, Y., & Valencia, J. F. (2005). Linguistic signatures of regulatory focus: How abstraction fits promotion more than prevention. *Journal of Personality and Social Psychology*, *89*, 36–45.

Snelgar, R. S. (2006). Egoistic, altruistic, and biospheric environmental concerns: Measurement and structure. *Journal of Environmental Psychology*, *26*, 87–99.

Spash, C. L. (2000a). Ecosystems, contingent valuation, and ethics: The case of wetlands re-creation. *Ecological Economics*, *34*, 195–215.

Spash, C. L. (2000b). Ethical motives and charitable contributions in contingent valuation: Empirical evidence from social psychology and economics. *Environmental Values*, *9*, 453–479.

Spash, C. L. (2000c). Multiple value expression in contingent valuation: Economics and ethics. *Environmental Science and Technology*, *34*, 1433–1438.

Spash, C. L. (2006). Non-economic motivation for contingent values: Rights and attitudinal beliefs in the willingness to pay for environmental improvements. *Land Economics*, *82*, 602–622.

Spash, C. L., Urama, K., Burton, R., Kenyon, W., Shannon, P., & Hill, G. (2009). Motives behind willingness to pay for improving biodiversity in a water ecosystem: Economics, ethics, and social psychology. *Ecological Economics*, *68*, 955–964.

Steg, L., & De Groot, J. I. M. (2008). Value orientations to explain beliefs related to environmental significant behavior: How to measure egoistic, altruistic, and biospheric value orientations. *Environment and Behavior*, *40*, 330–354.

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

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*(3), 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 for environmental concern. *Human Ecology Review*, *6*, 81–97.

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 orientation, gender, and environmental concern. *Environment and Behavior*, *25*, 322–348.

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

Thompson, S. C. G., & Barton, M. A. (1994). Ecocentric and anthoropocentric attitudes toward the environment. *Journal of Environmental Psychology*, *14*, 149–157.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, *211*, 453–458.

Tykocinski, O. E., Pittman, T. S., & Tuttle, E. S. (1995). Inaction inertia: Foregoing future benefits as a result of an initial failure to act. *Journal of Personality and Social Psychology*, *68*, 793–802.

Wang, X. T., Simons, F., & Bredart, S. (2001). Social cues and verbal framing in risky choice. *Journal of Behavioral Decision Making*, *14*, 1–15.

Appendix

Items for the Four Clusters

Grouping 1a—Beliefs that environmental protection has positive consequences

ACego1: Environmental protection will provide a better world for me and my children.

ACego2: Environmental protection is beneficial to my health.

ACego5: A clean environment provides me with better opportunities for recreation.

ACsoc1: Environmental protection benefits everyone.

ACsoc2: Environmental protection will help people have a better quality of life.

ACbio4: Tropical rain forests are essential to maintain a healthy planet earth.

Grouping 1b–Beliefs that the environment is being seriously harmed

*ACsoc4: The effects of pollution on public health are worse than we realize.

ACsoc5: Pollution generated here harms people all over the Earth.

ACbio2: Over the next several decades, thousands of species will become extinct.

*ACbio5: Modern development threatens wildlife.

Grouping 2a—Beliefs that environmental protection has negative consequences

ACego3: Protecting the environment will threaten jobs for people like me.

ACego4: Laws to protect the environment limit my choice and personal freedoms.

Grouping 2b—Beliefs that the environment is not being seriously harmed

ACsoc3: We don't need to worry much about the environment because future generations will be better able to deal with these problems than we are.

ACbio1: While some local plants and animals may have been harmed by environmental degradation, over the whole Earth there has been little effect.

*ACbio3: Claims that current levels of pollution are changing Earth's climate are exaggerated.

*Item did not consistently load strongly onto factor.