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Moderating effects of social value orientation on determinants of proenvironmental behavior intention

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Abstract

A sample of 524 car owners living in a metropolitan area of Sweden answered survey questions measuring intention to perform collective proenvironmental behavior, awareness of egoistic, social-altruistic, and biospheric environmental consequences, personal norm, and ascribed responsibility. A measure derived from the survey responses was used to classify individuals in prosocial vs. proself value orientations. A structural model was estimated positing that proenvironmental behavior intentions are causally related to personal norm that in turn is causally related to ascribed responsibility and awareness of the different types of environmental consequences. Prosocials differed from proselfs in that to them social-altruistic consequences were more and egoistic consequences less salient.

Keywords: Proenvironmental behavior; Social value orientation; Norm-activation theory

1. Introduction

Determinants of behavior include both motivational and volitional components (Brandstätter & Gollwitzer, 1994). This is exemplified by the theories of reasoned action (TRA; see Fishbein & Ajzen, 1975) and planned behavior (Ajzen, 1985, 1991) in which intention (volition) mediates the relation between motivation (attitude) and behavior. Yet, these theories may not directly apply to proenvironmental behavior since internalized moral or personal norms appear to play an important role for such behaviors (Stern & Oskamp, 1987; Thøgersen, 1996). Therefore, Schwartz' norm-activation theory of altruistic behavior (Schwartz, 1977; Schwartz & Howard, 1981) has instead been drawn on by several researchers (e.g., Stern & Dietz, 1994; Stern, Dietz, & Black, 1986; Stern, Dietz, & Kalof, 1993; Van Liere & Dunlap, 1978). In a similar vein, Harland, Staats, and Wilke (1999) found that personal norm was an additional determinant in the theory of planned behavior. Similar conclusions may be drawn from still other studies (e.g., Axelrod & Lehman, 1993; Kaiser & Shimoda, 1999).

In the applications of Schwartz' theory, the determinants of intentions to perform proenvironmental behavior include *awareness of consequences.* This concept may roughly be equated with environmental concern or attitude (Fransson & Gärling, 1999). In line with Stern and Dietz (1994), Stern et al. (1993) and Stern, Dietz, and Guagnano (1995b), a distinction is furthermore made between awareness of egoistic, social-altruistic, and biospheric consequences corresponding to three different underlying value orientations (Schultz & Zelezny, 1999; Stern, 1992). In order for the behavior to be performed, attention to or awareness of consequences must induce an *ascribed responsibility* to perform the behavior that in turn activates a *personal norm* or moral obligation to perform the behavior.

Although the modified Schwartz theory apparently has received support in previous research (Fransson & Gärling, 1999; Thøgersen, 1996), questions about its validity can be raised. If some hypothesized consequences are related to self-interest, it may be argued that these would directly affect pro-environmental behavior

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intention. Thus, an alternative model may be proposed in which such a direct path is posited. The alternative model is more closely related to TRA (Fishbein & Ajzen, 1975). However, to the extent that the influence of the other consequences are still mediated by ascribed responsibility and personal norm, a hybrid theory may be called for. An aim of the present study was to test this alternative model.

A second aim of the present study concerned the influence of a *prosocial value orientation* (Messick & McClintock, 1968) on proenvironmental behavior. The biologist Garrit Hardin observed that many environmental problems entail a conflict between self-interest and the interest of the collective. In "The Tragedy of the Commons" (Hardin, 1968) a *resource dilemma* is exemplified with the case of a herdsman's rational belief that the positive utility of having an additional animal is greater than the negative effects of the increment of the total number of animals grazing on the same commons. Assuming that people are egoistic by nature, Hardin saw no other solution to this dilemma than infringements on freedom enforced by governments, or in his own words "… mutual coercion mutually agreed upon" (p. 1247).

In the first review of related research in social psychology, Dawes (1980) coined the generic term social dilemma for which he proposed two defining characteristics: (1) the social payoff to each individual for acting in self-interest (called defecting) is higher than the payoff for acting in the interest of the collective (called cooperating), regardless of what the other society members do, yet (2) all individuals in the society receive a lower payoff if all defect than if all cooperate. As reviewed in several subsequent sources (e.g., Biel & Gärling, 1996; Komorita & Parks, 1995; Van Lange, Liebrand, Messick, & Wilke, 1992), cooperation in social dilemmas is affected by, among other factors, their structure (e.g., limits on free access) and social pressure (e.g., identifiability). However, even though neither of these factors are present to constrain self-interest, some individuals will cooperate whereas others will not. A factor that to some extent account for such individual differences is social value orientation (Liebrand, 1984; McClintock, 1978; Messick & McClintock, 1968; Van Lange & Liebrand, 1989; Van Lange, Otten, De Bruin, & Joireman, 1997) implying a preference for a particular allocation of common resources among oneself and others.

Messick and McClintock (1968) empirically identified three social value orientations referred to as cooperative, individualistic, and competitive. As in most subsequent research, Messick and McClintock used the "decomposed game" (Kuhlman and Marshello (1975); see Liebrand and McClintock (1988), for a discussion of this and alternative methods). In this game participants make a series of choices between different ways of allocating a sum of money or points to themselves and an unknown person. Van Lange (1996) proposed a standardized paper-and-pencil version in which a participant makes nine choices, each time among one alternative that maximizes his or her own outcome (number of points for oneself), one alternative that maximizes joint outcome (the sum of number of points for oneself and the other), or one alternative that maximizes his or her own outcome relative to the other's outcome (the difference in number of points for oneself and the other). Participants who choose the same alternative at least six times are classified as cooperators, individualists, or competitors depending on which of the alternatives they consistently choose. In most studies cooperators or prosocials have been compared to individualists and competitors combined (referred to as noncooperators or proselfs).

Many environmental problems may be conceived of as resource dilemmas in which the cooperative choice is beneficial and the self-interest choice detrimental to the environment (e.g., Ostrom, 1990; Thompson & Stoutemeyer, 1991). However, as Blamey (1998) points out, with few exceptions (e.g., Stern & Dietz, 1994) previous research has not investigated the relationships between awareness of environmental consequences, social value orientation, and proenvironmental behavior. In the present study we test a model that posits that determinants of intentions to perform proenvironmental behaviors include awareness of various environmental consequences, ascribed reponsibility, and personal norms. If such behaviors are collective (e.g., signing a petition), in which case the cooperative feature stands out, we hypothesize that a prosocial value orientation modifies the influence of the different determinants.

1.1. Hypotheses

Our primary hypotheses are embedded in a model (see Fig. 1) positing that proenvironmental behavior intention (PBI) is causally related to personal norm (PN) which in turn is causally related to ascribed responsibilty (AR) and awareness of consequences for oneself (ACE), others (ACS), and the biosphere (ACB). Employing

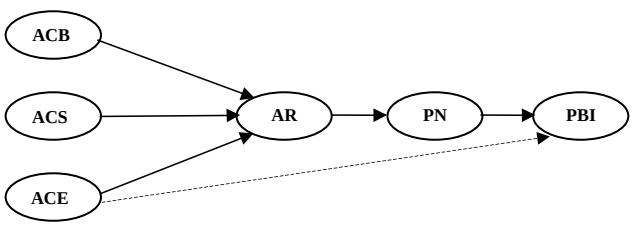

Fig. 1. Hypothesized structural model. (ACE = Awareness of consequences for oneself, ACS = Awareness of consequences for others, ACB = Awareness of consequences for the biosphere, AR = Ascribed responsibility, PN = Personal norm, and PBI = Proenvironmental behavior intention.)

structural equation modeling (SEM) (Bollen, 1989), this model is estimated and compared to an alternative model embedding the hypothesis of a direct path from ACE to PBI (represented by a broken arrow in the figure). An additional hypothesis subject to test is that environmental consequences for others and the biosphere are relatively more salient to individuals with a prosocial value orientation than for individuals with a proself value orientation, whereas the reverse is true of consequences for oneself. A final hypothesis is that with respect to collective proenvironmental behavior with no immediate positive consequences for oneself, personal norm is a stronger determinant of prosocials' behavior intention than of proselfs' behavior intention.

2. Method

2.1. Participants

The participants consisted of 524 car owners randomly sampled from the official register of all car owners living in a metropolitan area of Sweden (Greater Göteborg, with approximately 550,000 residents). The response rate was 32.7%. The participants consisted of 70.3% men. Their average age was 51.7 years (S.D. = 15.1 years). A university degree was held by 45.1% of the sample, whereas 38.8% had finished high school.

2.2. Questionnaire and procedure

Two mail-back questionnaires were sent to each car owner included in the sample, requesting both them and their spouses[1] to reply. On the first page of the questionnaires, the main purpose was stated to be to obtain information about attitudes toward electric vehicles, environmental issues, and travel. Participants were guaranteed anonymity. They were also told how much time (estimated at 30 minutes) filling out the questionnaire would take. No incentives were offered. After having answered the questions, participants were asked to seal the questionnaires and mail them back free of charge. A reminder was sent after 1 week.

The questionnaire consisted of five modules. In a first module questions were asked about participants' opinions about electric vehicles. A second module consisted of questions about proenvironmental behavior intention and its determinants. In a third module questions were asked about attitudes toward road pricing. A fourth module consisted of questions measuring social value orientation. A final fifth module contained sociodemographic questions. Only the questions in the second and fourth modules, providing the key data for this study, are described below.

Several of the questions asked in the second module with the purpose of measuring proenvironmental behavior intention and its determinants were obtained from previous research, translated into Swedish, and if necessary adapted to the prevailing conditions in the country. Three sets of three questions were used to measure each of the awareness of consequences for oneself, for others, and for the biosphere, respectively. They were taken from Stern et al. (1993). Another three questions were constructed to measure ascribed responsibility. Personal norm was also measured by three questions, of which two were taken from Hopper and Nielsen (1991). The main dependent variable consisted of the three questions measuring proenvironmental behavior intention used by Stern et al. (1993). The same response format was used for all questions consisting of nine-point Likert-type scales ranging from strongly disagree (1) to strongly agree (9).

Social value orientation was measured in the fourth module with the paper-and-pencil version of the "decomposed game" (Van Lange, 1996). The respondents made nine choices of how to allocate a sum of points to oneself and another person. The instructions did not specify who the other person was, except that participants were told that they had never met him or her in the past and were unlikely to do it in the future. In each choice one alternative maximized the sum allocated to both (cooperative choice), a second alternative maximized one's own outcome (individualistic choice), and a third alternative maximized the difference between one's own and the other's outcome (competitive choice). The following shows one of the choices which was presented to participants (A is the cooperative, B the individualistic, and C the competitive alternative):

	A	B	C
Own outcome	480	540	480
Other's outcome	480	280	80

The nine choices were presented on a single page. Participants each time encircled their preferred alternative (A, B, or C). They were asked to imagine that the points were valuable to them, and that how much they would obtain depended on their choice as well as on the choice independently made by the other person. In other words, the participants would obtain the points allocated to them in the alternative chosen (e.g., 540 for alternative B) but also the points allocated by the other person's choice (e.g., 280, if he or she likewise chose alternative B). Across the nine choices the number of points in each cell was varied in steps of 10 points.

[1] Questionnaires were also obtained from 250 spouses representing a response rate of 67.2%. Analyzing the data including spouses did not result in substantially different results. Therefore, in order to avoid dependencies between responses by both spouses that may bias the error estimates, the spouses were excluded.

Table 1
Questions measuring proenvironmental behavior intention and its determinants

Awareness of consequences for oneself (ACE) ($\alpha = 0.45$)
Laws that protect the environment limit my choices and personal freedom (ACE1)
Protecting the environment will threaten jobs for people like me (ACE2)
Awareness of consequences for others (ACS) ($\alpha = 0.42$)
The effects of pollution on public health are worse than we realize (ACS1)
Pollution generated in one country harms people all over the world (ACS2)
Awareness of consequences for the biosphere (ACB) ($\alpha = 0.54$)
The balance in nature is delicate and easily upset (ACB2)
Over the next several decades, thousands of species will become extinct (ACB1)
Ascribed responsibility (AR) ($\alpha = 0.46$)
I am not concerned about the environment (AR1)
Every citizen must take responsibility for the environment (AR2)
Authorities rather than the citizens are responsible for the environment (AR3)
Personal norm (PN) ($\alpha = 0.84$)
I feel a moral obligation to protect the environment (PN1)
I feel that I should protect the environment (PN2)
I feel it is important that people in general protect the environment (PN3)
Our environmental problems cannot be ignored (PN4)
Proenvironmental behavior intention (PBI) ($\alpha = 0.74$)
I would contribute money to an environmental organization (PBI1)
I would sign a petition in support of tougher environmental laws (PBI2)
I would participate in a demonstration against companies that are harming the environment (PBI3)

Estimates of reliability with Cronbach's α are given within parentheses.

The choices were presented in a random order with the positions of the different alternatives (left, middle, or right) counterbalanced.

2.3. Measures

Following recommendations by Anderson and Gerbing (1988), an exploratory principal component analysis as well as reliability analyses were performed to improve the measures of proenvironmental behavior intention and its determinants. As shown in Table 1, a reliable composite measure of proenvironmental behavior intention (PBI) was possible to construct from the three questions. Similarly, a reliable index was possible to obtain of personal norm (PN). In this case an additional question was appropriate to include. However, reliability of the composite measures of the remaining constructs were lower. The measures of the awareness of consequences for oneself (ACE), for others (ACS), and for the biosphere (ACB) were somewhat improved by excluding one question in each case.

The scores obtained from the decomposed game were used to classify respondents in prosocials and proselfs. In accordance with the conventional procedure (Van Lange, 1996), a respondent was classified as prosocial if he or she chose the cooperative alternative at least six times. A participant who instead chose either the individualistic or competitive alternatives at least six times was classified as proself. In this way 231 (44.1%) participants were classified as prosocials and 145 (27.7%) were classified as proselfs. Of the remaining participants, 37 (7.1%) were not possible to classify since they did not respond consistently whereas data were missing for 111 (21.1%) participants.

3. Results

The standardized path coefficients in the structural model displayed in Fig. 1 were estimated[2] simultaneously with the measurement models specified on the basis of the results of the exploratory factor and reliability analyses. Descriptives for each manifest variable are given in Table 5. Missing values were replaced by variable means when calculating the covariances. In the estimation statistically significant error covariances were included. Despite a significant $\chi^2[n = 524;\ \text{df.} = 218] = 312.45$, $p < 0.001$, the following statistics suggest that the fit of the model was excellent (see Fan, & Thompson, & Wang, 1999; Hu & Bentler, 1995): NNFI = 0.966, CFI = 0.971, and RMSEA = 0.028. As Table 2 shows, the parameters of the measurement models indicated that the constructs were appropriately measured. In addition, reliability measures are reported for all the latent constructs. They are substantially higher than those given in Table 1 for the index scales. This difference is due to the estimation of the error

[2] All SEM analyses used the full information maximum-likelihood method available in LISREL 8 (Jöreskog & Sörbom, 1993). In each case the results from distribution-free (generalized least-squares) estimates were essentially the same.

Table 2
Estimated measurement models

Construct	Measure	Standardized coefficient	t	Reliability[a]
Awareness of consequences for oneself	ACE1	−1.44	0.62	
	ACE2	−1.22	−3.89**	
Awareness of consequences for others	ACS1	1.03	0.60	
	ACS2	0.79	8.34***	
Awareness of consequences for the biosphere	ACB1	1.26	0.72	
	ACB2	1.11	9.84***	
Ascribed responsibility	AR1	−0.76		0.64
	AR2	1.50	6.05**	
	AR3	−0.77	−4.08**	
Personal norm	PN1	1.11		0.90
	PN2	1.26	14.28***	
	PN3	1.10	15.08***	
	PN4	1.24	14.29***	
Proenvironmental behavior intention	PBI1	1.57		0.95
	PBI2	1.89	11.55***	
	PBI3	1.76	10.94***	

See Table 1 for information about the measures.
*$p<.05$.
**$p<0.01$.
***$p<.001$.
[a]The reliabilities were computed after eliminating error covariances

Table 3
Estimation of structural model for total sample ($n=524$)

(i) Standardized path coefficients

Path from	Path to	Coefficient	t	Multiple correlation
Awareness of consequences for oneself	Ascribed responsibility	0.21	3.37***	93***
Awareness of consequences for others	Ascribed responsibility	0.54	4.49**	
Awareness of consequences for the biosphere	Ascribed responsibility	0.55	5.17***	
Ascribed responsibility	Personal norm	1.43	5.97***	0.35*
Personal norm	Proenvironmental behavior intention	1.27	8.81***	0.40*

(ii) Covariance matrix (correlations are given above the main diagonal)

	PBI	PN	AR	ACB	ACS	ACE
Proenvironmental behavior intention (PBI)	2.47	0.65	0.51	0.31	0.73	0.23
Personal norm (PN)	1.14	1.24	0.78	0.81	0.99	0.29
Ascribed responsibility (AR)	0.61	0.66	0.58	0.63	0.70	0.50
Awareness of consequences for oneself (ACB)	1.30	1.14	0.60	1.58	—	—
Awareness of consequences for others (ACS)	1.18	1.03	0.55	—	1.06	—
Awareness of consequences for the biosphere (ACE)	0.52	0.46	0.36	—	—	2.07

*$p<0.05$.
**$p<0.01$.
***$p<0.001$.

covariances. Furthermore, Table 3 shows that the path coefficients were significant with the expected signs. Estimating the alternative model positing a direct path from ACE to PBI yielded a slightly worse overall goodness of fit: $\chi^2[n=524;\ \mathrm{df}=217]=316.63$, $p<0.001$, NNFI = 0.963, CFI = 0.969, and RMSEA = 0.029. However, the estimated coefficient corresponding to the direct path failed to reach significance ($b=0.055$, $t=0.75$).[3] Thus, the results do not refute that collective proenvironmental behavior intention is causally related

[3]An alternative model specification positing direct paths from all the consequences to proenvironmental behavior intention resulted in an unacceptable fit.

to a personal norm whose activation depends on ascribed responsibility and awareness of the three different types of environmental consequences, egoistic, social-altruistic, and biospheric.

A test of the differences between prosocials and proselfs was conducted by estimating the standardized path coefficients of the structural model separately for each group. The estimates are given in Table 4 that also includes one-sided *t*-tests of the differences between the path coefficients. Although only the expected group difference with respect to the path from awareness of consequences for oneself to ascribed responsibility reached significance at $p=0.05$, almost equally large differences in the expected direction were observed for the path from awareness of consequences for others to ascribed responsibility, for the path from ascribed responsibility to personal norm, and for the path from personal norm to proenvironmental behavior intention. The coefficient corresponding to the path from awareness of consequences for oneself to ascribed responsibility was significant only for proselfs, the coefficient corresponding to the path from awareness of consequences to others to ascribed responsibility was significant only for prosocials, and the coefficient corresponding to the path from awareness of consequences for the biosphere to ascribed responsibility was significant for both proselfs and prosocials.

Table 4
Estimated structural model for proselfs ($n=145$) and prosocials ($n=231$).

(i) Standardized path coefficients

Path from	Path to	Coefficient	*t*	Multiple correlation
Proselfs				
Awareness of consequences for oneself	Ascribed responsibility	0.46	2.07*	0.90
Awareness of consequences for others	Ascribed responsibility	0.16	1.03	
Awareness of consequences for the biosphere	Ascribed responsibility	0.49	3.43***	
Ascribed responsibility	Personal norm	0.86	4.28***	0.65
Personal norm	Proenvironmental behavior intention	1.18	4.15***	0.31
Prosocials				
Awareness of consequences for oneself	Ascribed responsibility	0.11	1.35	0.90
Awareness of consequences for others	Ascribed responsibility	0.40	2.41*	
Awareness of consequences for the biosphere	Ascribed responsibility	0.37	2.95**	
Ascribed responsibility	Personal norm	1.17	3.45***	0.65
Personal norm	Proenvironmental behavior intention	1.43	5.69***	0.31

(ii) Differences in standardized path coefficients between proselfs and prosocials

Path from	Path to	Difference	t
Awareness of consequences for oneself	Ascribed responsibility	0.35	1.72*
Awareness of consequences for others	Ascribed responsibility	−0.24	−1.25
Awareness of consequences for the biosphere	Ascribed responsibility	0.12	0.30
Ascribed responsibility	Personal norm	−0.31	−0.39
Personal norm	Proenvironmental behavior intention	−0.25	−0.24

(iii) Covariance matrices (correlations are given above the main diagonal)

	PBI	PN	AR	ACB	ACS	ACE
Proselfs						
Proenvironmental behavior intention (PBI)	2.42	0.67	0.57	0.30	0.70	0.23
Personal norm (PN)	1.13	1.18	0.85	0.78	0.97	0.27
Ascribed responsibility (AR)	0.57	0.60	0.42	0.69	0.73	0.37
Awareness of consequences for oneself (ACB)	1.24	1.02	0.54	1.45	—	—
Awareness of consequences for others (ACS)	1.06	0.87	0.46	—	0.94	—
Awareness of consequences for the biosphere (ACE)	0.67	0.55	0.3	-	—	3.63
Prosocials						
Proenvironmental behavior intention (PBI)	2.08	0.62	0.54	0.24	0.83	0.20
Personal norm (PN)	0.94	1.11	0.86	0.77	0.96	0.23
Ascribed responsibility (AR)	0.42	0.49	0.29	0.66	0.82	0.42
Awareness of consequences for oneself (ACB)	1.16	0.98	0.43	1.45	—	—
Awareness of consequences for others (ACS)	1.16	0.98	0.43	—	0.94	—
Awareness of consequences for the biosphere (ACE)	0.55	0.46	0.2	—	—	3.63

*$p<0.05$.
**$p<0.01$.
***$p<0.001$

Table 5
Means, SDs, skewnesses, kurtosises, missing values, and product moment correlations ($n = 524$).

	ACE1	ACE2	ACS1	ACS2	ACB1	ACB2	AR1	AR2	AR3	PN1	PN2	PN3	PN4	PBI1	PBI2	PBI3
ACE1	0.17															
ACE2	0.26	0.17														
ACS1	−0.17	−0.08	0.18													
ACS2	−0.08	−0.05	0.32	0.19												
ACB1	−0.18	−0.09	0.39	0.44	0.21											
ACB2	−0.09	0.01	0.32	0.41	0.37	0.15										
AR1	0.10	0.19	−0.18	−0.12	−0.18	−0.16	0.08									
AR2	−0.21	−0.17	0.37	0.32	0.42	0.39	−0.26	0.56								
AR3	0.08	0.17	−0.08	−0.08	−0.14	−0.10	0.19	−0.29	0.15							
PN1	−0.10	−0.08	0.30	0.24	0.25	0.27	−0.27	0.48	−0.20	0.19						
PN2	−0.14	−0.19	0.37	0.33	0.45	0.28	−0.21	0.61	−0.22	0.48	0.28					
PN3	−0.16	−0.14	0.41	0.37	0.48	0.37	−0.22	0.76	−0.20	0.50	0.65	0.59				
PN4	−0.21	−0.15	0.43	0.40	0.49	0.40	−0.24	0.67	−0.19	0.46	0.58	0.75	0.40			
PBI1	−0.19	−0.11	0.27	0.18	0.23	0.25	0.2−3	0.32	−0.14	0.36	0.27	0.27	0.35	0.22		
PBI2	−0.25	−0.09	0.50	0.33	0.35	0.34	−0.19	0.38	−0.15	0.36	0.36	0.36	0.46	0.47	0.30	
PBI3	−0.15	−0.01	0.29	0.35	0.23	0.40	−0.15	0.34	−0.07	0.35	0.28	0.31	0.36	0.43	0.53	0.26
Missing	6	6	4	4	6	8	6	5	8	4	4	6	7	7	6	7
Mean	4.23	3.38	6.95	7.67	7.34	6.50	3.98	7.77	4.30	6.98	7.69	8.06	7.90	4.97	5.38	4.69
S.D.	2.50	2.59	1.95	1.68	1.79	2.09	2.22	1.58	2.63	1.74	1.62	1.31	1.43	2.53	2.59	2.74
Skewness	2.71	7.54	−9.06	−14.29	−9.97	−6.15	3.63	−13.67	2.44	−7.67	−13.00	−14.08	−14.04	−0.59	−2.00	0.67
Kurtosis	−0.10	−0.16	0.21	0.04	0.19	−0.89	−0.12	0.05	−0.09	0.20	0.06	0.06	0.05	−0.10	−0.10	−0.08

Squared multiple correlations are shown in the diagonal; the measures of skewness and kurtosis are standardized.
Note. ACE = Awareness of consequences for oneself; ACS = Awareness of consequences for others; ACB = Awareness of consequences for the biosphere; AR = Ascribed responsibility; PN = Personal norm; PBI = Proenvironmental behavior intention; Missing = number of missing values.

4. Discussion

The present results confirmed the proposed structural model derived from Schwartz' norm-activation theory of altruistic behavior (Schwartz, 1977; Schwartz & Howard, 1981). This model specifies that intention to perform collective proenvironmental behavior depends on personal norm (moral obligation), ascribed responsibility, and awareness of consequences for oneself, for others, and for the biosphere. Several other studies (e.g., Stern & Dietz, 1994; Stern et al., 1986; Stern et al., 1993; Van Liere & Dunlap, 1978) have obtained similar results. However, not all of them measured the full set of constructs.

It should be noted that, both in the present study and in several of the previous studies with similar aims, constructing reliable measures of the theoretical constructs has been challenging. A reason may be the frequently skewed distributions of responses to questions about environmental issues. Another possible reason is that participants fail to clearly distinguish conceptually between the different terms used in defining the scales. Therefore, as the present study demonstrated, it may be essential to pursue an approach such as the present one that uses structural equation modelling with estimates of error covariances. The latter procedure isolates and eliminates errors in the measures of the latent constructs. It is of course presupposed that such covariances for some reason exist. Likely reasons are difficulties on the part of the participants to clearly distinguish the constructs or general tendencies to respond favorably. Still another problem encountered in the present study was that many respondents refused to answer the questions in the social value orientation test. Since this test requires participants to make somewhat abstract, hypothetical choices, it is understandable that many in a population-based sample refuse to answer the questions. This limits the value of the test if the aim is to infer social value orientations in the population. However, the important thing in the present study is that a sufficient number of participants were possible to classify as prosocoials and proselfs, respectively.

A contribution of the present study is that the results refute that egoistic consequences directly affect intention to perform proenvironmental behavior. Since this is assumed in the theories of reasoned action and planned behavior (assuming that attitude is one determinant of intention) which have received substantial empirical support (e.g., Conner & Armitage, 1998), the present results suggest that proenvironmental behavior may differ from those many other behaviors that have been studied. Of course, the attitude construct as defined in the theories of reasoned action and planned behavior is not identical to awareness of egoistic consequences measured in the present study. The similarity is that attitude is related to consequences beneficial to self (Fishbein & Ajzen, 1975). Since the proenvironmental

behavior targeted in the present study was collective, it is also plausible that ascribed responsibility and personal norms are more important determinants of such behavior (e.g., signing a petition) than of behavior more directly related to self-interest (e.g., using public transport).

Another contribution of the present study is the demonstration that social value orientation modifies the relationship between proenvironmental behavior intention and awareness of environmental consequences. Social value orientation refers to the distinction between proselfs and prosocials. Since in the "decomposed game" (Kuhlman & Marshello, 1975; Liebrand, 1984; Van Lange, 1996) proselfs place more weight on their own outcome than do prosocials, they were hypothesized to also be more influenced by awareness of environmental consequences for themselves (e.g., laws to protect the environment limit choice and infringe on personal freedom). The results from estimating separate structural models confirmed this. In contrast, prosocials who place more weight on joint outcomes were expected to be more influenced by awareness of social-altruistic (e.g., harm to people all over the world) and biospheric consequences (e.g., the balance in nature is easily upset). The results partly confirmed this for social-altruistic consequences but prosocials and proselfs were both equally influenced by awareness of biospheric consequences. Anyway, the hypothesized relationship between social value orientation and awarenerss of egoistic and social-altruistic environmental consequences (Blamey, 1998; Stern & Dietz, 1994) was demonstrated.

In previous research (e.g., Stern, Dietz, & Guagnano, 1995a; Stern et al., 1995b) social-altruistic and biospheric environmental consequences have not been clearly distinguishable. In fact, factor analyses performed by Stern et al. (1995a) showed that the social-altruistic and biospheric consequences merged into one factor. Therefore, we hypothesized that prosocials and proselfs would also differ on awareness of biospheric consequences. The fact that they did not, at the same time as they differed on awareness of egoistic and social-altruistic environmental consequences, suggests that biospheric environmental consequences are in fact distinct. A challenge for future research is to disentangle the value orientation underlying awareness of biospheric environmental consequences (Stern, 1992).

Proenvironmental behavioral intention was found in both prosocials and proselfs to be influenced by personal norm and ascribed responsibility. Although not confirmed by direct statistical tests, the relationships tended, as was hypothesized, to be stronger for prosocials. It is possible that the collective nature of the proenvironmental behavior made personal norm a stronger determinant than would otherwise have been the case. Furthermore, according to a definition of personal norm emphasizing moral obligation (Schwartz, 1977), it is consistent with previous experimental social-dilemma research (e.g., Van Lange & Liebrand, 1989) that prosocials should be more influenced by personal norm than should proselfs.

It is important to point out in conclusion that the present results do not simply imply, as may be falsely believed, that a prosocial value orientation makes people more environmentally concerned or likely to perform proenvironmental behavior. The message is that if prosocials are concerned about the environment, they are likely to be this for other reasons than are proselfs. In addition, if the proenvironmental behavior explicitly requires cooperation with others, prosocials are more likely than are proselfs to engage in this behavior. Whether this is also true of proenvironmental behavior more directly requiring personal sacrifices is a question that future research must address.

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

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

Axelrod, L. J., & Lehman, D. R. (1993). Responding to envionmental concern: What factors guide individual action? *Journal of Environmental Psychology*, *13*, 149–159.

Biel, A., & Gärling, T. (1996). The role of uncertainty in resource dilemmas. *Journal of Environmental Psychology*, *15*, 222–233.

Blamey, R. (1998). The activation of environmental norms: Extending schwartz's model. *Environment and Behavior*, *30*, 676–708.

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

Brandstätter, V., & Gollwitzer, P. M. (1994). Research on motivation: A review of the eighties and early nineties. *The German Journal of Psychology*, *18*, 181–232.

Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology*, *28*, 1429–1464.

Dawes, R. M. (1980). Social dilemmas. *Annual Review of Psychology*, *46*, 190–203.

Fan, X., Thompson, B., & Wang, L. (1999). Effects of sample size, estimation methods, and model specification on structural equation modeling fit indexes. *Structural Equation Modeling*, *6*, 56–83.

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

Fransson, N., & Gärling, T. (1999). Environmental concern: Conceptual definitions, measurement methods, and research findings. *Journal of Environmental Psychology*, *19*, 397–408.

Hardin, G. (1968). The tradegy of the commons. *Science*, *162*, 1243–1248.

Harland, P., Staats, H., & Wilke, H. A. M. (1999). Explaining proenvironmental intention and behavior by personal norms and the theory of planned behavior. *Journal of Applied Social Psychology*, *29*, 2505–2528.

Hopper, J. R., & Nielsen, J. M. (1991). Recycling as altruistic behavior: Normative and behavioral strategies to expand participation in a community recycling program. *Environment and Behavior*, *23*, 195–220.

Hu, L. T., & Bentler, P. M. (1995). Evaluating model fit. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues and applications* (pp. 76–99). Thousand Oaks, CA: Sage.

Jöreskog, K. G., & Sörbom, D. (1993). *Lisrel8: structural equation modeling with the simplis command language*. Mooresville, IN: Scientific Software.

Kaiser, F. G., & Shimoda, T. A. (1999). Responsibility as a predictor of ecological behavior. *Journal of Environmental Psychology*, *19*, 243–253.

Komorita, S. S., & Parks, C. D. (1995). Interpersonal relations: Mixed-motive interaction. *Annual Review of Psychology*, *46*, 183–207.

Kuhlman, D., & Marshello, A. (1975). Individual differences in game motivation as moderators of preprogrammed strategy effects in prisoner's dilemma. *Journal of Personality and Social Psychology*, *32*, 922–931.

Liebrand, W. B. G. (1984). The effects of social motives, communication, and group size on behavior in an N-person multi-stage mixed-motive-game. *European Journal of Social Psychology*, *14*, 239–264.

Liebrand, W. B. G., & McClintock, C. G. (1988). The ring measure of social values: A computerized procedure for assessing individual differences in information processing and social value orientation. *European Journal of Social Psychology*, *2*, 217–230.

McClintock, C. G. (1978). Social values: Their definition, measurement, and development. *Journal of Research and Development in Education*, *12*, 121–137.

Messick, D. M., & McClintock, C. G. (1968). Motivational basis of choice in experimental games. *Journal of Experimental Social Psychology*, *4*, 1–25.

Ostrom, E. (1990). *Governing the commons*. New York: Cambridge University Press.

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. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology*, Vol. 10 (pp. 221–279). New York: Academic Press.

Schwartz, S. H., & Howard, J. A. (1981). A normative decision making model of altruism. In J. P. Rushton, & R. M. Sorrentino (Eds.), *Altruism and helping behavior: Social, personality, and developmental perspectives* (pp. 189–211). Hillsdale, NJ: Erlbaum.

Stern, P. C. (1992). Psychological dimensions of global environmental change. *Annual Review of Psychology*, *43*, 269–302.

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., & Black, J. S. (1986). Support for environmental protection: The role of social 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. (1993a). Value orientations, gender, and environmental concern. *Environment and Behavior*, *25*, 322–348.

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

Stern, P. C., & Oskamp, S. (1987b). Managing scarce environmental resources. In D. Stokols, & I. Altman (Eds.), *Handbook of environmental psychology*, Vol. 2 (pp. 1043–1088). New York: Wiley.

Thøgersen, J. (1996). Recycling and morality: A critical review of the literature. *Environment and Behavior*, *28*, 536–558.

Thompson, S. C., & Stoutemeyer, K. (1991). Water use as a commons dilemma: The effects of education that focuses on long-term consequences and individual action. *Environment and Behavior*, *23*, 314–333.

Van Lange, P. (1996). Social value orientations: A brief note. Unpublished manuscript.

Van Lange, P. A. M., & Liebrand, W. B. G. (1989). On perceiving morality and potency: Social values and the effects of person perception in a give-some dilemma. *European Journal of Social Psychology*, *3*, 209–225.

Van Lange, P. A. M., Liebrand, W. B. G., Messick, D. M., & Wilke, H. A. M. (1992). Introduction and literature review. In W. Liebrand, D. M. Messick, & H. Wilke (Eds.), *Social dilemmas* (pp. 3–28). Oxford: Pergamon.

Van Lange, P. A. M., Otten, W., De Bruin, E. M. N., & Joireman, J. A. (1997). Development of prosocial, individualistic, and competitive orientations: Theory and preliminary evidence. *Journal of Personality and Social Psychology*, *73*, 733–746.

Van Liere, K. D., & Dunlap, R. E. (1978). Moral norms and environmental behavior: An application of schwartz's norm-activation model to yard burning. *Journal of Applied Social Psychology*, *8*, 174–188.