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### Mean or green?

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*Document Version*

Publisher's PDF, also known as Version of record

*Publication date:*

2008

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Groot, J. I. M. D. (2008). *Mean or green? value orientations, morality and prosocial behaviour*. [Thesis fully internal (DIV), University of Groningen]. [s.n.].

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## Chapter 5

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# Value orientations and the norm activation model

**This chapter is based on:**

De Groot, J. I. M., Steg, L. & Dicke, M. (2007). Morality and Reducing Car Use: Testing the Norm Activation Model of Prosocial Behavior. In F. Columbus (Ed.), *Transportation Research Trends* (in press), NOVA Publishers.

**Abstract.** Two questionnaire studies ( $N = 489$  and  $N = 109$ ) are reported in which three types of Environmental Significant Behaviour (ESB; i.e., acceptability of a transport pricing measure, intention to reduce car use, and buying organic food) are explained by the norm activation model (NAM) together with egoistic, altruistic and biospheric value orientations. As expected, value orientations and NAM variables form a partial mediating model. Specifically, personal norms fully mediated the relationship between ascription of responsibility for the consequences of behaving anti-environmentally and ESB. Ascription of responsibility partially mediated the relationship between problem awareness and personal norms. And, problem awareness partially mediated the relationship between value orientations and ascription of responsibility. These results are in line with other scholars who proposed a partial mediating role of value orientations, NAM variables and ESB. Furthermore, value orientations also showed strong direct relationships with personal norms and ESB. In conclusion, ESB may best be strengthened by emphasizing egoistic and biospheric value orientations and by increasing awareness and responsibility for the problems related to behaving anti-environmentally, hereby increasing moral obligations for taking proenvironmental actions.

## 5.1 Introduction

Helping, sharing and cooperation are all considered to be types of prosocial behaviour. Prosocial behaviour is referred to as any act that benefits another person or other persons (Aronson, Wilson, & Akert, 2005). The most important motivations for individuals to act prosocially are benefiting others or themselves (e.g., Batson & Powell, 2003; Cialdini, 1991; Staub, 1978; Swap, 1991). The understanding of prosocial behaviour and its' motivations can be seen as one of the key factors to harmonious interpersonal and group relationships. Therefore, studying prosocial behaviours and its psychological determinants are relevant in numerous fields, including education, social work, and criminal justice.

Also in the field of environmental psychology the significance of prosocial behaviours and their motivations are examined extensively. Environmental Significant Behaviour (ESB) is believed to be a special case of prosocial behaviour, because these types of behaviours require people to restrain egoistic tendencies to benefit collective interests. Stern (2000) defines ESB as behaviour that changes the availability of materials or energy from the

environment or alters the structure and dynamics of ecosystems or the biosphere. Because there is a growing awareness that human behaviour contributes to environmental problems such as the greenhouse effect, depletion of the ozone layer, water pollution, decline of biodiversity, and desertification (Intergovernmental Panel on Climate Change [IPCC], 2001), it is relevant to study determinants that influence ESB as a special type of prosocial behaviour. Two studies are reported in this chapter which focus on determinants that affect ESB. These determinants are based on two different lines of research, namely from a value-basis and from a moral point of view. We will explain both theoretical frameworks below.

### **5.1.1 Values and environmental significant behaviour**

The first line of research includes studies that attempted to identify values as a basis for environmental attitudes and behaviour (e.g., Karp, 1996; McCarty & Shrum, 1994; Nordlund & Garvill, 2002; 2003; Schultz & Zelezny, 1999; Stern, Dietz, & Kalof, 1993; Stern & Dietz, 1994; Stern, Dietz, Kalof, & Guagnano, 1995; Van Vugt, Meertens, & Van Lange, 1995). These studies assume that values direct attention toward value-congruent information which will affect ESB accordingly (Stern & Dietz, 1994). Schwartz (1992) defines a value as “a desirable transsituational goal varying in importance, which serves as a guiding principle in the life of a person or other social entity (p.21).” The total number of values that people possess is relatively small. Therefore, relative to other antecedents of behaviour (e.g., attitudes), values provide an economically efficient instrument for describing and explaining similarities and differences between persons, groups, nations, and cultures (Rokeach, 1973).

A large number of studies concerning values in environmental research are based on Schwartz’s value theory (1992; 1994). In this theory, Schwartz proposes a general classification of fifty-six values. The importance of these values may differ across persons and cultures, but the structure of these values is believed to be universal. Indeed, studies that are conducted in different countries and cultures reveal that these values may be categorized into two dimensions (Schwartz, 1994; Schwartz & Bardi, 2001; Schwartz, Melech, Lehman, Burgess, Harris, & Owens, 2001). The first dimension, openness to

change versus conservatism, distinguishes values that stress independence, such as self-direction and stimulation, from values that emphasize tradition and conformity. The second dimension distinguishes a social or self-transcendent value orientation from an egoistic or self-enhancement value orientation. Whereas the first value orientation includes altruistic and biospheric values such as universalism and benevolence, the latter includes values that are related to pursuit personal interests, such as power and achievement.

Research shows that especially the self-transcendent versus self-enhancement dimension is related to different types of environmental beliefs and behaviours, because environmental behaviour often involves a conflict between immediate individual gains and long-term collective interests (Nordlund & Garvill, 2002; 2003; Thøgersen & Ölander, 2002; Stern, 2000). Most studies have found that people with a dominant self-transcendent value orientation have stronger proenvironmental beliefs and are more likely to engage in proenvironmental behaviour than people who strongly prefer self-enhancement values (Bardi & Schwartz, 2003; Cameron, Brown, & Chapman, 1998; Gärling, Fujii, Gärling, & Jakobsson, 2003; Karp, 1996; Nordlund & Garvill, 2002; 2003; Stern & Dietz, 1994; Stern, Dietz, & Guagnano, 1998; Van Vugt, et al., 1995).

Several scholars have argued that the self-transcendent value orientation includes both altruistic and biospheric values and can therefore be divided into two separate value orientations. For example, Stern and colleagues (Stern, 2000; Stern & Dietz, 1994; Stern, et al., 1993; Stern, et al., 1998) propose that three different value orientations may affect environmental beliefs and behaviour, namely an egoistic (i.e., values focusing on maximizing individual outcomes), a social-altruistic (i.e., values reflecting concern for the welfare of others) and a biospheric value orientation (i.e., values emphasizing the environment and the biosphere). Until recently, most studies related to ESB did not support a distinction of biospheric and altruistic value orientations (see De Groot & Steg, 2007b; e.g., Bardi & Schwartz, 2003; Corraliza & Berenguer, 2000; McCarty & Shrum, 1994; Nordlund & Garvill, 2002; Stern & Dietz, 1994; Stern, et al., 1998). Generally, only two value orientations are found, that is, self-transcendent versus self-enhancement (Stern, et al., 1998). This may be due to the selection of values included in these studies (i.e., only a few biospheric values were included in the relevant value instruments). But also, the emerging of a separate biospheric value orientation may be something

of recent years in which environmental problems are more visible.

De Groot and Steg (2007b) constructed a new value instrument that is able to show a distinction between egoistic, altruistic and biospheric value orientations. In three studies, the instrument was validated through confirmatory factor analysis. Each value orientation had sufficient internal consistency. It appeared that the altruistic and the biospheric value orientation were indeed related differently to behavioural intentions when altruistic and biospheric goals conflicted (i.e., when people had to decide whether to donate to humanitarian or environmental organizations) suggesting that it is useful to distinguish altruistic from biospheric value orientations. Therefore, in the studies reported in this chapter, we use this value instrument to examine the relationships between egoistic, altruistic and biospheric value orientations, environmental beliefs and behaviour.

Although value orientations may be important determinants to explain ESB, many studies suggest that the direct relationship between values and behaviour is rather weak. In general, values affect behaviour indirectly, through specific beliefs, norms and intentions (Feather, 1990; Nordlund & Garvill, 2003; Poortinga, Steg, & Vlek, 2004). Thus, the three types of value orientations may have considerable leverage, but they have modest direct influence on ESB. Therefore, in this chapter I will focus on how value orientations affect specific beliefs, intentions and ESB directly as well as indirectly.

### **5.1.2 Morality and environmental significant behaviour**

The second line of research focuses on the role of moral obligations to act in favour of the common good, because prosocial behaviour and ESB particularly is often considered as a moral issue (Allen & Ferrand, 1999; Baron, 1997; Vandenberg, 2005). These studies apply the Norm Activation Model (NAM; Schwartz, 1977; Schwartz & Howard, 1981) to explain ESB. According to the NAM, personal norms which are “feelings of moral obligation to perform or refrain from specific actions” (Schwartz & Howard, 1981, p.191) result in prosocial actions. Personal norms are activated when someone acknowledges that not acting prosocially will lead to negative consequences for others or the environment (Awareness of Consequences; AC) and when someone feels responsible for these negative consequences (Ascription of Responsibility;

AR). If the actor fails to activate personal norms, no actions will be recognized as appropriate and no prosocial action will follow.

The NAM appeared to be successful in explaining various kinds of ESB, including energy conservation (Osterhus, 1997; Tyler, Orwin & Schurer, 1982), willingness to pay for environmental protection (Guagnano, 2001; Guagnano, Dietz & Stern, 1994), proenvironmental political behaviour (Joireman, Lasane, Bennet, Richards & Solaimani, 2001; Stern, Dietz, Abel, Guagnano & Kalof, 1999), recycling (Bratt, 1999; Hopper & Nielsen, 1991; Vining & Ebreo, 1992) and general proenvironmental behaviour (Nordlund & Garvill, 2002; Schultz, Gouveia, Cameron, Tankha, Schmuck, & Franěk, 2005). However, empirical studies that use the NAM show different interpretations of the model. Some researchers propose a mediator model (Black, Stern, & Elworth, 1985; Diamond & Kashyap, 1997; Steg, Drijerink, & Abrahamse, 2005; Stern, 2000; Stern & Dietz, 1994), which assumes that AC has an indirect effect on PN through AR, which in turn has an indirect effect on intentions and behaviour through PN. Other researchers argue that the relationship between PN and prosocial behaviour is moderated by AC and AR (e.g., Hopper & Nielsen, 1991; Schultz & Zelezny, 1998; Schwartz & Howard, 1980; Vining & Ebreo, 1992), that is, the relationship between PN and prosocial behaviour is believed to be especially strong among those who are highly aware of the consequences of not acting prosocially and those who feel highly responsible for the consequences of this behaviour. De Groot and Steg (2007d) examined the relative strength of these two prevalent interpretations of the NAM in five studies with a variety of prosocial intentions, including environmental significant intentions. In general, their findings most strongly supported the NAM as a mediator model. Therefore, the studies included in this chapter focus on the predictability of the NAM as a mediator model to explain environmental intentions and behaviour. More specifically, PN are assumed to mediate the relationship between AR and prosocial intentions and behaviours, and AR is assumed to mediate the relationship between AC and PN.

### **5.1.3 Value orientations, norm activation and environmental significant behaviour**

Although Schwartz theorised about how values are related to moral obligations, most of the empirical studies based on the NAM did not include values explicitly into the model. They only included AC *and* AR, or AC *or* AR (see e.g., Eriksson, Garvill, & Nordlund, 2006; Hopper & Nielsen, 1991; Stern, et al., 1999). Furthermore, the NAM does not explicate which values are relevant when explaining prosocial behaviour. Stern (2000) proposed the Value Belief Norm (VBN) model which explicates how values are related in the NAM.

VBN interprets NAM as a mediator model and proposes a causal chain which moves from relatively stable and general values to specific beliefs (i.e., AC and AR), personal norms and proenvironmental actions. Stern argues that egoistic, altruistic and biospheric value orientations may all be related to ESB, although mostly indirectly, through AC, AR and PN. More specifically, PN mediates the relationship between AR and ESB, AR mediates the relationship between AC and PN (i.e., NAM as a mediator model), and AC will mediate the relationship between value orientations and AR.

The studies included in this chapter will examine the NAM as a mediator model and include values into the model as well (see Figure 5.1). As mentioned before, and as explicitly suggested by the VBN model, ESB is most strongly and consistently related to egoistic, altruistic and biospheric value orientations. Therefore, in this chapter, I examine how these value orientations fit into the NAM to explain ESB.

#### **5.1.4 Aim of the present study**

In conclusion, the NAM has been successful in explaining various types of prosocial behaviours, among which ESB, but most empirical studies fail to include values into the model. Also, the NAM does not explicate which values are relevant when explaining prosocial behaviour. VBN theory includes explicitly values into the model. However, most studies that examine VBN model were not able to distinct egoistic, altruistic and biospheric value orientations systematically (e.g., Gärling, Fujii, Gärling, & Jakobsson, 2003;



Value orientations and the NAM

Joireman, Lasane, Bennett, Richards, & Solaimani, 2001; Stern & Dietz, 1994; Stern et al., 1999), or did not include values and all NAM variables into their model (e.g., Guagnano, 2001; Hopper & Nielsen, 1991; Nordlund & Garvill, 2002, 2003; Stern & Dietz, 1994). An exception is a study by Steg and colleagues (Steg, et al., 2005), which supports the VBN model when applied to explaining the acceptability of energy policies aimed at reducing the emission of CO<sub>2</sub> by households. To test the robustness of the findings of Steg and colleagues, the present study aims to test the NAM by including egoistic, altruistic and biospheric value orientations into the model. I report two studies that examine whether the NAM with inclusion of egoistic, altruistic and biospheric value orientations is successful in explaining three types of ESB. In accordance with Steg and colleagues, the first type concerns an acceptability measure, only in a different domain (i.e., pricing policy aimed at reducing car use). To further validate the model, I include two other types of ESB. The second type is intention to reduce car use when a pricing policy would be introduced. And, the third behavioural variable concerns buying organic food.

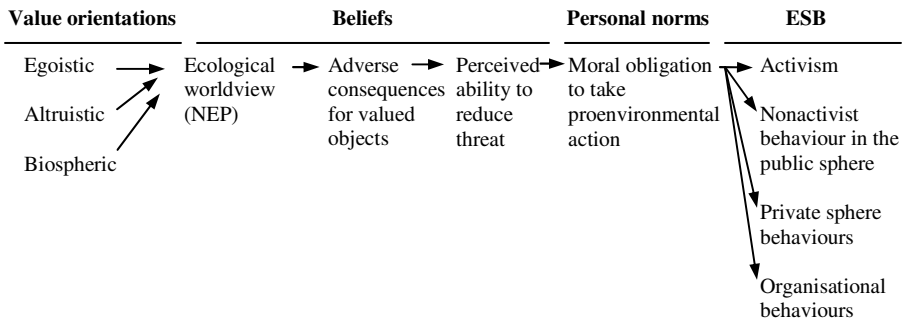


Figure 5.1. Schematic representation of value orientations included in the norm activation model (adapted from Stern, 2000).

Based on the support of the NAM as a mediator model and in line with VBN model, I hypothesize that each variable in the causal chain is related to the next variable, and may also be directly related to variables further down the chain, although these relationships will be weaker. Furthermore, I expect that PN mediate the relationship between AR and behaviour, AR mediates the relationship between AC and PN, and finally, AC mediates the relationship

between value orientations and AR. I will test this hypothesis within a mediation framework, following the procedure suggested by Baron and Kenny (1986).

## 5.2 Study 1

Study 1 aimed to examine whether the NAM as a mediator model is successful in explaining the acceptability of a transport pricing policy and intention to reduce car use when such a policy would be implemented. Reducing car use is seen as a type of ESB, because car use constitutes environmental problems such as environmental pollution, extensive land use and congestion (Eriksson, Garvill & Nordlund, 2006). I also include egoistic, altruistic and biospheric value orientations into the model.

### 5.2.1 Procedure and respondents

An Internet survey was conducted in five European countries (i.e., Austria, Czech Republic, Italy, the Netherlands and Sweden) in 2004 and the beginning of 2005. The study was part of a larger study that examined the effects of transport policies on life quality.<sup>10</sup> Among other things, the survey comprised questions about values, AC, AR, PN, acceptability of a transport pricing measure, and intention to reduce car use. The questions focused on car use and the (negative) environmental impact of cars. In every country, the questionnaire was translated into the native language. After a language check, questionnaires were distributed through e-mail. A link to the questionnaire was sent to acquaintances, family, students and colleagues with the request to fill out the questionnaire and to send the link to as many other persons as possible (snowball method). Respondents were told that the questionnaire comprised questions about their opinion on the effect of transport policies on their quality of life.

A total of 490 respondents returned the questionnaire. One respondent did not fill out the value items and was therefore excluded from further analysis. Because the survey was conducted through the Internet, no exact response rate is known. Respondents' age ranged from 17 to 72 years ( $M = 38.2$  and  $SD = 12.7$ ). Forty-five percent of the respondents were male and 55% were female.

The sample is probably not representative for the five participating countries, therefore this paper is not aimed at exploring differences between countries. However, I aimed to recruit a heterogeneous sample, for example, respondents from different age groups, regions, income levels, to secure variation in the variables of interest. As planned, the convenience samples showed substantial variation in socio demographic variables, such as age, gender and income.

### **5.2.2 Measures**

*Value orientations.* Value orientations were assessed by means of an adapted version of Schwartz's value scale (1992) developed by De Groot and Steg (2007b; 2007c). This scale consists of 13 values that belong to the self-enhancement versus self-transcendent dimension and aims to distinguish between egoistic, altruistic and biospheric value orientations. The following values were included: social power, wealth, authority, influential, ambitious (i.e., egoistic value orientation), equality, a world of peace, social justice, helpful (i.e., altruistic value orientation), preventing pollution, respecting the earth, unity with nature and protecting the environment (i.e., biospheric value orientation). Respondents indicated to what extent these values were important "as a guiding principle in their lives" on a nine-point scale ranging from -1 *opposed to my values*, 0 *not important* to 7 *extremely important*. Following Schwartz, respondents were urged to vary scores as much as possible and to rate no more than two values as extremely important. Multiple group method (MGM), a simple and effective type of confirmatory factor analysis (e.g., Nunnally, 1978; Stuive, Kiers, Timmerman, & Ten Berge, 2006), was carried out to verify the a priori classification of value items into the three value orientations empirically. In MGM, components must first be defined on theoretical grounds. For this purpose, mean scores were composed on value items supposedly related to the value orientations. Next, correlations were computed between items and components. For items included in a scale, the correlation coefficients were corrected for "self-correlation", i.e., the fact that items automatically correlate high with components in which they take part. Finally, we verified whether the items (i.e., values) indeed correlated strongest with the component (i.e., value orientation) to which they were assigned on theoretical grounds. In MGM, it is assumed that factor structures are supported

when values correlate strongest with the value orientation they are assigned to on theoretical grounds (see Nunnally, 1978). Table 5.1 shows that each value item correlated strongest to the value orientation with which it was associated, hereby providing support of the distinction between three value orientations. Cronbach's alpha was .74 for the egoistic ( $M = 2.5$ ,  $SD = 1.2$ ), .73 ( $M = 5.1$ ,  $SD = 1.1$ ) for the altruistic and .86 for the biospheric value orientation ( $M = 5.0$ ,  $SD = 1.3$ ).

Table 5.1

*Corrected correlations between value items and value orientations through multiple group method for total sample ( $N = 489$ ; adapted from De Groot & Steg, 2007b; 2007c).*

	<i>Egoistic orientation</i>	<i>Altruistic orientation</i>	<i>Biospheric orientation</i>
<i>Egoistic values:</i>			
1. Social power	<b>.50</b>	-.09	-.02
2. Wealth	<b>.50</b>	-.05	-.07
3. Authority	<b>.59</b>	-.10	-.14
4. Influential	<b>.52</b>	.09	.07
5. Ambitious	<b>.45</b>	.10	.01
<i>Altruistic values:</i>			
6. Equality	-.09	<b>.51</b>	.30
7. A world at peace	.03	<b>.44</b>	.43
8. Social justice	-.05	<b>.63</b>	.35
9. Helpful	.08	<b>.49</b>	.30
<i>Biospheric values:</i>			
10. Preventing pollution	-.11	.44	<b>.71</b>
11. Respecting the earth	.00	.31	<b>.68</b>
12. Unity with nature	.00	.41	<b>.76</b>
13. Protecting the environment	-.05	.43	<b>.72</b>

*Note.* For each item, the highest correlation is printed in bold. The correlations between items included in a scale and the specific scale itself were corrected for 'self-correlations', i.e. in this case, corrected-item total correlations are printed. All correlations are significant at  $p < .05$  except for the correlations printed in italic.

*Awareness of consequences, ascription of responsibility and personal norms.* Respondents indicated to what extent they agreed with 11 items reflecting awareness of consequences (AC), and ascription of responsibility (AR) on a

scale ranging from 1 *totally agree* to 7 *totally disagree*. AC as well as AR beliefs focused on problems related to car use and were placed in randomized order together with 8 items reflecting personal norms (PN; see Table 5.2). MGM supported the distinction between AC, AR, and PN (see Table 5.2). However, one AR item did not correlate strongest with the AR scale. Therefore, this item was not included in this scale. Mean scores were computed on items included in the scales. Cronbach's alpha for the AC scale was .81 ( $M = 2.7, SD = 1.2$ ), for the AR scale, with exclusion of one AR item, .72 ( $M = 3.8, SD = 1.0$ ), and for the PN scale .83 ( $M = 3.6, SD = 1.1$ ).

*Acceptability and intention.* Two dependent variables were included in the questionnaire. Respondents were asked to evaluate the following transport pricing policy: "Imagine that the government doubled the prices of car use. Increasing the cost of parking, fuel levies, transport pricing measures, and increases in insurance costs would mean that for each car you use you would pay 100% more than you currently do." Respondents first evaluated the acceptability of this policy. The following questions aimed to measure acceptability: "If this policy was implemented: a) I would protest against it; b) I would resign myself to it; c) I would accept it; d) I would feel that the policy was unfair to me; e) I would agree with it." Responses could range from 1 *definitely not* to 5 *certainly*. Scores on acceptability were based on the mean score on these items after reverse coding items a and d. The scale could range from 1, meaning that people think the measure is not acceptable at all, to 5, meaning people think the measure is very acceptable ( $M = 2.2, SD = 1.1, \alpha = .90$ ).

Second, intention to change car use when this policy would be implemented was measured by the following 5 items: "If this policy was implemented, I would...: a) drive less, b) travel more with other transport modes instead of the car, c) trade my car for a cheaper car, d) buy a small, more efficient car, and, e) get rid of my car." Again, responses could range from 1 *definitely not* to 5 *certainly*. The answer possibility *not applicable* was included as well, because not all respondents travelled by car, owned a car and/or had a driver's license ( $N = 128$ ). This category was coded as missing value and these respondents were omitted in the relevant analysis. Scale scores on intention to change car use were constructed by computing the mean score on the 5 items. Scores could range from 1 *no intention to change car use* to 5 *strong intention to change car use* ( $M = 2.0, SD = 0.9, \alpha = .81$ ).

Table 5.2

*Corrected correlations between AC, AR and PN items and AC, AR, and PN components through multiple group method (N = 489).*

		AC	AR	PN
AC:	1. Car use causes exhaustion of scarce resources, such as oil	<b>.58</b>	.41	.47
	2. Car use takes up a lot of space resulting in less space for cyclists, pedestrians and children	<b>.61</b>	.29	.58
	3. Car use is an important cause of traffic-related accidents	<b>.59</b>	.28	.46
	4. Car use reduces urban quality of life due to traffic noise and odour nuisance	<b>.63</b>	.26	.50
	5. <u>By reducing car use the level of air pollution will decrease</u>	<b>.58</b>	.31	.35
AR:	1. I feel joint responsibility for the exhaustion of fossil fuels by car use	.34	<b>.60</b>	.41
	2. I am jointly responsible for the problems caused by car use	.35	<b>.61</b>	.28
	3. Not just others, like the government, are responsible for heavy traffic, but me too	.38	<b>.38</b>	.35
	4. In principle, one person cannot decrease the problems of car use ( <i>rs</i> )*	<i>.04</i>	<i>.06</i>	<b>.16</b>
	5. I feel joint responsibility for the contribution of car traffic to global warming	.41	<b>.53</b>	.45
	6. <u>My contribution to the problems of car use is negligible (<i>rs</i>)</u>	<i>.00</i>	<b>.22</b>	<i>.15</i>
PN:	1. I feel personally obliged to travel in an environmentally sound way, such as by using a bicycle or public transport	.54	.33	<b>.68</b>
	2. I would be a better person if I used more often other transport modes instead of the car	.40	.37	<b>.44</b>
	3. People like me should do whatever they can to minimize their car use	.58	.41	<b>.66</b>
	4. I feel obliged to take the environmental consequences of car use into account when making travel choices	.41	.37	<b>.63</b>
	5. I don't feel guilty when I use the car even though there are other feasible transport alternatives available ( <i>rs</i> )	.25	.18	<b>.39</b>
	6. If I buy a new car, I feel morally obliged to buy an energy-efficient car	.38	.33	<b>.40</b>
	7. I feel morally obliged to use the car as little as possible, regardless of what other people do	.51	.32	<b>.71</b>
	8. I don't feel personally obliged to use the car as little as possible ( <i>rs</i> )	.32	.30	<b>.54</b>

*Note.* AC: Awareness of consequences; AR: Ascription of responsibility; PN: Personal norms; *rs*: reverse scored. For each item, the highest correlation is printed in bold. The correlations between items included in a scale and the specific scale itself were corrected for 'self-correlations', that is, in this case, corrected-item total correlations are printed. All correlations are significant at  $p < .05$  except for the correlations printed in italic. \*This item is excluded from further analysis.

### 5.2.3 Analyses

For all studies included in this chapter, the NAM was tested by means of a series of regression analyses. Each variable in the causal chain was regressed onto the preceding variable in the causal chain. Model 1 examines whether the variable directly preceding the dependent variable contributes significantly to the explanation of the variance in the dependent variable. In model 2, I examined whether all preceding variables explain additional variance in the dependent variable. This procedure makes it possible to test whether variables also directly affect variables further down the chain when intermediate variables are controlled for. For these regression analyses, I use a significance level of  $p < .006$  (.05 divided by 8), because a Bonferonni correction was used to reduce capitalization of chance.

To test the mediation effects I followed the same approach as in Chapter 4 (Baron & Kenny, 1986). The Goodman version of the Sobel-test (Preacher & Leonardelli, 2006) was used to test the significance of the mediation effects. In contrast to Chapter 4, I now examine all mediating relationships: PN are assumed to mediate the relationship between AR and intention, AR is assumed to mediate the relationship between AC and PN, and AC is assumed to mediate the relationship between value orientations and AR. Again, this procedure was followed for all studies included in this chapter. For Study 1 some of the mediation effects are already described in Chapter 4. In order to be able to read this chapter independently from Chapter 4, I will also include these results in this chapter.

### 5.2.4 Results

*Correlations between value orientations, AC, AR, PN, acceptability and intention.* Bivariate correlations were computed between value orientations, AC, AR, PN, acceptability of the policy and intention to reduce car use. Table 5.3 shows that most variables correlate significantly with each other. As expected, the dependent measures acceptability and intention are most strongly related to PN ( $r_{\text{acceptability}} = .52$ ;  $r_{\text{intention}} = .37$ ). Also in line with the NAM as a mediation model, AR is most strongly related to PN ( $r = .47$ ). AC is strongly related to AR ( $r = .42$ ). However, in contrast to NAM expectations, AC is

more strongly related to PN ( $r = .63$ ) and acceptability ( $r = .45$ ) than is AR. Table 5.3 further shows strong correlations between value orientations and NAM variables. Of the three value orientations, the biospheric value orientation correlates most strongly with NAM variables, acceptability and intention to reduce car use. As expected, egoistic value orientations are negatively related to all NAM variables. Also value orientations are stronger related to PN ( $r_{\text{egoistic}} = -.21$ ;  $r_{\text{altruistic}} = .20$ ;  $r_{\text{biospheric}} = .42$ ) than to AC and AR. According to the NAM as a mediation model, variables correlate most strongly with the variables directly following in the causal chain. Because some variables correlate stronger with variables further down the chain, these results suggest that there is no full mediating model.

Table 5.3

*Bivariate correlations between value orientations, awareness of consequences (AC), ascription of responsibility (AR), personal norms (PN), acceptability of a pricing policy and intention to reduce car use (N = 489).*

	1	2	3	4	5	6	7
1. Egoistic	1.00						
2. Altruistic	-.02	1.00					
3. Biospheric	-.05	.46**	1.00				
4. AC	-.20**	.14**	.25**	1.00			
5. AR	-.12*	.20**	.27**	.42**	1.00		
6. PN	-.21**	.20**	.42**	.63**	.47**	1.00	
7. Acceptability	-.26**	.00	.16**	.45**	.20**	.52**	1.00
8. Intention	-.14**	.13*	.30**	.31**	.18**	.37**	.21**

\* $p < .05$  \*\* $p < .01$

*Testing NAM.* Table 5.4 shows the results of the first part of the series of regression analyses aimed to test the NAM. PN explained 27% of the variance in acceptability judgements. A high PN was associated with a stronger acceptability of the transport pricing measure ( $\beta = .52, p < .001$ ). When all variables further up the causal chain were entered in the regression analysis as well, 32% of the variance was explained. As expected, PN contributed most strongly to this model ( $\beta = .41, p < .001$ ). Next to PN, AC and egoistic value orientations also contributed significantly to the model. When respondents were aware of the problems related to car use, they were more willing to accept the pricing policy ( $\beta = .22, p < .001$ ). When respondents were more



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egoistically oriented, they were less willing to accept the policy ( $\beta = -.14, p < .001$ ). Neither AR nor altruistic and biospheric value orientations contributed significantly to the model.

Table 5.4

*Multiple regression analyses to test the causal chain of the NAM included with values (N = 489).*

	$\beta$	<i>t</i>	<i>p</i>	Adj. $R^2$	<i>F</i>	<i>df</i>
DV: Acceptability						
Model 1:				.27	168.33	1, 463
PN	.52	12.97	.000			
Model 2:				.32	37.24	6, 458
PN	.41	7.49	.000			
AR	-.08	-1.74	.082			
AC	.22	4.21	.000			
Egoistic values	-.14	-3.62	.000			
Altruistic values	-.10	-2.25	.025			
Biospheric values	-.01	-.16	.876			
DV: Intention to reduce car use						
Model 1:				.14	57.11	1, 359
PN	.37	7.56	.000			
Model 2:				.16	12.68	6, 354
PN	-.23	3.39	.001			
AR	.07	-1.21	.229			
AC	-.13	2.06	.041			
Egoistic values	-.06	1.11	.270			
Altruistic values	.02	.38	.706			
Biospheric values	.19	3.19	.002			

*Note.* DV: dependent variable; AC: Awareness of consequences; AR: Ascription of responsibility; PN: Personal norms.

Table 5.5 shows the additional regression analyses to test the causal chain of the NAM. PN explained 14% of the variance in intention to reduce car use when the pricing policy would be implemented. A high PN was associated with a stronger intention to reduce car use ( $\beta = .37, p < .001$ ). When AR, AC and value orientations were entered in the regression analysis as well, 16% was explained. Again, PN contributed most strongly to this model ( $\beta = .23, p = .001$ ). Next to PN, only the biospheric value orientation contributed significantly to the model ( $\beta = .19, p = .002$ ). When respondents were more

biospherically oriented, they were more willing to reduce their car use ( $\beta = .19$ ,  $p < .001$ ).

Table 5.5

*Multiple regression analyses to test the causal chain of the NAM included with values (N = 489).*

	$\beta$	$t$	$p$	Adj. $R^2$	$F$	$df$
DV: PN						
Model 1:				.22	135.85	1, 487
AR	.47	11.66	.000			
Model 2:				.50	97.03	5, 483
AR	.21	5.68	.000			
AC	.46	12.60	.000			
Egoistic values	-.09	2.62	.009			
Altruistic values	-.03	.68	.494			
Biospheric values	.24	-6.52	.000			
DV: AR						
Model 1:				.18	105.89	1, 487
AC	.42	21.84	.000			
Model 2:				.20	31.79	4, 484
AC	.37	8.70	.000			
Egoistic values	.10	.83	.408			
Altruistic values	-.03	-2.21	.028			
Biospheric values	.10	-2.19	.029			
DV: AC						
Egoistic values	-.19	-4.42	.000	.11	20.21	3, 485
Altruistic values	.02	.47	.642			
Biospheric values	.26	5.27	.000			

*Note.* DV: dependent variable; AC: Awareness of consequences; AR: Ascription of responsibility; PN: Personal norms.

AR explained 22% of the variance in PN. The more respondents felt responsible for the problems related to car use, the stronger was their personal obligation to reduce it ( $\beta = .47$ ,  $p < .001$ ). The full model including all variables preceding PN explained 50% of the variance in PN. In contrast with expectations, AC contributed most strongly to this model ( $\beta = .46$ ,  $p < .001$ ). Respondents with a strong awareness also felt a stronger moral obligation to reduce car use ( $\beta = .46$ ,  $p < .001$ ). In line with the assumptions of the NAM, AR also contributed significantly to this model ( $\beta = .21$ ,  $p < .001$ ). The biospheric value orientation contributed also to the explanation of PN. The beta was  $.24(p < .001)$ , meaning the respondents who valued the environment

felt a stronger moral obligation.

AC explained 18% of the variance in AR. As expected, respondents who were highly aware of the problems related to car use felt more responsible for these problems ( $\beta = .42, p < .001$ ). Value orientations and AC together explained 20% of the variance in AR. Still, only AC contributed significantly to this model ( $\beta = .37, p < .001$ ). None of the three value orientations reached significance.

Finally, value orientations contributed significantly to the explanation of variance in AC (Adj.  $R^2 = .11, p < .001$ ). Both egoistic ( $\beta = -.19, p < .001$ ) and the biospheric ( $\beta = .26, p < .001$ ) value orientation contributed significantly to the regression model. When respondents were more oriented on self-interest, they were less aware of the problems related to car use ( $\beta = -.19, p < .001$ ). The opposite was true for respondents who were had a strong biospheric value orientation: they were more aware of problems related to car use ( $\beta = .26, p < .001$ ).

*Testing mediation effects between AR, PN and acceptability and intention.* Regression analyses showed a direct positive relationship between AR and PN (Adj.  $R^2 = .22, F(1, 488) = 139.55, p < .001$ ): the more respondents felt responsible for the problems related to car use, the stronger they felt a moral obligation to reduce car use ( $\beta = .47$ ). Next, significant direct relationships were found between AR and acceptability of the transport pricing policy (Adj.  $R^2 = .04, F(1, 488) = 19.80, p < .001$ ) and PN and acceptability (Adj.  $R^2 = .26, F(1, 488) = 173.07, p < .001$ ). When respondents felt more responsible for the problems of car use ( $\beta = .20$ ) and felt morally obliged to reduce car use ( $\beta = .51$ ), they evaluated the transport pricing policy aimed at reducing car use as more acceptable. Finally, in the regression of acceptability on both AR and PN, Adj.  $R^2 = .26, F(2, 487) = 87.47, p < .001$ , only PN contributed significantly to the explanation of the variance in acceptability ( $\beta = .54, p < .001$ ), pointing to a mediating role of PN. Sobel-test confirmed this conclusion ( $t = 8.77, p < .001$ ).

Intention to change car use were positively related to AR (Adj.  $R^2 = .03, F(1, 360) = 12.34, p < .001$ ) as well as to PN (Adj.  $R^2 = .14, F(1, 360) = 57.90, p < .001$ ). When respondents felt responsible for the negative consequences of car use, they more strongly intended to reduce their car use ( $\beta = .18$ ). And, a

strong personal norm to reduce car use was positively related to intention to reduce car use ( $\beta = .37$ ). In the regression of intention to change car use on AR and PN (Adj.  $R^2 = .13$ ,  $F(2, 359) = 29.05$ ,  $p < .001$ ), only PN contributed significantly to the model ( $\beta = .39$ ,  $p < .001$ ). Again, Sobel-test confirmed the mediating role of PN ( $t = 6.41$ ,  $p < .001$ ).

*Testing mediation effects between AC, AR and PN.* AR partially mediated the relationship between AC and PN ( $t = 8.37$ ,  $p < .001$ ). The regression of AR on AC was significant: Adj.  $R^2 = .22$ ,  $F(1, 488) = 140.12$ ,  $p < .001$ . The stronger respondents' awareness of problems related to car use, the stronger they felt responsible for these problems ( $\beta = .47$ ). Also, the regression of PN on AC was significant (Adj.  $R^2 = .40$ ,  $F(1, 488) = 321.34$ ,  $p < .001$ ). PN were stronger when respondents were aware of the negative effects of car use ( $\beta = .63$ ). Finally, when PN was regressed on both AC and AR (Adj.  $R^2 = .43$ ,  $F(2, 487) = 188.23$ ,  $p < .001$ ), both AC ( $\beta = .52$ ,  $p < .001$ ) and AR ( $\beta = .22$ ,  $p < .001$ ) contributed significantly to the explanation of PN, but the contribution of AC was significantly reduced.

*Testing mediation effects between value orientations, AC and AR.* Finally, value orientations were significantly related to the mediator, that is, AC. The three value orientations explained 11% of the variance in AC ( $F(3, 485) = 20.21$ ,  $p < .001$ ). Only egoistic and biospheric value orientations contributed significantly to the explanation of AC. When respondents possessed a strong egoistic value orientation, they were less aware of the problems related to car use ( $\beta = -.19$ ,  $p < .001$ ). The more respondents valued the environment, the more they were aware of these problems ( $\beta = .26$ ,  $p < .001$ ). Second, the three value orientations were also significantly related to AR (Adj.  $R^2 = .08$ ,  $F(3, 485) = 14.89$ ,  $p < .001$ ). All three value orientations contributed to the explanation of AR. As expected, egoistic values were negatively related to AR ( $\beta = -.11$ ,  $p < .05$ ), while altruistic and biospheric values were positively related to AR ( $\beta_{alt} = .11$ ,  $p < .05$ ;  $\beta_{bio} = .20$ ,  $p < .001$ ). Third, AC was positively related to AR (Adj.  $R^2 = .18$ ,  $F(1, 487) = 105.89$ ,  $p < .001$ ). The stronger respondents' awareness of problems related to car use, the stronger they felt responsible for these problems ( $\beta = .42$ ,  $p < .001$ ). When both AC and value orientations were included into the regression model, 21% of the

variance in AR was explained ( $F(4, 484) = 31.79, p < .001$ ). AC ( $\beta = .37, p < .001$ ) as well as altruistic ( $\beta = .10, p < .05$ ) and biospheric ( $\beta = .10, p < .05$ ) value orientations contributed significantly to this model, while egoistic value orientations did not contribute significantly to this model ( $\beta = -.03, p = .408$ ). To test whether AC indeed carries the influence of value orientations on AR, Sobel tests were conducted for each value orientation separately. These tests confirmed that AC mediated the relationship between biospheric value orientations and AR ( $t = 2.06, p = .040$ ), but not the relationships between altruistic value orientations and AR ( $t = .50, p = .616$ ) and between egoistic value orientations and AR ( $t = .81, p = .404$ ).

### **5.2.5 Conclusion**

The results of this study suggest that the NAM is successful in explaining judgements of acceptability of a transport pricing measure and intention to reduce car use when this policy would be implemented. As expected, all variables were significantly related to the next variable in the causal chain. However, in some cases, the explanatory power of the model strongly increased when other predictor variables further up the chain were entered into the regression model. Next to PN, AC as well as egoistic value orientations were significantly related to acceptability of the policy when intermediate variables were controlled for. For intention to reduce car use, biospheric values made a significant contribution next to PN. Also, the variance in PN could be better explained when biospheric values and AC were included into the regression model next to AR. Although Stern also suggests direct relationships between variables further down the chain, these relationships should theoretically be weaker. Therefore, results partly confirm the causal chain that moves from relatively stable general values to behaviour specific beliefs and norms to take corrective action, and acceptability and intention, respectively.

The hypothesis on mediation effects was confirmed, which provides further support for the causal structure of the NAM. As expected, PN mediated the relationship between AR and acceptability as well as between AR and intention to reduce car use. AR beliefs mediated the relationship between AC and PN. Finally, AC mediated the relationship between biospheric values and AR, but not between egoistic and altruistic value orientations and AR.

## 5.3 Study 2

Study 2 aimed to further examine the NAM as a mediator model. I tested whether value orientations, AC, AR and PN contribute to the explanation of buying organic food. Environmental pressure from food production results for example from the use of land, energy, water, and medicine (see Hoogland, 2006). The impact from food production on the environment is comparable to that of other major pressures such as those from transportation. Because it is generally accepted that sustainable development implies balancing environmental, social and economic qualities now and in the future (e.g., Organisation for Economic Co-operation and Development [OECD], 1996; World Commission on Environment and Development [WCED], 1987), those food production chains are preferable that create less environmental impacts while being socially justifiable and economically feasible (Hoogland, 2006; Langhelle, 2000). Organic food is produced according to certain legally regulated standards which try to maintain sustainability. Therefore, it can be regarded as a type of ESB.

### 5.3.1 Procedure and Respondents

An Internet survey was conducted in 2005 in the Netherlands. The survey focused on the impact of NAM variables and value orientations on buying organic food. A link to the questionnaire was sent to acquaintances of a research fellow with the request to fill out the questionnaire and to send the link to as many other persons as possible (snowball method). Also, paper flyers were distributed in which the aim of the survey and the Internet-link were explicated.

In total, 109 respondents returned the questionnaire of which 48% male and 52% female. Mean age of the respondents was 31.6 ( $SD=13.6$ ). The sample was not representative because low-income groups (38.5%) and high educational level (76.4%) were overrepresented compared to the Dutch population (Centraal Bureau voor de Statistiek [CBS], 2005). Because I was especially interested in relationships between NAM variables and value orientations and do not compare mean scores, a sample that is not fully representative is less problematic (Schultz et al., 2005). Therefore, I think the sample was sufficient for the aim of this study.

**5.3.2 Measures**

*Value orientations.* The same value instrument as used in Study 1 was included in the survey of Study 2. MGM again supported the grouping of 13 values into 3 value orientations (see Table 5.6). Cronbach’s alpha was .75 for the egoistic ( $M = 2.5, SD = 1.2$ ), .82 ( $M = 5.0, SD = 1.2$ ) for the altruistic and .83 for the biospheric value orientation ( $M = 4.2, SD = 1.3$ ).

Table 5.6

*Corrected correlations between value items and value orientations through multiple group method (N = 109).*

	<i>Egoistic orientation</i>	<i>Altruistic orientation</i>	<i>Biospheric orientation</i>
<i>Egoistic values:</i>			
1. Social power	<b>.64</b>	-.20	-.06
2. Wealth	<b>.48</b>	-.15	.08
3. Authority	<b>.49</b>	.14	.24
4. Influential	<b>.54</b>	-.06	.08
5. Ambitious	<b>.48</b>	-.04	-.07
<i>Altruistic values:</i>			
6. Equality	-.06	<b>.66</b>	.50
7. A world at peace	-.01	<b>.67</b>	.46
8. Social justice	-.17	<b>.67</b>	.49
9. Helpful	-.01	<b>.57</b>	.51
<i>Biospheric values:</i>			
10. Preventing pollution	.06	.50	<b>.66</b>
11. Respecting the earth	.02	.47	<b>.66</b>
12. Unity with nature	.13	.38	<b>.64</b>
13. Protecting the environment	-.01	.48	<b>.73</b>

*Note.* For each item, the highest correlation is printed in bold. The correlations between items included in a scale and the specific scale itself were corrected for ‘self-correlations’, that is, in this case, corrected-item total correlations are printed. All correlations are significant at  $p < .05$  except for the correlations printed in italic.

*Awareness of consequences, ascription of responsibility and personal norms.* Respondents indicated to what extent they agreed with 10 items reflecting AC, AR and PN on a scale ranging from 1 *totally disagree* to 7 *totally agree*. MGM was carried out to verify the a priori classification of items empirically (see Table 5.7). Results showed that all AC items were more strongly related to the PN component than to the AC component. This is problematic for testing the full NAM. I deal with this problem as follows. First, I do consider AC as a separate construct, but keeping the strong correlations with PN in mind when

interpreting results. Second, I exclude AC from further analyses, hereby not analyzing the full model. The model that is tested in this case is described in Figure 5.2. Both options are described in the results section. Mean scores were computed on items included in the scales. Cronbach’s alpha for the AC scale was .69 ( $M = 4.4, SD = .9$ ). For the AR scale the Cronbach’s alpha was .69 ( $M = 4.3, SD = 1.4$ ). PN had a Cronbach’s alpha of .87 ( $M = 2.9, SD = 1.3$ ).

Table 5.7

*Corrected correlations between AC, AR and PN items and AC, AR, and PN components through multiple group method (N = 109).*

	AC	AR	PN
AC items: <sup>1</sup>			
1. Damage caused by non-organic food is negligible ( <i>reverse scored</i> ).	.40	.19	<b>.47</b>
2. The natural environment will break down when I keep buying non-organic products.	.55	.40	<b>.63</b>
3. The environmental consequences of using pesticides in agriculture are problematic.	.48	.26	<b>.50</b>
4. Buying organic products is good for the environment.	.49	<i>.14</i>	<b>.53</b>
AR items:			
1. I am jointly responsible for the problems caused by using pesticides in agriculture and cattle breeding.	.32	<b>.52</b>	.24
2. I cannot be charged responsible for the solution of environmental problems caused by chemical pesticides used in agriculture ( <i>reverse scored</i> ).	.30	<b>.52</b>	.27
PN items:			
1. I feel guilty when I don’t buy organic products.	.66	.31	<b>.75</b>
2. I feel morally obliged to buy organic products.	.65	.28	<b>.79</b>
3. I would be a better person if I bought ECO-products. <sup>2</sup>	<b>.63</b>	.22	.61
4. I would violate my principles when I buy regular instead of organic products.	.57	<i>.18</i>	<b>.73</b>

*Note.* AC: Awareness of consequences; AR: Ascription of responsibility; PN: Personal norms. For each item, the highest correlation is printed in bold. The correlations between items included in a scale and the specific scale itself were corrected for ‘self-correlations’. All correlations are significant at  $p < .05$  except for the correlations printed in italic. <sup>1</sup>The AC component is excluded in the second part of the analyses, because AC items correlated stronger with the PN component after corrections for self-correlations. <sup>2</sup>This item is included from further analysis.

### 5.3.3 Results

*Correlations between value orientations, AC, AR, PN, and buying organic food.* Bivariate correlations were computed between value orientations, AC, AR, PN, and buying organic food. Table 5.8 shows that most variables correlate significantly with each other.



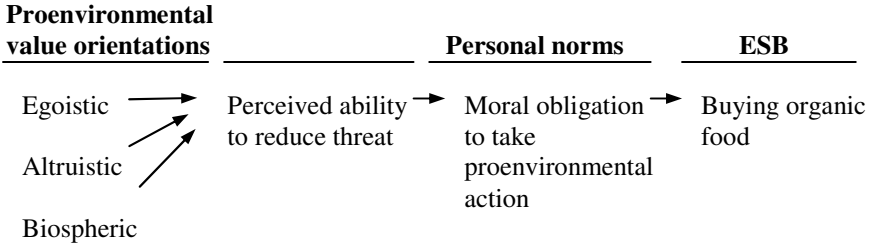


Figure 5.2. Model tested in Study 2 when Awareness of Consequences is excluded from analyses.

As expected, buying organic food was most strongly related to PN ( $r = .46$ ). AR showed strong positive correlations with PN ( $r = .29$ ), and AC ( $r = .35$ ). In contrast to NAM expectations, but in line with the results of the MGM, AC is too strongly related to PN ( $r = .74$ ), again indicating that AC and PN measure similar constructs. In contrast to expectations, value orientations are more strongly related to PN than to AR. Biospheric value orientations correlated strongly with AC ( $r = .41$ ), PN ( $r = .47$ ) and buying organic food ( $r = .29$ ), but not with AR ( $r = .05$ ). Altruistic value orientations showed a similar pattern, only correlations were less strong. Finally, egoistic value orientations were negatively significantly related to all variables except for buying biological food: egoistic values correlated with AC ( $r = -.28$ ), AR ( $r = -.28$ ) and PN ( $r = -.26$ ). Some variables correlated stronger with variables further down the chain, which suggests that NAM variables only partially mediate relationships between value orientations, AC, AR, PN and buying organic food.

*Testing NAM.* I tested the NAM including and excluding the AC construct. PN explained 20% of the variance in buying organic food (Table 5.9). Respondents with a high PN reported that they bought more organic food than respondents with a low PN ( $\beta = .20, p < .001$ ). When PN, AR, AC, and value orientations were entered in the regression analysis as well, no extra variance was explained (Adj.  $R^2 = .18, p < .001$ ). PN contributed most strongly to this model ( $\beta = .37, p = .008$ ). When AC was excluded from analyses, PN, AR and value orientations explained approximately the same amount of variance (Adj.  $R^2 = .19, p < .001$ ). As expected, again PN was the only variable that

Table 5.8

*Bivariate correlations between value orientations, awareness of consequences (AC), ascription of responsibility (AR), personal norms (PN), and buying organic food (N = 109).*

	1	2	3	4	5	6	7
1. Egoistic	1.00						
2. Altruistic	-.08	1.00					
3. Biospheric	.07	.55**	1.00				
4. AC	-.28**	.36**	.41**	1.00			
5. AR	-.28**	-.10	.05	.35**	1.00		
6. PN	-.26**	.39**	.47**	.74**	.29**	1.00	
7. Buying organic food	-.09	.22*	.29**	.37**	.20**	.46**	1.00

\*p < .05 \*\*p < .01

Table 5.9

*Multiple regression analyses to test the causal chain of the NAM (N = 109).*

	B	t	p	Adj. R <sup>2</sup>	F	df
DV: <i>Buying organic food</i>						
Model 1:				.20	28.65	1, 107
PN						
Model 2 (AC included):	.46	5.35	.000	.18	4.98	6, 102
PN						
AR	.37	2.71	.008			
AC	.09	.93	.355			
Egoistic values	.03	.20	.843			
Altruistic values	.04	.41	.682			
Biospheric values	.03	.24	.809			
	.08	.73	.465			
Model 2 (AC excluded):*				.19	6.03	5, 103
PN	.39	3.56	.001			
AR	.10	1.00	.319			
Egoistic values	.04	.40	.694			
Altruistic values	.03	.27	.788			
Biospheric values	.09	.76	.452			

Note. DV: dependent variable; AC: Awareness of consequences; AR: Ascription of responsibility; PN: Personal norms. \* Series of regression analyses when AC is excluded from the NAM.

contributed significantly to this model ( $\beta = .39, p = .001$ ).

In Table 5.10 AR explained 8% of the variance in PN. The more respondents felt responsible for the problems caused by chemical pesticides, the stronger their personal obligation to buy organic food ( $\beta = .29, p = .002$ ). The full model including all variables preceding PN explained 58% of the variance in PN. In contrast to the NAM, but in line with the MGM results, only AC contributed significantly to this model. When respondents were aware of the problems related to buying normal instead of organic food, they felt a stronger moral obligation to buy organic food ( $\beta = .60, p = .001$ ). Of course, this result disappeared when AC was excluded from analyses ( $\text{Adj. } R^2 = .35, p < .001$ ). In this case, AR and biospheric values contributed significantly to the model. When respondents felt responsible ( $\beta = .24, p = .005$ ) and when they strongly valued the environment ( $\beta = .37, p < .001$ ), they felt more morally obliged to buy organic food.

AC explained 12% of the variance in AR. As expected, respondents who were highly aware of the problems caused by pesticides, felt more responsible for these problems ( $\beta = .35, p < .001$ ). Together with the three value orientations, AC still explained 60% of the variance in AR. As expected, only AC contributed significantly to this model ( $\beta = .72, p < .001$ ). None of the three value orientations reached significance.

Finally, value orientations explained 26% of the variance in AC. Both the egoistic and the biospheric value orientation contributed significantly to the regression model. When respondents valued self-interests, they possessed a stronger problem awareness for buying organic food ( $\beta = -.29, p = .001$ ). The more respondents valued the environment, their problem awareness increased ( $\beta = .35, p = .001$ ). Egoistic, altruistic and biospheric value orientations explained 9% of the variance in AR (i.e., when AC was excluded from NAM). Only egoistic value orientations contributed significantly. When respondents valued maximizing individual outcomes strongly, they also felt less responsible for the environmental problems caused by producing food ( $\beta = -.31, p = .001$ ).

Table 5.10

*Multiple regression analyses to test the causal chain of the NAM (N = 109).*

	$\beta$	<i>t</i>	<i>p</i>	Adj. $R^2$	<i>F</i>	<i>df</i>
<b>DV: PN</b>						
Model 1:				.08	10.10	1, 107
AR	.29	3.18	.002			
Model 2 (AC included):				.58	30.79	5, 103
AR	.06	.80	.428			
AC	.60	7.63	.000			
Egoistic values	-.09	-1.31	.193			
Altruistic values	.06	.80	.427			
Biospheric values	.20	2.46	.012			
Model 2 (AC excluded):*				.35	15.45	4, 104
AR	.24	2.86	.005			
Egoistic values	-.21	-2.49	.014			
Altruistic values	.19	2.00	.049			
Biospheric values	.37	3.90	.000			
<b>DV: AR</b>						
Model 1:				.12	15.09	1, 107
AC	.35	3.88	.000			
Model 2:				.19	7.20	4, 104
AC	.37	3.63	.000			
Egoistic values	-.20	-2.17	.032			
Altruistic values	-.28	-2.67	.009			
Biospheric values	.07	-.59	.555			
<b>DV: AC</b>						
Egoistic values	-.29	-3.46	.001	.26	13.53	3, 105
Altruistic values	.15	1.45	.149			
Biospheric values	.35	3.53	.001			
<b>DV: AR*</b>						
Egoistic values	-.31	-3.33	.001	.09	4.66	3, 105
Altruistic values	-.23	-2.07	.041			
Biospheric values	.20	1.78	.079			

*Note.* DV: dependent variable; AC: Awareness of consequences; AR: Ascription of responsibility; PN: Personal norms. \* Series of regression analyses when AC is excluded from the NAM.

*Testing mediation effects between AR, PN and buying organic food.* Regression analyses showed a direct positive relation between AR and PN (Adj.  $R^2 = .08$ ,  $F(1, 107) = 10.10$ ,  $p = .002$ ): the more respondents felt responsible for the problems caused by chemical pesticides, the stronger they felt a moral obligation to buy organic food ( $\beta = .29$ ). Next, significant direct relationships were found between AR and buying organic food (Adj.  $R^2 = .03$ ,

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$F(1, 107) = 4.52, p = .036$ ) and PN and buying organic food (Adj.  $R^2 = .20, F(1, 107) = 28.65, p < .001$ ). When respondents felt more responsible for the problems caused by pesticides ( $\beta = .20$ ) and felt morally obliged to reduce these problems ( $\beta = .46$ ), they bought more organic food. Finally, in the regression of buying organic food on both AR and PN, Adj.  $R^2 = .20, F(2, 106) = 14.61, p < .001$ , only PN contributed significantly to the explanation of the variance in buying organic food ( $\beta = .44, p < .001$ ), pointing to a mediating role of PN. Sobel-test confirmed this conclusion ( $t = 2.70, p = .007$ ).

*Testing mediation effects between AC, AR and PN.* As expected based on the results of the MGM, AR did not mediate the relationship between AC and PN ( $t = 0.55, p = .580$ ). The regression of AR on AC was significant: Adj.  $R^2 = .12, F(1, 107) = 15.09, p < .001$ . The stronger respondents' awareness of problems related to buying regular instead of organic food, the stronger they felt responsible for the problems ( $\beta = .35$ ). Also, the regression of PN on AC was significant (Adj.  $R^2 = .55, F(1, 107) = 132.00, p < .001$ ). PN were stronger when respondents were aware of the negative effects of buying regular food ( $\beta = .74$ ). Finally, when PN was regressed on both AC and AR (Adj.  $R^2 = .55, F(2, 106) = 65.70, p < .001$ ), only AC ( $\beta = .73, p < .001$ ) instead of AR ( $\beta = .04, p = .533$ ) contributed significantly to the explanation of PN.

*Testing mediation effects between value orientations, AC and AR.* Egoistic, altruistic and biospheric value orientations were significantly related to AC. The three value orientations explained 26% of the variance in AC ( $F(3, 105) = 13.53, p < .001$ ). Only egoistic and biospheric value orientations contributed significantly to the explanation of AC. When respondents possessed a strong egoistic value orientation, they were less aware of problems related to buying non-organic food ( $\beta = -.23, p = .001$ ). The more respondents were oriented to the environment, the more they were aware of the problems related to buying regular food ( $\beta = .25, p = .001$ ). The three value orientations were also significantly related to AR (Adj.  $R^2 = .09, F(3, 105) = 4.66, p = .004$ ). The egoistic value orientation contributed most strongly to the explanation of AR ( $\beta = -.31, p = .001$ ). The altruistic value orientation was also negatively related to AR ( $\beta = -.23, p = .041$ ). Although, the contribution of the altruistic value orientation to AR reached significance, I believe this result was due to a

statistical artefact (i.e., the correlation between altruistic value orientation and AR was only  $-.10, p = .316$ ). Biospheric values did not contribute significantly to the explanation of AR as well ( $\beta = .20, p = .079$ ). When both AC and value orientations were included into the regression model, 19% of the variance in AR was explained ( $F(4, 104) = 7.20, p < .001$ ). AC ( $\beta = .37, p < .001$ ) as well as altruistic ( $\beta = -.28, p = .009$ ) and egoistic ( $\beta = -.20, p = .032$ ) value orientations contributed significantly to this model. Based on the results of these three regression analysis, I concluded that AC could only mediate the relationship between egoistic value orientations and AR. Sobel test confirmed that AC indeed mediated the relationship between egoistic value orientations and AR ( $t = 2.56, p = .011$ ).

*Testing mediation effects between value orientations, AR, and PN.* I also tested whether AR mediated the relationship between value orientations and PN when the AC construct was excluded from the model. Next to AR (see above), egoistic, altruistic and biospheric value orientations were also significantly related to PN. The three value orientations explained 30% of the variance in PN ( $F(3, 105) = 16.72, p < .001$ ). Egoistic as well as biospheric value orientations contributed significantly to the model. When respondents valued self-interests, they felt less morally obliged to buy organic food ( $\beta = -.28, p = .001$ ). The more respondents valued the environment, the stronger their PN to buy organic food ( $\beta = .42, p < .001$ ). When both AR and value orientations were included into the regression model, 35% of the variance in PN was explained ( $F(4, 104) = 15.45, p < .001$ ). All variables contributed significantly to the model. Biospheric value orientations contributed most strongly to the model ( $\beta = .37, p < .001$ ), followed by AR ( $\beta = .24, p = .005$ ), egoistic ( $\beta = -.20, p = .014$ ) and altruistic ( $\beta = .19, p < .049$ ) value orientations. Because only egoistic value orientations were significantly related to AR and PN, I concluded that AR could only mediate the relationship between egoistic value orientations and PN. Sobel test confirmed that the relationship between the egoistic value orientation and PN was indeed significantly reduced when AR was entered into the same regression model ( $t = 2.33, p = .026$ ), pointing to a mediating role of AR.

### 5.3.4 Conclusion

Confirmatory factor analysis showed that the AC component could not be usefully distinguished from the PN component. Therefore, I offered two regression analyses to test the hypotheses, one in which AC is included and the other one in which AC is excluded from analyses. In general, the results of this study further validate the assumption that the NAM variables together with value orientations are successful in explaining ESB.

When AC was included in regression analyses, all variables were significantly related to the next variable in the causal chain. Above all, the explanatory power hardly increased when other predictors further down the chain were entered into the regression model. An exception was the explanation of PN, in which AC was the only significant and strongest predictor instead of AR.

The NAM and values as a mediator model was for the most part supported when AC was excluded from regression analyses. Again, all predictors were directly related to the next variable in the model. The only exception was the biospheric value orientation, which was more strongly related to PN when intermediate variables were controlled for than was AR.

Specific mediation effects mostly confirmed the mediation model as well, that is, PN mediated relationships between AR and buying organic food, AR mediated relationships between egoistic value orientations and PN, and, AC mediated the relationship between egoistic value orientations and AR. Mediation analyses showed no relationship between AC and PN through AR.

Although both analyses (i.e., including AC or excluding AC) mostly support the mediating model of value orientations, AR, AC, PN and buying organic food, I prefer to interpret results when AC is excluded from analyses. Items included in the AC scale were too strongly related to respondents' moral obligations to buy organic food. When AC was excluded from the model, the pattern of results seems more strong and consistent with VBN expectations. Furthermore, results that failed to support the mediation hypotheses can be logically explained by the fact that AC was indistinguishable from PN. In the general discussion, I will extent on possible explanations why AC and PN were too strongly related to each other.

## 5.4 General Discussion

Results of the two studies suggest that variables included in the NAM together with egoistic, altruistic and biospheric value orientations are successful in explaining three types of ESB. As expected, all NAM variables were significantly related to the next variable in the causal chain. In some cases, other variables also directly affected variables further down the chain when intermediate variables were controlled for, suggesting a partial mediating model. Although Stern (2000) suggests direct relationships between variables further down the chain as well, these relationships should theoretically be weaker. Therefore, results mostly confirm the causal chain that moves from relatively stable general values to behaviour specific beliefs and ESB.

These results were further confirmed by mediation analyses. As expected, PN fully mediated the relationship between AR and acceptability of a pricing policy, intention to reduce car use and buying organic food. AR only partially mediated the relationship between AC and PN in Study 1, but not in Study 2. However, this was due to the factor structure that was not validated through MGM. When AC was out of analysis, AR partially mediated the relationship between egoistic value orientations and moral obligations. In Study 1, AC partially mediated the relationship between value orientations and AR. These results are in line with other scholars who proposed a mediating model of values, NAM variables and ESB (Nordlund & Garvill, 2002, 2003; Steg, et al., 2005).

As expected, strong moral obligations were related to higher acceptability levels of a policy aimed at reducing car use, stronger intention to reduce car use, and buying more organic food. Personal norms explained 27% (i.e., acceptability of a transport pricing policy aimed at reducing car use), 14% (i.e., intention to reduce car use when this policy would be implemented) and 20% of the variance (i.e., buying biological food), respectively. Other studies show similar amounts of explained variance by personal norms. For example, Bamberg and Schmidt (2003) reported that personal norms explained 14% variance in car use. In a study aimed at explaining willingness to reduce car use, PN explained 20% of the variance (Nordlund & Garvill, 2002). Steg and colleagues (2005) reported that PN explained 29% in acceptability judgments of policies aimed at reducing CO<sub>2</sub> emissions in households. This relatively



high contribution of PN is comparable with results of our study in which PN explains 27% of acceptability of transport pricing policies. Also, the total amount of variance explained by all variables included into our model, which ranged from 16% for intention to reduce car use to 32% for acceptability of a transport pricing policy, is similar to other studies. Thus, results suggest that value orientations and NAM variables together are able to explain a variety of intention and behaviours in an environmental context. However, the amount of variance being explained seems to differ across various behavioural domains. For example, intention to reduce car use may be perceived as more costly behaviour compared to acceptability and buying organic food because of the high behavioural costs associated with reducing car use (e.g., Poortinga, Steg & Vlek, 2004; Steg, et al., 2005). That is, the car has many personal advantages, such as freedom, comfort, status, and convenience which may be evaluated as more important than environmental consequences associated with car use (Steg, 2003). Indeed, in line with other scholars (e.g., Lindenberg & Steg, 2007), results of the studies reported here suggest that personal norms will especially affect those environmental behaviours in which behavioural constraints are limited.

PN was the only significant predictor to explain buying biological food. However, for explaining acceptability and intention to reduce car use, next to PN, other variables contributed significantly to the model as well. AC as well as egoistic value orientations were directly related to acceptability judgments. Respondents who thought car use caused problems were more willing to accept a pricing policy which doubled costs of car use. The opposite was true for people who strongly endorsed egoistic values, who were less willing to accept the pricing policy. And, AC and the biospheric value orientation contributed significantly to the explanation of intention to reduce car use. Respondents who strongly valued the environment and biosphere showed stronger intention to reduce their car use.

Value orientations, AC and AR were able to explain 50% (Study 1) and 58% (Study 2) of the variance in PN. Even when AC was excluded from the analysis when explaining moral obligations to buy organic food, value orientations and AR were still able to explain 35% of the variance in PN. As expected, PN was especially strong among respondents who felt responsible for the problems related to car use and for those who felt responsible for

problems related to buying regular instead of organic food. However, in both studies the biospheric value orientation also contributed significantly to the explanation of PN. This result implies that those who value the environment feel more obliged to reduce car use and eat organic food. Biospheric value orientations also contributed uniquely to the explanatory power of PN in other studies. For example, in the study of Steg and colleagues (2005), values, worldviews, AC and AR explained almost 50% of the variance in PN. AR as well as biospheric values contributed to this explanation. Also the study of Nordlund and Garvill (2003) showed that biospheric values were directly as well as indirectly related to PN.

In Study 1, AC and value orientations explained 20% of the variance in AR. Only AC made a unique contribution to this model meaning that respondents felt more responsible for the problems related to car use when they were aware of these problems. In Study 2, approximately the same amount of variance in AR was explained by AC and value orientations. Again, AC was the only significant predictor in the regression model. How is it possible that AC could not be distinguished from PN in Study 2? I have two possible explanations for this result. First, as explained in the Introduction, most studies that are based on the NAM often include either AC or AR instead of both variables (e.g., Eriksson, Garvill, & Nordlund, 2006; Hopper & Nielsen, 1991; Nordlund & Garvill, 2002, 2003; Stern, et al., 1999; Thøgersen, 1999) or AC and AR but not PN (e.g., Guagnano, Dietz, & Stern, 1994). For example, Hunecke and colleagues (Hunecke, Blöbaum, Matthies, & Höger, 2001) include both AR and PN items into one construct (i.e., PN) to explain travel mode choice. It is plausible that these studies do not report all constructs because one of these constructs is too strongly related to PN or to each other, or because they do not use confirmatory factor analysis to check the factor structure. However, more empirical results should be reported to accept or reject this possibility. Second, there is a subtle difference in how AC is measured in Study 1 compared to Study 2. In Study 1, AC items are mainly focused on the awareness of the problems based on cause-and-effect relationships (e.g., “Car use causes exhaustion of scarce resources, such as oil”). In Study 2, AC items also included a type of judgment (e.g., “Buying organic products is good for the environment”) or a personal contribution (e.g., “The natural environment will break down when I keep buying non-organic products”). Based on the results

of these studies, AC and PN are better distinguishable when the AC items are defined as in Study 1. Therefore, future studies should define AC items clearly in order to provide an unambiguous distinction between the different variables included in the NAM.

The studies reported in this chapter include three different indicators of ESB, namely behavioural intention, acceptability and self-reported behaviour. Although replication in two different domains with three different dependent measures is worthy, it is also important to include behavioural measures, instead of environmental intention and self-reported ESB. People are likely to over-report proenvironmental intentions and self-reported behaviours, because it includes a social desirability component. This may have exaggerated the amount of variance explained by value orientations, AC, AR and PN. A large amount of studies show, however, that intentions are closely linked to behaviour (see Armitage & Conner, 2001). Subsequently, most studies that tested the NAM included only behavioural intentions or self-reported behaviours (e.g., De Ruyter & Wetzels, 2000; Diamond & Kashyap, 1997; Guagnano, 2001; Joireman, et al., 2001; Nordlund & Garvill, 2002; 2003; Steg, et al., 2005; Stern, 2000; Tyler, et al., 1982; Van Liere & Dunlap, 1978). Choosing similar dependent measures as these studies makes comparing results easier. Therefore, studying intentions and self-reported behaviour does provide useful insights in relationships between value orientations, NAM variables and ESB. Of course, future studies should examine whether the causal chain is the most plausible alternative to explain actual ESB as well.

The correlational designs of the two studies reported here do not permit to draw definite causal inferences on relationships between value orientations, AC, AR, PN and ESB. Based on the results presented here, we assume value orientations affect AC. In turn, AC affects AR, and AR activates PN which eventually result in proenvironmental intentions and behaviour. However, it is possible that engagement in proenvironmental behaviour shapes awareness, responsibility and norms through a variety of other social psychological processes as well. Experimental and longitudinal studies are needed to further examine causal relationships between the NAM variables.

The relationship between values and ESB seems more complex than suggested by Stern (2000). Although values were indirectly related to PN and ESB through AC (and AR in Study 2), they also were directly related to these

variables. More specifically, biospheric value orientations contributed strongly to the explanation of PN in both studies after controlling for AC and AR. Biospheric value orientations contributed also uniquely to the explanation of intention to reduce car use, and egoistic value orientations contributed significantly to the explanation of acceptability of a transport pricing measure to reduce car use. Especially the strong direct relationship between biospheric values and moral considerations make sense. Because biospheric values reflect how concerned individuals are about collective interests and the biosphere, they may be especially related to personal norms related to ESB (e.g., Nordlund & Garvill, 2002; 2003; Stern et al., 1999; Stern, 2000). Indeed, Nordlund and Garvill (2002) found that self-transcendence values (i.e., altruistic and biospheric values) were positively related to PN, while self-enhancement values (reflecting egoistic values) were not significantly related to feelings of moral obligation. In turn, personal norms were related to behaviour. This is also theoretically in line with Schwartz's (1977) assumptions that personal norms may be rooted in internalized values. Therefore, in contradiction with the VBN model which assumes that values are most strongly related to problem awareness, then to AR, PN and finally to ESB, results of these studies suggest that they also have considerable leverage directly through PN and ESB.

The two studies replicated the distinction into egoistic, altruistic and biospheric value orientations with the value instrument of De Groot and Steg (2007b). MGM clearly supported the distinction between three value orientations. Results were similar to other studies that used the instrument (De Groot & Steg, 2007b, 2007c). Furthermore, the three value orientations were directly as well as indirectly related to NAM variables and ESB in the expected way. Therefore, this study further validates the distinction of the self-transcendent value dimension of Schwartz (1992) into an altruistic as well as a biospheric part.

A better understanding of factors influencing ESB has important policy implications. The results of this chapter revealed that the variables included in the NAM are successful predictors of various kinds of ESB. Furthermore, two studies demonstrated that value orientations and NAM variables form a partial mediating model. As expected, the relationship between AR and ESB was mediated by PN, AR partially mediated the relationship between AC and PN,

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and AC partially mediated the relationship between value orientations and AR. Results further imply that ESB may best be strengthened by emphasizing the positive consequences of behaving proenvironmentally for egoistic and biospheric value orientations in particular, depending on which behavioural domain has to be promoted. Furthermore, results indicate that ESB will be strengthened by increasing awareness and responsibility for the problems related to behaving anti-environmental, hereby increasing moral obligations for taking proenvironmental actions.