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Relationships between value orientations, self-determined motivational types and pro-environmental behavioural intentions

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ABSTRACT

We examined the predictive power of egoistic, altruistic and biospheric value orientations and six types of self-determined motivations (i.e. intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation) toward acting pro-environmentally for explaining two types of pro-environmental intentions in two questionnaire studies among student samples ($N = 304$ and $N = 520$). The two pro-environmental intentional measures included choosing a car based on environmental performance and donating to an environmental organisation. Values were more predictive of pro-environmental intentions than were self-determined motivational types, although these differences were not always statistically significant. Furthermore, we explored how value orientations are related to self-determined motivational types. The more respondents were altruistically and biospherically oriented, the more they were self-determined to act pro-environmentally. When respondents endorsed egoistic values, they were less self-determined towards acting in a pro-environmental way. When altruistic and especially biospheric values were important predictors of pro-environmental intentions, stronger types of self-determined motivations were also important to explain intentions. And, when egoistic values contributed uniquely to the explanation of pro-environmental intentions, amotivation and external regulation (i.e. less self-determined motivational types) were most relevant for explaining intentions.

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1. Introduction

There is a growing awareness that human behaviour contributes to environmental problems such as water pollution, decline of biodiversity, and desertification (Gardner & Stern, 2002; Intergovernmental Panel on Climate Change [IPCC], 2007). It is increasingly recognized that pro-environmental actions are essential for decreasing these problems and to promote sustainable development. Following Stern (2000), we define pro-environmental behaviours by its positive impact on “the availability of materials or energy from the environment” and/or by the extent to which the behaviours positively “alter the structure and dynamics of ecosystems or the biosphere” (p. 408). To promote pro-environmental actions, a thorough understanding is needed of which factors affect these behaviours. In this paper, we therefore focus on motivational determinants of pro-environmental behaviours. More

specifically, we explore the explanatory power of values and self-determined motivational types.

1.1. Values and pro-environmental behaviour

Many scholars emphasise the importance of human values for explaining pro-environmental behaviours (e.g. Axelrod, 1994; Clark, Kotchen, & Moore, 2003; Stern, 2000). 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).” Values may affect a wide range of attitudes and behaviours. Therefore, values can provide an economically efficient instrument for describing and explaining similarities and differences between persons, groups, nations, and cultures (Rokeach, 1973), that is, the number of behaviour-specific beliefs is countless compared to the number of values.

Stern (2000) argues that three types of values (i.e. value orientations) are relevant when explaining pro-environmental behaviours, namely egoistic, altruistic and biospheric values (see also, De Groot & Steg, 2007, 2008; Steg, Dreijerink, & Abrahamse, 2005; Stern, Dietz, & Guagnano, 1998). All three value orientations may

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motivate people to act in a pro-environmental way. For instance, a person may buy an energy-efficient instead of an energy-inefficient car because this is perceived as the cheapest option (egoistic value orientation, i.e. focus on the self), because it emits less polluting gasses that may endanger the health of people (altruistic value orientation, i.e. focus on the welfare of other people), or because it produces less CO₂ which protects the environment (biospheric value orientation, i.e. focus on the welfare of the environment and biosphere).

Studies show that while egoistic values are mostly negatively related to pro-environmental attitudes, intentions and behaviours; altruistic and/or biospheric values show a positive relationship (e.g. Gärling, Fujii, Gärling, & Jakobsson, 2003; Honkanen & Verplanken, 2004; Milfont & Gouveia, 2006; Nordlund & Garvill, 2002; Stern & Dietz, 1994), probably because many pro-environmental behaviours require individuals to restrain egoistic tendencies (Nordlund & Garvill, 2002; Stern, 2000; Thøgersen & Ölander, 2002). However, biospheric values are generally more strongly related to pro-environmental intentions and behaviours than altruistic values (De Groot & Steg, 2008).

1.2. Self-determined motivational types and pro-environmental behaviour

Another research tradition that focuses on motivations in explaining pro-environmental intentions and behaviours is grounded in the Self-Determination Theory (SDT; Deci & Ryan, 1985, 2000). SDT proposes that people can be motivated to perform behaviours at different levels of self-determination. When people are motivated more autonomously or are said to be “self-determined”, they experience themselves as initiators of their own behaviour, they select their own desired outcomes and choose how to achieve them. By contrast, being controlled or having a low level of self-determined motivation is characterized by lacking a true sense of choice.

Deci and Ryan (1985) propose six types of motivations that are ordered along a self-determination continuum reflecting the extent to which they are autonomously supported by an individual (i.e. self-determined motivational types). On the left of the continuum there is amotivation, which is the least self-determined of all types of motivation, indicating that someone has no intention to perform a certain action at all. Amotivation is accompanied by feelings of incompetence and lack of control, and feeling no sense of purpose, reward, or change of course with respect to those behaviours. To the right of amotivation is a category that represents the least autonomous form of extrinsic motivation, that is, external regulation. People perform such behaviours to satisfy an external demand such as rewards or constraints. Introjected regulation is the next factor on the continuum and describes a type of controlled internal regulation because people are motivated to act out of a sense of obligation related to approval from oneself or from other persons. Such actions are often accompanied by feelings of social pressure. Next, there is identification. Here, the person identifies with the behaviour and the behaviour becomes part of one's personal identity. The most autonomous form of extrinsic motivation is integrated regulation, which occurs when identified regulations have been fully internalised in the self. Intrinsic motivation is at the far right of the continuum. It represents the most self-determined motivational type and involves those behaviours that are naturally interesting or enjoyable.

Various studies showed that self-determined motivational types towards acting pro-environmentally are related to pro-environmental behaviours, such as recycling, conserving resources, purchasing environmentally-friendly products, and general pro-environmental behaviours (e.g. Green-Demers, Pelletier, & Ménard,

1997; Koestner, Houliort, Paquet, & Knight, 2001; Séguin, Pelletier, & Hunsley, 1999; Villacorta, Koestner, & Lekes, 2003). For example, self-determined motivational types were associated with the frequency of behaving pro-environmentally (Pelletier, Green-Demers, & Béland, 1997; Pelletier, Tuson, Green-Demers, Noël, & Beaton, 1998; Villacorta et al., 2003). When respondents were more self-determined towards acting pro-environmentally, they more frequently performed pro-environmental actions, and performed a wider range of those actions. Also, people with stronger self-determined motivational types were more likely to engage in pro-environmental behaviours that were perceived to be difficult (Green-Demers et al., 1997). That is, while respondents who were more extrinsically motivated were likely to perform some low-cost pro-environmental behaviours, such as recycling, they were less likely to perform more difficult behaviours (i.e. purchasing environmentally-friendly products) compared to people who showed a stronger self-determined motivation. These results support the assumption of Deci and Ryan (1987) that pro-environmental behaviours are more likely when motivations are more self-determined. However, it is not clear how predictive the six specific motivational types are in explaining pro-environmental behaviours, because most of the studies above only report correlations between the various motivational types and pro-environmental intentions and do not report the amount of explained variance (e.g. Green-Demers et al., 1997; Pelletier et al., 1997, 1998; Villacorta et al., 2003).

1.3. Predictive power of values and self-determined motivational types

The studies reviewed above indicate that both values and self-determined motivational types are related to pro-environmental intentions and behaviours. Both can be regarded as general antecedents of pro-environmental behaviour, because they reflect general motives to act pro-environmentally and do not focus on a specific type of pro-environmental behaviour. General antecedents may affect behaviour indirectly, via behaviour-specific beliefs (e.g. Stern, 2000), but also directly (e.g. Séguin et al., 1999; Steg, De Groot, Dreijerink, Abrahamse, & Siero, *in press*). For example, egoistic, altruistic and biospheric value orientations were directly and significantly related to explaining environmental activism (Steg et al., *in press*). And, Séguin et al. (1999) showed that stronger types of self-determined motivational types were directly related to various types of pro-environmental behaviours. As in the studies above, we also focus on the direct relationships between these general antecedents and pro-environmental behaviours.

Although both values and self-determined motivational types reflect general motives for environmental behaviour, they differ in some important respects. First, egoistic, altruistic and biospheric value orientations explain what people seek through their actions, that is, what they value most when pursuing pro-environmental behaviours (i.e. egoistic, altruistic or biospheric outcomes of the behaviour). In contrast, the six different types of self-determined motivations reveal to what extent someone is autonomously motivated to act in a pro-environmental way (see Pelletier et al., 1998). Therefore, they answer in two different ways the question “Why do people act in a pro-environmental way?”. That is, they focus either on 1) the outcomes of the behaviour (values), or, 2) the extent of freedom of choice when undertaking the behaviour (motivational types).

Second, egoistic, altruistic and biospheric value orientations can affect various behaviours, among which are pro-environmental behaviours. In contrast, self-determined motivational types towards the environment are conceptualised as reasons for engaging in pro-environmental behaviours only. Therefore, the

latter are somewhat more specific motivations for environmental actions than are value orientations.

1.4. Study aim

We aimed to compare the predictive power of egoistic, altruistic and biospheric value orientations and the six types of self-determined motivations (i.e. intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation) in explaining pro-environmental intentions. Based on the above, we put forward two competing hypotheses. First, it can be argued that self-determined motivational types are better predictors of pro-environmental behavioural intentions than value orientations. This may be because the different types of self-determined motivations toward the environment are conceptualised on a more behaviour-specific level than are the value orientations, that is, they specifically refer to environmental actions. Behaviour-specific beliefs are assumed to be better predictors of behaviour than are general antecedents such as values (e.g. Ajzen, 1985; Eagly & Chaiken, 1993). Following this line of reasoning, self-determined motivational types should be more strongly related to pro-environmental intentions than values because they are more specific than are values (*Hypothesis 1*).

Second, people do not act pro-environmentally out of specific environmental motivations only (Stern, 2000). In many cases, behaviour results from multiple motivations (e.g. Frederik, Loewenstein, & O'Donoghue, 2002; Lindenberg & Steg, 2007). Following this line of reasoning, values should be more powerful in explaining pro-environmental intentions than self-determined motivational types, because they reflect a wider range of motivations (e.g. egoistic, altruistic, and biospheric) than do self-determined motivational types (*Hypothesis 2*). Self-determined motivational types towards the environment focus on environmental interests only, that is, they reflect why people do something for the environment. We explore which line of reasoning is most plausible by comparing the predictive power of both behavioural determinants in explaining different types of pro-environmental intentions.

Values and self-determined motivational types have frequently been used in empirical studies in the domain of pro-environmental behaviour, but they have typically been used separately. Therefore, a second aim of this study is to explore relationships between values and self-determined motivational types in more detail. As argued, studies show that stronger types of self-determined motivational types and biospheric values are most strongly positively related to a variety of pro-environmental behaviours. Subsequently, the stronger self-determined motivational types are based on internalised values (Ryan & Deci, 2002). Altruistic and, even more so, biospheric value orientations are most positively related to pro-environmental behaviours. Does this suggest that when people are more strongly biospherically (and to a lesser extent altruistically) oriented, they are more self-determined towards acting in a pro-environmental way? And, on the flip-side, when they are more strongly egoistically oriented, are they less autonomously motivated? In this paper, we conducted two studies to test these themes.

2. Study 1

The first study aimed to examine the predictive power of egoistic, altruistic and biospheric value orientations and the six self-determined motivational types in explaining two types of pro-environmental intentions, that is, 1) the intention to buy a car that performs well on environmental aspects, and, 2) the intention to donate to environmental instead of humanitarian organisations.

We also tested how values and self-determined motivational types are interrelated.

2.1. Method

2.1.1. Respondents and procedure

Respondents were undergraduates at the University of Groningen, The Netherlands, who were recruited from the Psychology Department's Human Participant Pool in September and October 2006. They received course credits for participation. In total, 304 respondents completed the paper and pencil questionnaire of which were 20.9% males and 79.1% females. Mean age was 20 years ($SD = 3.9$).

2.1.2. Measures

Respondents first completed questions on egoistic, altruistic and biospheric values. Next, they completed the Motivation Toward the Environment Scale (MTES; Pelletier et al., 1997, 1998), followed by measures of pro-environmental intentions. The main constructs were measured as follows.

2.1.2.1. Value orientations. Egoistic, altruistic and biospheric value orientations were assessed by means of an adapted version of Schwartz's value scale (1992, 1994) developed by De Groot and Steg (2007, 2008). The value instrument consisted of 13 values and aims to measure egoistic, altruistic and biospheric value orientations. The following values were included: social power, wealth, authority, being influential, ambition (i.e. egoistic value orientations), equality, a world of peace, social justice, being helpful (i.e. altruistic value orientations), preventing pollution, respecting the earth, unity with nature and protecting the environment (i.e. biospheric value orientation). Respondents rated the importance of these 13 values as "a guiding principle in their lives" on a nine-point scale, ranging from -1 "opposed to the value", 0 "not at all important" to 7 "of supreme importance". Mean scores were computed on items included in each scale. Cronbach's alpha was .75 for the egoistic values ($M = 2.6$, $SD = 1.2$), .77 for the altruistic values ($M = 5.5$, $SD = 1.0$) and .88 for the biospheric value scale ($M = 4.1$, $SD = 1.4$).

2.1.2.2. Self-determined motivational types. We employed the MTES developed and validated by Pelletier and colleagues (Pelletier et al., 1997, 1998). The MTES measures people's level of autonomy when performing pro-environmental behaviours (see also: Villacorta et al., 2003). This scale distinguishes the six types of self-determined motivations as proposed in the SDT. The MTES consists of 24 items reflecting various reasons for engaging in pro-environmental behaviours and starts with the question "Why are you doing things for the environment?" Some examples of items included in this scale are: "I enjoy contributing to the environment" (e.g. intrinsic motivation; IM); "It is an integral part of my life" (e.g. integrated regulation; IntR); "It is a sensible thing to do" (e.g. identified regulation; IdR); "I would feel guilty if I didn't" (e.g. introjected regulation; IR); "For the recognition I get from others" (e.g. external regulation; ER); "Don't know; I have the impression I'm wasting my time" (e.g. amotivation; AM). Subjects rated the extent to which they agreed with these items on a 7-point scale ranging from 1 "totally disagree" to 7 "totally agree". Mean scores were computed on the 4 items included in each of the 6 scales. The means were 4.3 ($SD = 1.1$, $\alpha = .82$) for intrinsic motivation, 3.7 ($SD = 1.3$, $\alpha = .80$) for integrated motivation, 5.3 ($SD = .9$, $\alpha = .79$) for identified regulation, 4.2 ($SD = 1.2$, $\alpha = .83$) for introjected motivation, 2.4 ($SD = 1.0$, $\alpha = .79$) for external regulation, and 2.8 ($SD = 1.1$, $\alpha = .73$) for amotivation.

2.1.2.3. Outcome variables. We used two outcome variables that we regard as measures of pro-environmental intentions throughout this paper. First, respondents were asked to fill in a consumer choice task developed by Verplanken and Holland (2002). This original task implicitly measured to what extent people base their decision to buy a television set on environmental aspects. Instead of television sets, we asked respondents to choose their most favourable car for work-purposes. The cars varied on 7 different aspects (e.g. model, engine power, safety, size, emissions, comfort and costs; see Appendix). The 7 aspects were briefly explained. The information on the cars was provided in a 20 (number of cars) $\times$ 7 (number of aspects) matrix. Each cell contained one of five symbols (–, –, 0, +, ++) indicating how favourable or unfavourable a particular car was on each aspect. The environmental aspect was reflected in the feature “Emissions”. We explained that scores on emissions were based on fuel consumption, harmful emissions, and sustainable production of the car. We did not include words such as “environment” and “environmental”, because we wanted to avoid priming effects. The dependent variable was the score of the car selected on this “environmental” aspect on a five-point scale. This scale ranged from – (which was coded as a “1”), indicating that the preferred car scored very low on environmental aspects, to ++ (which was coded as a “5”), indicating that the preferred car scored very high on environmental aspects. We refer to this score as the “environmental performance of the preferred car”. The mean score on this measure was 2.8 ($SD = 1.5$), suggesting that, in general, respondents chose a car that scored a little above average on environmental aspects.

Second, we measured donation intention by means of an instrument developed by De Groot and Steg (2008). Respondents were asked how much money they would donate to a humanitarian or an environmental organisation. The question was: “Suppose you have 10 Euro that you are willing to donate to charity. Below, we list nine pairs of donating choices in which you can choose to donate between two organisations. Please indicate in every situation how you would divide your 10 Euro.” In five of the nine cases, respondents were given a choice between a humanitarian and an environmental organisation, the other 4 situations were not relevant (i.e. fillers) to mask the purpose of the task. Based on face validity, each pair of organisation was comparable with respect to degree of (inter) nationalisation of aid and aim. A short description of the mission of each organisation was included. Respondents were not allowed to equally divide the 10 Euro over the two organisations. An example: “If I have to donate 10 Euro to charity, then I would give: xx Euro to Habitat for Humanity and xx Euro to Greenpeace.” Scores on donating intention were computed by summing up the

amount of money someone gave to an environmental organisation. This scale score could range from 0 ‘no donations to environmental organisations, 50 Euro to humanitarian organisations’ to 50 “50 Euro to environmental organisations, no donations to humanitarian organisations”. A score of ‘35’ would mean that of the five times a respondent donated to an organisation, he or she chose to donate 35 Euro to an environmental and 15 Euro to an humanitarian organisation. The mean score was 20.7 ($SD = 7.5$) indicating that, on average, respondents tended to donate somewhat less to environmental organisations compared to humanitarian organisations.

2.1.3. Analyses

For Study 1 and Study 2 we report the following analyses. First, we show Pearson's bivariate correlations between self-determined motivational types, value orientations and pro-environmental behavioural intentions to show how value orientations and self-determined motivational types are related (cf. Roccas, Sagiv, Schwartz, & Knafo, 2002). Then, we further examined the predictive power and relationships between motivational types and pro-environmental intentions, and values and pro-environmental intentions separately by means of multiple regression analyses. We report our results in two ways. First, we show the results of separate multiple regression analyses for motivational types and pro-environmental intentions and values and pro-environmental intentions. For creating a full picture of the results, we also report the betas and significant levels of the model in which both self-determined motivations and value orientations are included (i.e., hierarchical regression model, see below). As our hypotheses concern the predictive power of self-determined motivational types in comparison to value orientations, we compared the amount of variance (R^2) explained by values and self-determined motivational types, respectively. For each regression analysis, we computed the confidence interval around R^2 following the procedure proposed by Olkin and Finn (1995). We consider the squared multiple correlation-values of regression models to be significantly different when the confidence intervals around the R^2 of these regression models overlap no more than half of the distance of one side on a confidence interval (see Masson & Loftus, 2003).

Second, we used hierarchical regression analyses to further test the strength of difference in predictive power according to the method used by Roccas et al. (2002). If self-determined motivational types strongly predict behavioural intentions over and above the variance explained by values, then this provides support for Hypothesis 1. If values explain additional variance over and above the variance predicted by self-determined motivations, then we regard this as support for Hypothesis 2.

Table 1

Bivariate correlations between self-determined motivational types, value orientations, environmental performance of the preferred car and donating intention ($N = 304$).

	Car	Donate	IM	IntR	IdR	IR	ER	AM	Ego	Alt	Bio
Car											
Donate	–.17**										
IM	.24**	.37**									
IntR	.21**	.26**	.62**								
IdR	.13*	.23**	.63**	.46**							
IR	.18**	.27**	.58**	.54**	.60**						
ER	.05	.07	.17**	.19**	–.03	.29**					
AM	–.21**	–.18**	–.47**	–.38**	–.62**	–.40**	.15**				
Ego	–.26**	–.00	–.16**	–.17**	–.19**	–.16**	.16**	.25**			
Alt	.16**	–.16**	.15**	.15**	.28**	.27**	–.16**	–.20**	–.15**		
Bio	.25**	.36**	.53**	.52**	.45**	.52**	.06	–.33**	–.06	.40**	

* $p < .05$; ** $p < .01$.

NOTES. Donate = how much money do respondents tend to donate to an environmental instead of a humanitarian organisation? Scores ranged from 0 ‘no donations to environmental organisations, 50 Euro to humanitarian organisations’ to 50 “50 Euro to environmental organisations, no donations to humanitarian organisations”; Car = how likely do respondents take the environmental performance into account when they choose a car? Scores ranged from 1 “low score on environmental aspects when choosing a car” to 5 “high score on environmental aspects”; IM = intrinsic motivation; IntR = integrated regulation; IdR = identified regulation; IR = introjected regulation; ER = external regulation; AM = amotivation; Ego = egoistic value orientation; Alt = altruistic value orientation; Bio = biospheric value orientation.

2.2. Results

2.2.1. Correlations between self-determined motivational types, value orientations, and pro-environmental intentions

Table 1 shows the correlations between self-determined motivational types, values and the outcome variables. Value orientations were significantly correlated with the self-determined motivational types. Biospheric values showed medium to strong correlations with stronger self-determined motivational types (intrinsic motivation, integrated regulation, identified regulation and introjected regulation), with correlations ranging between .45 and .53. Biospheric values were negatively and significantly related to amotivation ($r = -.33$), but not to external regulation ($r = .06$, n.s.). The relationships between altruistic values and self-determined motivational types towards acting pro-environmentally were comparable with the correlations between biospheric values and motivational types, but less strong. The egoistic value orientation was negatively correlated with intrinsic motivation ($r = -.16$), integrated regulation ($r = -.17$), identified regulation ($r = -.19$) and introjected regulation ($r = -.16$). In contrast, the egoistic value orientation was positively related to the less autonomous, extrinsic motivational types (i.e. $r_{ER} = .16$; $r_{AM} = .25$).

Of the motivational types, intrinsic motivation ($r = .24$) and integrated regulation ($r = .21$) were most strongly and positively related to preference for a car with high environmental performance, with small to medium effect sizes. Identified ($r = .13$) and introjected regulation ($r = .18$) were also positively but more weakly related to the environmental performance of the preferred car. External regulation was not significantly related to the environmental performance of the favoured car, while amotivation was negatively correlated with environmental aspects of the preferred car ($r = -.21$).

Value orientations were all related to preference for a car with high environmental performance. People who strongly endorsed egoistic values were less likely to prefer a car that performed high on environmental aspects ($r = -.26$), while altruistic ($r = .16$) and especially biospheric ($r = .25$) values were positively related to the environmental performance of the car.

The five types of self-determined motivations showed medium to weak correlations with donating intention, with correlations ranging from .37 for intrinsic motivation to .07 (n.s.) for external regulation. Only amotivation was moderately but negative correlated with donation intention ($r = -.18$).

Donating intention was positively related to biospheric values ($r = .36$). The correlations between altruistic values and donating intentions were less strong and in opposite directions ($r = -.16$). Egoistic values were not correlated with donating intention ($r = .00$, n.s.).

2.2.2. Regression of pro-environmental intentions on motivational types and values

Table 2 presents results of the regression of the environmental performance of the preferred car on the six motivational types; and egoistic, altruistic and biospheric values, respectively. The motivational types explained 8% of the variance in the environmental performance of the preferred car ($F(6, 294) = 4.44$, $p < .001$). Only intrinsic motivation and amotivation made a significant contribution to the regression model. Respondents who were intrinsically motivated had a stronger preference for a car that performed high on environmental aspects ($\beta = .17$). In contrast, respondents who were amotivated were less likely to choose a car that performed well on environmental aspects ($\beta = -.18$).

Value orientations explained 12% in variance of the environmental performance of the preferred car ($F(3, 297) = 13.62$, $p < .001$). Both egoistic and biospheric value orientations contributed uniquely to the environmental performance of the preferred car in the expected direction. Respondents who endorsed egoistic values were more likely to prefer a car which scored low on environmental performance ($\beta = -.24$). The more respondents were biospherically oriented, the more they preferred a car that scored high on environmental performance ($\beta = .22$).

Although value orientations ($R^2 = .12$, 95% $ci = .05, .19$) explained more variance in car preference based on environmental performance than self-determined motivational types ($R^2 = .08$, 95% $ci = .02, .14$), the confidence intervals overlapped more than half of the distance of one side of the confidence intervals, which indicates that the difference is not statistically significant.

Table 2

Regression of the environmental performance of the preferred car on different types of motivations and value orientations ($N = 300$).

DV: preferred car	β	t	R^2	adj. R^2	df	F
<i>Self-determined motivations only:</i>			.08	.06	6294	4.44***
Intrinsic motivation	.17	2.01*				
Integrated regulation	.07	.88				
Identified regulation	-.16	-1.81				
Introjected regulation	.07	.86				
External regulation	.01	.10				
Amotivation	-.18	-2.39**				
<i>Value orientations only:</i>			.12	.11	3297	13.62***
Egoistic value orientation	-.24	-4.34***				
Altruistic value orientation	.04	.62				
Biospheric value orientation	.22	3.65***				
<i>Self-determined motivations and values:</i>			.15	.13	9291	5.786***
Intrinsic motivation	.13	1.57				
Integrated regulation	.01	.08				
Identified regulation	-.18	-2.05*				
Introjected regulation	-.01	-.08				
External regulation	.08	1.26				
Amotivation	-.15	-2.02*				
Egoistic value orientation	-.22	-3.91***				
Altruistic value orientation	.07	1.21				
Biospheric value orientation	.16	2.14*				

* $p < .05$; ** $p < .01$; *** $p < .001$.

NOTES. DV = Dependent variable; "Preferred car" refers to the environmental performance of the preferred car.

Table 3

Percentage of variance in the environmental performance of the preferred car and donating intention accounted for in hierarchical regression analyses (Study 1).

Predictors entered by step	R ²
<i>Outcome variable: preferred car</i>	
A. Self-determined motivational types first	
Self-determined motivational types	.08
Values	.15**
B. Values first	
Values	.12
Self-determined motivational types	.15 ^{ns}
<i>Outcome variable: donation intention</i>	
C. Self-determined motivational types first	
Self-determined motivational types	.14
Values	.28**
D. Values first	
Values	.24
Self-determined motivational types	.28*

* $p < .05$ ** $p < .001$.

NOTES. "Preferred car" refers to the environmental performance of the preferred car; ns = non significant.

Table 3 presents the variance in the preferred car based on environmental performance accounted for (R^2) in each step in the hierarchical regression analysis. First, we included self-determined motivational types only. They accounted for 8% of the variance in the environmental performance of the preferred car. Values accounted for 7% additional variance (F -change = 7.85, $p < .001$), indicating that they still significantly contributed to explaining the outcome variable after correcting for the contribution of the self-determined motivational types. Values accounted for 12% of the variance in preferred car when entered first and self-determined motivational types accounted for 3% additional variance. The R^2 -change was not significant (F -change = 1.76, $p = .106$). Betas indicate that especially the egoistic value orientation contributes strongly to the preference of a car based on environmental performance (Table 2, third row). Betas of all constructs show similar directions as in the single regression analyses. Together, these results are more consistent with Hypothesis 2 than with

Hypothesis 1, i.e. values are more powerful in explaining pro-environmental intentions than self-determined motivational types.

The results of the regression on donating intention on the six motivational types and egoistic, altruistic and biospheric values are shown in Table 4 (i.e. first and second row of table). Self-determined motivational types explained 14% of the variance in donating intention ($F(6, 290) = 8.05$, $p < .001$). Only intrinsic motivation made a significant contribution to the regression model. Respondents who were strongly intrinsically motivated towards acting in favour of the environment were more likely to donate to an environmental organisation instead of a humanitarian organisation ($\beta = .33$) compared to respondents who were less intrinsically motivated.

Value orientations explained 24% of the variance in donating intention ($F(3, 293) = 30.29$, $p < .001$). As expected, both altruistic and biospheric value orientations contributed uniquely to this model. Respondents with a strong altruistic value orientation intended to donate less money to environmental organisations and more to humanitarian organisations ($\beta = -.37$). For biospherically oriented respondents results showed the opposite pattern: they were more willing to donate money to environmental than to humanitarian organisations ($\beta = .50$). Egoistic value orientations did not significantly contribute to this model.

Value orientations ($R^2 = .24$, 95% $ci = .16, .32$) appeared to be significantly more successful in explaining donating intention than self-determined motivational types ($R^2 = .14$, 95% $ci = .07, .22$): the confidence intervals overlap less than half of the distance of one side of the confidence intervals.

The hierarchical regression analyses showed that self-determined motivational types explained 14% of the variance in donating intention (Table 3). Values accounted for 14% additional variance explained (F -change = 8.05, $p < .001$). Twenty four percent of the variance in donating intention was explained when values were first entered in the regression model. Self-determined motivational types accounted for 4% additional variance (F -change = 2.60, $p = .018$). Also, betas indicate that especially value orientations contribute strongly to donating intention (Table 4, third row). Betas of all constructs show similar directions as in the single regression analyses. Again, these results are more consistent with Hypothesis 2 than with Hypothesis 1, i.e. values are more powerful in

Table 4

Regression of donating intention on different types of motivations and value orientations ($N = 300$).

DV: Donating	β	t	R^2	adj. R^2	df	F
<i>Self-determined motivations only:</i>			.14	.13	6290	8.05***
Intrinsic motivation	.33	3.98***				
Integrated regulation	.02	.30				
Identified regulation	-.07	-.84				
Introjected regulation	.12	1.47				
External regulation	-.03	-.51				
Amotivation	-.02	-.23				
<i>Value orientations only:</i>			.24	.23	3293	30.29***
Egoistic value orientation	.03	.57				
Altruistic value orientation	-.37	-6.51***				
Biospheric value orientation	.50	8.99***				
<i>Self-determined motivations and values:</i>			.28	.25	9287	12.16***
Intrinsic motivation	.24	3.06**				
Integrated regulation	-.05	-.70				
Identified regulation	-.01	-.15				
Introjected regulation	.04	.57				
External regulation	-.05	-.89				
Amotivation	-.03	-.39				
Egoistic value orientation	.01	.25				
Altruistic value orientation	-.36	-6.28***				
Biospheric value orientation	.38	5.43***				

* $p < .05$; ** $p < .01$; *** $p < .001$.

NOTES. DV = Dependent Variable; "Donating" refers to how much money respondents tend to donate to an environmental instead of a humanitarian organisation.

Table 5
Bivariate correlations between self-determined motivational types, value orientations, environmental performance of the preferred car and donating intention ($N = 520$).

	Car	Donate	IM	IntR	IdR	IR	ER	AM	Ego	Alt	Bio
Car											
Donate	-.19**										
IM	.30**	.35**									
IntR	.30**	.33**	.65**								
IdR	.31**	.28**	.61**	.48**							
IR	.29**	.26**	.58**	.45**	.59**						
ER	-.08	-.05	.08	.11*	-.07	.21**					
AM	-.25**	-.09*	-.18**	-.14**	-.32**	.21**	.55**				
Ego	-.20**	.03	-.07	-.07	-.01	.01	.22**	.21**			
Alt	.11**	-.09*	.27**	.28**	.33**	.28**	-.11*	-.21**	.02		
Bio	.33**	.43**	.56**	.59**	.45**	.41**	-.06	-.25**	.07	.49**	

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

NOTES. Donate = how much money do respondents tend to donate to an environmental instead of a humanitarian organisation? Scores ranged from 0 'no donations to environmental organisations, 50 Euro to humanitarian organisations' to 50 '50 Euro to environmental organisations, no donations to humanitarian organisations'; Car = how likely do respondents take the environmental performance into account when they choose a car? Scores ranged from 1 'low score on environmental aspects when choosing a car' to 5 'high score on environmental aspects'; IM = intrinsic motivation; IntR = integrated regulation; IdR = identified regulation; IR = introjected regulation; ER = external regulation; AM = amotivation.

explaining pro-environmental intentions than self-determined motivational types.

3. Study 2

A drawback of Study 1 was that an order effect could have influenced the results because participants could be primed on "environmental aspects" when first filling in the MTES and value instrument before they indicated their pro-environmental intentions. To exclude this possible explanation, we conducted a second study. We also wanted to examine whether the findings noted in Study 1 could be replicated.

3.1. Method

3.1.1. Respondents, procedure and measures

We conducted a questionnaire study through the Internet. Respondents were 520 first year students at the University of Groningen. They were recruited from the Psychology Department's Human Participant Pool in 2007, and received course credits for

their participation. Of the respondents, 109 were males (21.0%) and 411 were females (79%). Mean age was 20 years ($SD = 3.4$).

We used exactly the same measures for value orientations, motivational types, and pro-environmental intentions. However, to avoid possible order effects, we decided to introduce three separate questionnaire studies. In one questionnaire, only the value orientations were asked; in another questionnaire the MTES was included, and in the final questionnaire the two outcome variables were included. For each participant, the three questionnaires were randomly presented amongst approximately 60 other questionnaires that were not related to environmental issues. Respondents could fill out all questionnaires on the Internet during a one and a half month time period.

3.2. Results

3.2.1. Correlations between self-determined motivational types, value orientations, and pro-environmental intentions

Table 5 shows the correlations between self-determined motivational types, value orientations and pro-environmental

Table 6
Regression of environmental performance of preferred car on different types of motivations and value orientations ($N = 519$).

DV: donating	β	t	R^2	adj. R^2	df	F
<i>Self-determined motivations only:</i>			.17	.16	6513	17.01***
Intrinsic motivation	.05	3.98***				
Integrated regulation	.15	.30				
Identified regulation	.07	-.84				
Introjected regulation	.14	1.47				
External regulation	-.04	-.51				
Amotivation	-.16	-.23				
<i>Value orientations only:</i>			.24	.23	3293	30.29***
Egoistic value orientation	-.23	-5.70***				
Altruistic value orientation	-.07	-1.49				
Biospheric value orientation	.38	8.32***				
<i>Self-determined motivations and values:</i>			.22	.21	9510	16.01***
Intrinsic motivation	-.03	-.50				
Integrated regulation	.06	1.60				
Identified regulation	.11	1.88				
Introjected regulation	.13	2.47*				
External regulation	.00	.04				
Amotivation	-.12	-2.39*				
Egoistic value orientation	-.19	-4.63***				
Altruistic value orientation	-.11	-2.40*				
Biospheric value orientation	.25	4.41***				

* $p < .05$; ** $p < .01$; *** $p < .001$.

NOTES. "Preferred car" refers to the environmental performance of the preferred car.

intentions. Self-determined motivational types and value orientations were correlated in a similar direction and with comparable effect sizes as in Study 1. Again, biospheric values were particularly positively related to the more self-determined motivational types, with correlations ranging from .41 to .59. Again, the biospheric value orientation was not significantly related to external regulation ($r = -.06$). The correlation between biospheric values and amotivation was significant and negative ($r = -.25$). The altruistic value orientation was related to the six types of self-determined motivations in a similar way as the biospheric value orientation, but again, less strongly. Correlations ranged from .33 for identified regulation to $-.21$ for amotivation. The egoistic value orientation correlated only significantly with external regulation ($r = .22$) and amotivation ($r = .21$).

Intrinsic motivation ($r = .30$), integrated ($r = .30$), identified ($r = .31$) and introjected ($r = .29$) regulation were all positively related to preferring a car with a high environmental performance. External regulation was not significantly related to the environmental performance of the chosen car. Amotivation was negatively correlated with the environmental performance of the preferred car ($r = -.25$).

Correlations between value orientations and environmental performance of the favourite car were similar as in Study 1. Egoistic values were negatively correlated to a high environmental performance of the preferred car ($r = -.20$). Altruistic ($r = .11$) and especially biospheric ($r = .33$) values were positively related to a high environmental performance of the preferred car.

Again, most types of self-determined motivations were positively correlated with donating intention, with correlations ranging from .35 for intrinsic motivation to .26 for introjected regulation. Amotivation showed a negative correlation with donation intention ($r = -.09$).

Donating intention was most strongly and positively related to biospheric values ($r = .43$). Individuals with strong altruistic values tended to donate less money to environmental and more to humanitarian organisations ($r = -.09$), although this correlation was weaker. Egoistic values were not significantly related to donating intention ($r = -.03$).

3.2.2. Regression of pro-environmental intentions on motivational types and values

In Table 6, we show the results of the single regression analyses of the environmental performance of the preferred car on the six self-determined motivational types and the three value orientations, respectively (i.e. first two rows of table). The motivational types explained 17% of the variance in the preference for a car with a high environmental performance ($F(6, 513) = 17.01, p < .001$). Integrated and introjected regulation, and amotivation made a significant contribution to this model. Respondents who scored high on integrated regulation were more likely to choose a car with high environmental performance ($\beta = .15$). The same was true for respondents who scored high on introjected regulation ($\beta = .15$). Respondents who were strongly amotivated tended to choose a car which scored low on environmental performance ($\beta = -.16$).

In addition, value orientations explained 17% of the environmental performance of the preferred car ($F(3, 516) = 34.52, p < .001$). As in Study 1, both egoistic and biospheric value orientations contributed uniquely to the model: respondents who had strong egoistic values were more likely to choose a car with a poor environmental performance ($\beta = -.23$). In contrast, respondents who were biospherically oriented were more likely to choose a car which scored high on environmental performance ($\beta = .38$).

The confidence intervals around R^2 revealed that self-determined motivational types ($R^2 = .17$; 95% $ci = .11, .23$) and value orientations ($R^2 = .17$; 95% $ci = .11, .23$) do not significantly differ in

explaining the level of environmental performance of car preference based on environmental performance: the confidence intervals fully overlap.

The hierarchical regression analyses are in line with the single regression analyses (see Table 7). When either values or self-determined motivational types were entered into the regression model, they both accounted for 17% of the variance in the preference of a car based on environmental performance. When values were entered into the regression model as well, an additional 5% in variance was explained (F -change = 11.86, $p < .001$). Also, five percent of additional variance was explained when self-determined motivational types were also entered in the regression model (F -change = 5.79, $p < .001$). Betas indicate that especially the egoistic value orientation contributes strongly to the preference of a car based on environmental performance (Table 6, third row). Betas of all constructs show similar directions as in the single regression analyses. These results do not support Hypothesis 1 or Hypothesis 2.

Table 8 presents the regression of donating intention on the six motivational types and egoistic, altruistic and biospheric value orientations. The self-determined motivational types explained 16% of the variance in donating intention ($F(6, 513) = 15.70, p < .001$). Intrinsic motivation, integrated and external regulation made a significant contribution to the regression model. Respondents who were intrinsically motivated towards acting in favour of the environment were more likely to donate to environmental organisations and less to humanitarian organisations ($\beta = .17$). The same was true for respondents with a strong integrated regulation ($\beta = .18$). In contrast, respondents with a strong external regulation were more willing to donate money to humanitarian and less to environmental organisations ($\beta = -.13$).

Value orientations explained 30% of the variance in donating intention ($F(3, 516) = 72.55, p < .001$). Again, both altruistic and biospheric value orientations contributed uniquely to this model. Respondents who were strongly altruistically oriented intended to donate less money to environmental organisations and more to humanitarian organisations ($\beta = -.39$). For respondents who strongly valued the biosphere the opposite was true: they tended to donate more money to environmental and less to humanitarian organisations ($\beta = .61$). As in Study 1, egoistic value orientations did not significantly contribute to the model.

Value orientations ($R^2 = .30$, 95% $ci = .23, .37$) explained a significantly higher proportion of the variance in donating

Table 7

Percentage of variance in environmental performance of preferred car and donating intention accounted for in hierarchical regression analyses (Study 2).

Predictors Entered by Step	R^2
<i>Outcome variable: preferred car</i>	
A. Self-determined motivational types first	
Self-determined motivational types	.17
Values	.22
B. Values first	
Values	.17
Self-determined motivational types	.22
<i>Outcome variable: donation intention</i>	
C. Self-determined motivational types first	
Self-determined motivational types	.16
Values	.34
D. Values first	
Values	.30
Self-determined motivational types	.34

NOTES. R^2 -change is significant ($p < .001$) in all steps. "Preferred car" refers to the environmental performance of the preferred car.

Table 8Regression of donating intention on different types of motivations and value orientations ($N = 519$).

DV: Donating	β	t	R^2	adj. R^2	df	F
<i>Self-determined motivations only:</i>			.16	.15	6513	15.70***
Intrinsic motivation	.17	2.79**				
Integrated regulation	.18	3.23***				
Identified regulation	.06	.99				
Introjected regulation	.08	1.38				
External regulation	-.13	-2.44*				
Amotivation	.06	1.11				
<i>Value orientations only:</i>			.30	.29	3516	72.55***
Egoistic value orientation	-.01	-.23				
Altruistic value orientation	-.39	-9.16***				
Biospheric value orientation	-.61	14.55***				
<i>Self-determined motivations and values:</i>			.34	.32	9510	28.70***
Intrinsic motivation	.07	1.14				
Integrated regulation	.06	1.08				
Identified regulation	.09	1.81				
Introjected regulation	.09	1.76				
External regulation	-.13	-2.83**				
Amotivation	.07	1.48				
Egoistic value orientation	.02	.62				
Altruistic value orientation	-.42	-9.82***				
Biospheric value orientation	.49	9.36***				

* $p < .05$; ** $p < .01$; *** $p < .001$.

NOTES. DV = Dependent variable; "Donating" refers to how much money respondents tend to donate to an environmental instead of a humanitarian organisation.

intention than did self-determined motivational types ($R^2 = .16$, 95% $ci = .10, .22$); the confidence intervals did not overlap at all.

Again, the hierarchical regression analyses support the results of the single regression analyses (see Table 7). When self-determined motivational types were entered into the regression model, they accounted for 16% of the variance in donating intention. When values were entered into the regression model as well, 14% of additional variance was accounted for (F -change = 46.38, $p < .001$). When self-determined motivational types were entered in the regression model after values, they explained only 4% additional variance (F -change = 5.06, $p < .001$). Betas indicate that values contribute more strongly than self-determined motivations to donating intention (Table 8, third row). Betas of all constructs show similar directions as in the single regression analyses. So, overall, the results of the regression analyses support Hypothesis 2.

4. Conclusion and discussion

This paper had two aims. First, we compared the predictive power of six self-determined motivational types and value orientations explaining pro-environmental intentions. In general, our results showed that value orientations explained more variance in the preference for a car with a high environmental performance and donating intention than the six types of self-determined motivations. More specifically, values explained a significantly higher proportion of the variance in donating intention in both studies. Values also explained higher proportions of additional variance in donating intention next to motivational types than the other way around. For the environmental performance of the preferred car, differences were less strong. In Study 1, value orientations explained more variance in environmental performance of the preferred car than self-determined motivational types, but this difference was not significant. However, hierarchical regression indicated that values explained a significant amount of additional variance of car preference next to motivational types, while this was not the case when values were entered in the model first. In Study 2, value orientations and self-determined motivational types explained the same amount of variance in explaining this variable. Thus, we found no support for Hypothesis 1. That is,

self-determined motivational types were not better predictors of pro-environmental intentions than values. Our findings provide most support for Hypothesis 2: values are more predictive of pro-environmental intentions than are motivations that more specifically focus on environmental behaviour. This suggests that people do not act out of environmental motivations only and that pro-environmental behaviours are based on multiple motivations (cf. Frederik et al., 2002; Lindenberg & Steg, 2007). This multiple motivation assumption is further validated by the multiple regression analyses: not only biospheric values contribute to the explanation of pro-environmental intentions, but egoistic and altruistic values contributed to the explanation as well. Value orientations as measured in our study better reflect this wider range of motivations than do self-determined motivational types that focus on environmental considerations. Our results therefore suggest that future studies directed towards understanding and changing pro-environmental beliefs and intentions can best focus on the role of values, and examine how values can best be changed or how to motivate people to act upon their (biospheric) values.

Second, we examined relationships between value orientations and self-determined motivational types. The correlations showed a consistent pattern across the two studies: altruistic and especially biospheric value orientations were positively related to the more self-determined types of motivations (i.e. intrinsic motivation, integrated regulation, identified regulation and introjected regulation), while they were negatively related to the external regulation and amotivation. In contrast, the egoistic value orientation was positively related to external regulation and amotivation, and negatively or not significantly to the stronger self-determined types of motivations.

Furthermore, we explored the way in which value orientations and self-determined motivational types predicted car preference based on its environmental performance and donating intention. Interestingly, when altruistic and biospheric value orientations were important predictors of pro-environmental intentions, so were the stronger self-determined motivational types. Therefore, the results of the correlations and regression analyses suggest that acting autonomously toward pro-environmental behaviour shows a similarity with acting on the basis of biospheric (and to a lesser extent

altruistic) value orientations, while acting less self-determinedly toward the environment shows a similar pattern of results as acting on egoistic values. Ryan and Deci (2002) suggest a possible explanation for this result: stronger types of self-determined motivations coincide with an integration of specific values, goals and needs as a part of the self. So, the stronger types of self-determined motivations may indeed be based on the internalisation of the biospheric value orientation.

A number of critical remarks can be made with respect to our findings. The first issue concerns the stability of our results. Relationships between egoistic, altruistic and biospheric value orientations and pro-environmental intentions were consistent in both studies. In Studies 1 and 2, egoistic and biospheric value orientations contributed significantly to the explanation of the environmental performance of the preferred car. In both studies, altruistic and biospheric value orientations explained the extent to which people tended to donate money to environmental instead of humanitarian organisations, in the expected directions. However, the six motivational types did not always contribute in a similar way to the explanation of pro-environmental intentions. In Study 1, intrinsic motivation and amotivation were the only motivational types that contributed uniquely to the explanation of the environmental performance of the preferred car, while in Study 2 integrated regulation and amotivation were the only significant predictors. For donating intentions, intrinsic motivation (Study 1), and intrinsic motivation and integrated regulation and external regulation (Study 2) contributed uniquely to the explanation of donating intention in the expected directions.

We offer two explanations for the inconsistent findings on the predictive power of the self-determined motivational types. First, Pearson correlations showed that some of the self-determined motivational types were strongly intercorrelated. For example, integrated regulation showed a correlation of .62 and .65 with intrinsic motivation in both studies. These high correlations are not unusual between the MTES subscales (Pelletier et al., 1998), but make it less likely that different types of self-determined motivations contribute uniquely to the explanation of pro-environmental intentions. A less specified distinction, for example into four categories or one global index for the level of self-determined motivation (see e.g. the Relative Autonomy Index; Blais, Sabourin, Boucher, & Vallerand, 1990; Pelletier, Dion, Tuson, & Green-Demers, 1999) may have resulted in less inconsistency. The aim of the present study was to examine the contribution of the separate motivational types, so we did not report these results. Second, the MTES specifically focuses on why people are motivated to do something for the environment. What if people lack a motivation to act pro-environmentally at all? As a consequence, the MTES may be less appropriate for some of the respondents who filled out the questionnaire. Although our sample sizes were large which may have levelled out possible negative side-effects, this may have resulted in some irregularities in our results.

A second issue concerns the overlap in content of the different constructs that may have influenced our findings. For example, the strong correlations between biospheric values and pro-environmental intentions could be the result of similar framings of both constructs. Although both biospheric values and motivational types are framed in a way that include “actions towards the environment”, and consequently are both highly susceptible for correlations with our outcome variables, we found that in general the motivational types were far less strongly related to our outcome variables than biospheric values. So, it is very likely that biospheric values are more important as a predictor for at least our behavioural intention measures.

Furthermore, we included two procedures to limit the effect of content overlap in our study. First, we used a measure to assess the

importance of environmental consideration for car preference based on a consumer task that was specially developed to measure importance of product features in a more implicit way (Verplanken & Holland, 2002). And second, in Study 2 we introduced values, self-determined motivational types and pro-environmental intentions as three separate questionnaires that were randomly assigned to respondents to avoid negative order effects. The three questionnaires were alternated with a battery of other questionnaires that were not related to pro-environmental intentions, to further weaken a possible explicit relationship (i.e. content overlap) for participants between our variables of interest. The pattern of results found in Study 2 was consistent with Study 1. Thus, although content overlap could have occurred because biospheric values as well as the self-determined motivational types may trigger environmental issues, these effects were probably negligible.

A third issue refers to our sampling method. Both studies included student instead of representative samples. Since we were particularly interested in correlations and did not compare mean scores, a sample that is not fully representative is less problematic (Schultz et al., 2005). Therefore, we think that the method was sufficient for the aim of this study; that is, examining the predictive power of self-determined motivational types and values in explaining pro-environmental intentions, and exploring relationships between self-determined motivational types and values. However, our conclusions remain tentative until we further validate our results in various samples and with other outcome variables.

Our findings have important practical implications. The results imply that practitioners can promote pro-environmental preferences and intentions by strengthening people's values, particularly their biospheric values. Values are more powerful in predicting pro-environmental preferences and intentions than are motivational types. Interventions could try to make biospheric and altruistic values more salient in a specific situation, or to weaken the influence of egoistic values (De Groot & Steg, 2009). It is difficult to change values, as values are relatively stable and enduring over time (Schwartz, 1992). However, it is possible to stimulate people to act more upon their (biospheric) values. For example, it is possible to make values more salient or to increase the cognitive accessibility of certain values, which will affect the way people prioritise their values in specific situations and consequently the extent to which different values influence pro-environmental intentions and behaviours in a particular situation (cf. Maio & Olson, 1998; Verplanken & Holland, 2002).

Our results further suggest that a promotion of pro-environmental behaviours can be realised by strengthening intrinsic motivation and integrated regulation, or by weakening amotivation and external regulation. Thus, policy makers should not externally control behaviours that are mainly explained by “intrinsic” types of motivations, while a stronger control (for example, using an incentive scheme) may be effective to change behaviours that are strongly explained by “extrinsic” motivational types. This will probably result in more frequent, more difficult and more different types of pro-environmental behaviours (Green-Demers et al., 1997; Pelletier et al., 1997, 1998; Villacorta et al., 2003).

Appendix

Explanations for the 7 different aspects of the car:

- Model: Charisma and appearance of the car.
- Engine power: Accelerating and pulling power.
- Safety: Optimal protection for driver and passengers by, for example, airbags, EPS and positive crush area.

- Size: Amount of space for passengers and luggage (++ = a lot of space; -- = few space).
- Emissions: Fuel consumption, environmental damage caused by emissions, energy-efficient production of car.
- Comfort: Accessories such as power steering, navigation system, air conditioning, alarm system, and auto lock function.
- Costs: Monthly private costs of car (++ = few extra costs; -- = a lot of extra costs).

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