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The value of environmental self-identity: The relationship between biospheric values, environmental self-identity and environmental preferences, intentions and behaviour

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ABSTRACT

Biospheric values and environmental self-identities are considered to be important antecedents of environmental preferences, intentions, and behaviour. Although various authors suggest a relationship between values and self-identity, this has rarely been studied empirically. This paper aimed to clarify the relationship between biospheric values and environmental self-identity and to study how both are related to environmental preferences, intentions, and behaviour. We hypothesized that biospheric values are related to environmental self-identity, and that self-identity is in turn related to preferences, intentions, and behaviour. Results of three studies including a wide range of environmental preferences, intentions, and behaviour support our reasoning and show that biospheric values are related to environmental self-identity, even when measured months before. Moreover, we found that the relationship between biospheric values and environmental preferences, intentions and behaviour was fully mediated by environmental self-identity, indicating that biospheric values are related to preferences, intentions, and behaviour via one's environmental self-identity. This suggests that values need to be linked to the self in order to be influential in choices made.

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1. Introduction

Self-identity and values have been viewed as important influences on environmental preferences, intentions and behaviour (e.g., [Gatersleben, Murtagh, & Abrahamse, 2012](#); [Sparks & Shepherd, 1992](#); [Steg & De Groot, 2012](#)). Self-identity is often defined as the label that one uses to describe oneself ([Cook, Kerr, & Moore, 2002](#)). Various scholars suggested that there is a relationship between values and self-identity. For example, [Crompton and Kasser \(2009\)](#) stated that “values and life goals are the aspects of people's identities that reflect what they deem to be desirable, important, and worthy of striving for in their lives” (p. 8). According to [Verplanken and Holland \(2002\)](#) “values may form important ingredients of a person's self-concept and thus contribute to a person's sense of identity” (p. 434). Also, [Sparks and Shepherd \(1992\)](#) indicate that “a person's self-identity would be reflected in that person's beliefs, values, and attitudes” (p. 390). Many authors thus suggest a relationship between values and self-identity, and some even suggest that they are similar to a certain extent. In the

current paper we aim to take a first step in studying the relationships between biospheric values and environmental self-identity, and how both in turn are related to environmental preferences, intentions and behaviour. First, we describe the conceptual difference between biospheric values and environmental self-identity, and discuss how they are related. Additionally, we will describe how biospheric values and environmental self-identity in turn are related to preferences, intentions and behaviours in the environmental domain. Next, we will test our theoretical model on relationships between biospheric values, environmental self-identity, and environmental preferences, intentions, and behaviours empirically. In doing so, we will integrate the two lines of research on values and self-identity, respectively.

1.1. Biospheric values

Values have been defined by [Schwartz \(1992\)](#) as desirable and transsituational goals that serve as guiding principles in one's life. Values are abstract and general and maintain stability over time ([Feather, 1995](#)). Studies showed that particularly biospheric values are strongly and consistently related to environmental preferences, intentions, and behaviour: those with strong biospheric values are more likely to have pro-environmental preferences and

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intentions, and to act pro-environmentally (see Steg & De Groot, 2012, for a review). People who strongly endorse biospheric values care for nature and the environment and more strongly base their decisions to engage in particular actions on the consequences of their behaviour for nature and the environment. Biospheric values have been shown to be related to a wide range of pro-environmental preferences and actions, including acceptability of climate change policies (Nilsson, von Borgstede, & Biel, 2004; Steg, De Groot, Dreijerink, Abrahamse, & Siero, 2011), sustainable consumption (Thøgersen & Ölander, 2002), environmental activism (Steg et al., 2011), pro-environmental behaviour (Schultz & Zelezny, 1998), preference for restaurants serving organic food (Steg et al., 2012), and donating money to an environmental rather than a humanitarian organisation (De Groot & Steg, 2008). Values reflect what people find important in their lives and should as such affect how people want to see themselves (i.e., their ideal selves) and what type of person they want to be, as well as how they actually see themselves. In other words, values should influence one's self-identity.

1.2. Environmental self-identity

Self-identity has been defined as the label used to describe oneself (Cook et al., 2002), which relates to a particular behaviour (Conner & Armitage, 1998). Hence, we define an environmental self-identity as the extent to which you see yourself as a type of person who acts environmentally-friendly. Someone with a strong environmental self-identity will more strongly see himself or herself as the type of person who will act environmentally-friendly and consequently be more likely to act pro-environmental. Please note that our conceptualisation of environmental self-identity differs from the concept environmental identity (e.g., Clayton & Opatow, 2003; Schultz & Tabanico, 2007) which has been conceptualised as a sense of connection to some part of the nonhuman natural environment that affects the way we perceive and act towards the world; a belief that the environment is important to us and an important part of who we are. Hence, environmental identity reflects whether one sees oneself as part of nature, whereas environmental self-identity reflects the view of self as a person who acts pro-environmentally. We think environmental self-identity is particularly relevant to understanding pro-environmental actions, as it more directly reflects pro-environmental actions, rather than only the importance of the environment as such for the self. Although environmental self-identity and environmental identity may be related, they are not necessarily the same. For example, you may see yourself as part of nature, but not as a person who acts pro-environmentally, for example because you do not acknowledge environmental problems, or do not link such problems to individual actions.

A few studies on self-identity in the environmental domain examined to what extent specific self-identities were related to behaviour related to that identity. These studies employed measures of self-identity that corresponded to our definition of environmental self-identity, namely: the extent to which people see themselves as the type of person who performs that particular environmental behaviour. These studies revealed that specific self-identities indeed predicted the relevant behaviours. For example, recycling self-identity appeared to be related to recycling behaviour (Nigbur, Lyons, & Uzzell, 2010), environmental activism self-identity was related to environmental activism (Fielding, McDonald, & Louis, 2008) and genetically modified food self-identity was found to be related to the intention to purchase genetically modified food (Cook et al., 2002). These specific self-identities are likely to be related to behaviours related to that self-identity, but are probably less predictive of other types of pro-

environmental actions. Recent studies suggest that people may also have a more general environmental self-identity which may be related to a range of environmental preferences, intentions and behaviour. For example, green (self-) identity was related to eco-shopping, waste reduction, water savings, and domestic energy conservation (Whitmarsh & O'Neill, 2010), while the environmental self-identity was related to various pro-environmental behaviours, recycling, buying fair trade products and not flying on holiday (Gatersleben et al., 2012). Such general environmental self-identities may be promising pointers for strategies aimed at promoting pro-environmental actions, because by targeting environmental self-identity, a range of preferences and behaviours may change simultaneously. Therefore, in the current paper we will focus on general environmental self-identities which may predict a range of environmental preferences, intentions and behaviours.

1.3. Differences between biospheric values and environmental self-identity

There is a conceptual difference between values and self-identity: values are general and abstract principles that you strive for in life, while self-identity reflects how you see yourself. Although it is likely that biospheric values and environmental self-identity are related, as we will explain below, they may not always be consistent. The fact that you strive for unity with nature does not necessarily mean that you see yourself as the type of person who acts environmentally-friendly. For example, even though you strive for unity with nature, you may always go to work by car instead of by bike and therefore not see yourself as an environmentally-friendly person. Hence, in theory, someone can thus have strong biospheric values, but not a strong environmental self-identity as this identity also depends on the extent to which you actually engage in pro-environmental actions. Indeed, according to Biel, Dahlstrand, and Grankvist (2005), many people endorse biospheric values, but for a small minority being environmentally-friendly is part of their identity. A possible explanation for such apparent inconsistencies may be that one believes technological solutions will solve environmental problems rather than pro-environmental actions, or that others should take responsibility to reduce these problems (such as industry or the government).

1.4. Relationship between biospheric values and environmental self-identity

As indicated above, even though biospheric values and environmental self-identity may not always be consistent, they are likely to be related. Self-identity is likely to be influenced by one's values. For example, if you think protecting the environment is a guiding principle in your life, you are likely to think that you should act upon your values and to see yourself as a person who acts environmentally friendly. In addition, self-identity is likely to be influenced by past behaviour (e.g., Lee, Piliavin, & Call, 1999). For example, if you realise that you recycled your waste, you are more likely to see yourself as a person who acts pro-environmentally. The latter implies that self-identity is more likely to change over time (e.g., by reminding people on their past pro-environmental actions), in contrast to values that are believed to be general and relatively stable over time (Feather, 1995). However, we propose that environmental self-identity will only change to some extent as it is also related to one's core values. This may make environmental self-identity an especially important factor to study, as it is likely to be stable to a certain extent (as it is influenced by values), but also susceptible to change (via past behaviour) and thus may be

strengthened (e.g., by reminding people on their previous pro-environmental actions) in order to promote pro-environmental actions. In sum, we hypothesize that one's environmental self-identity is related to biospheric values.

There is some initial evidence to suggest that values influence self-identity. Hitlin (2003) found that the strength of a volunteer identity was predicted by self-transcendent values, reflecting universalism and benevolence values. Those who found self-transcendent values more important had a stronger volunteer identity than those who found self-transcendent values less important. Interestingly, in a longitudinal study, Hitlin (2003) found that self-transcendent values predicted the volunteering identity even when controlling for prior measures of the same identity. This suggests that values may indeed be, as we reason, a stable factor influencing one's identity.

We propose that the stronger one's biospheric values, the more strongly a person sees himself or herself as an environmentally-friendly person. Moreover, the more one sees oneself as an environmentally-friendly person, the more one is motivated to act in line with this environmental self-identity. We predict that environmental self-identity mediates the relationship between biospheric values and environmental preferences, intentions and behaviour. As explained above, values reflect your ideal self, whereas environmental self-identity is also influenced by past behaviour and thus more strongly reflects your actual self. One's actual self is likely to be a better predictor of behaviour than one's ideal self (cf. Higgins, 1987). Based on this, we propose that biospheric values are related to environmental self-identity which is in turn related to environmental preferences, intentions and behaviour. Hence, we expect that environmental self-identity mediates the relationship between biospheric values and environmental behaviour. A study by Whitmarsh and O'Neill (2010) provides some preliminary support for our reasoning. Their study showed that general environmental concern (that is, the New Environmental Paradigm; Dunlap, Van Liere, Mertig, & Jones, 2000) did not predict environmental behaviour when pro-environmental self-identity was also included in the regression analysis. This is to be expected if self-identity indeed mediates the relationship between values (or other general antecedents such as environmental concern) and behaviour. However, Whitmarsh and O'Neill (2010) did not test if the relationship was mediated by self-identity, and their study focused on environmental concern (i.e., NEP) rather than values, while values proved to be a better predictor of pro-environmental preferences and behaviour than environmental concern (Steg et al., 2011).

2. Present research

2.1. Hypotheses

In the present research we examined the relationship between biospheric values, environmental self-identity and environmental preferences, intentions and behaviour in a series of studies. Based on the above, we put forward three hypotheses. First, we hypothesized that biospheric values are not only conceptually different, but can also be empirically distinguished from environmental self-identity (Hypothesis 1). Second, we expected that biospheric values are related to environmental self-identity, as environmental self-identity is partly derived from values, with values being the stable core of environmental self-identity (Hypothesis 2a). If this is true, biospheric values should predict environmental self-identity even when values are measured a few months earlier (Hypothesis 2b). Third, we expected that one's environmental self-identity in turn is related to preferences, intentions and behaviour, and that environmental

self-identity mediates the relationship between values and the dependent variables. Thus, we hypothesized that environmental self-identity mediates the relationship between biospheric values and environmental preferences, intentions, and behaviour (Hypothesis 3¹). To test the robustness and validity of our findings, we tested these hypotheses in a series of studies, focussing on different indicators of general environmental self-identity and with different indicators of environmental preferences, intentions and behaviour.

2.2. Analyses

To test our hypotheses, we first conducted a confirmatory factor analysis via the multiple group method (a simple and effective type of confirmatory factor analysis, e.g., Nunnally, 1978; Stuijve, 2007; Stuijve, Kiers, Timmerman, & Ten Berge, 2008) to test if biospheric values and environmental self-identity can be distinguished empirically. Second, we tested the relationship between biospheric values and environmental self-identity (Hypotheses 2a and 2b). Third, we examined the relationship between biospheric values and environmental self-identity, and the dependent variables (environmental preferences, intentions, and behaviours) respectively, and whether the relationships between biospheric values and the dependent variables (environmental preferences, intentions, and behaviours) significantly reduced when environmental self-identity was controlled for; for this purpose, we report bootstrapping confidence intervals (Hypothesis 3).

3. Study 1

Study 1 aimed to examine factors influencing energy use. Energy use is a major contributor to environmental problems (Dietz, Gardner, Gilligan, Stern, & Vandenbergh, 2009). Energy use depends on a wide range of behaviours, including energy use at home, for transport, and indirect energy use (or: embodied energy), that is, the energy used to produce, distribute, and dispose of products (Reinders, Vringer, & Blok, 2003). We selected energy-related behaviour from three different domains, namely transport (driving style), home energy use (showering time) and food consumption (meat consumption²). In addition, we measured respondents' general intention to reduce their overall energy consumption. We focused on energy-saving self-identity, which is a broad category of one's self-identity in the environmental domain as it may be related to a wide range of energy-saving behaviours. We first tested if biospheric values and energy-saving self-identity can be distinguished empirically (Hypothesis 1). Second, we examined if biospheric values influenced one's energy-saving self-identity (Hypothesis 2a). Also, we studied if the relationship between biospheric values and the

¹ One of the reviewers suggested testing the reversed mediation effect as well, namely whether biospheric values mediate the relationship between environmental self-identity and environmental preferences, intentions and behaviour. Although we had no theoretical reason to expect this, we tested this alternative reasoning. In line with our reasoning, we found that in all cases there was no significant mediation effect, suggesting that values did not mediate the effect of environmental self-identity on preferences, intentions and behaviour. More specifically, in all cases, when both biospheric values and environmental self-identity were included in the analyses, only environmental self-identity appeared to significantly predict the dependent variables, and in all cases, the bias-corrected bootstrap estimate of the indirect effect had a 95% confidence interval including 0, indicating that the mediation effect was not significant. A detailed overview of the results can be requested via the first author.

² Meat consumption reflects indirect energy use. A substantial amount of energy is needed to produce and distribute meat (FAO, 2009).

dependent variables was mediated by energy-saving self-identity (Hypothesis 3).

3.1. Method

3.1.1. Participants and procedure

Questionnaires were distributed door-to-door in a municipality in the North of the Netherlands. The questionnaire was completed by 468 respondents (a response rate of 54%). In total 229 females and 233 males participated in the study, 6 participants did not indicate their gender. Age ranged from 18 to 89 ($M = 52.46$, $SD = 14.68$). About 18% of the respondents did not complete any education or completed primary education or vocational secondary school, while 38% had completed the highest level of secondary school or vocational education, and 45% finished university. Around 7% of the sample indicated that their monthly net household income was less than 1000 Euros, 23% between 1000 and 2000 Euros, 30% between 2000 and 3000 Euros, while 39% earned more than 3000 Euros per month.

3.1.2. Measures

3.1.2.1. Values. Participants first filled in a brief value questionnaire measuring their altruistic, egoistic, biospheric and hedonic values (Steg, Perlaviciute, Van der Werff, & Lurvink, 2012). Participants rated the importance of each value as a guiding principle in their life on a scale from -1 *opposed to my values* to 7 *extremely important*. The biospheric value orientation was measured with four items (Respecting the earth: harmony with other species; Unity with nature: fitting into nature; Protecting the environment: preserving nature; Preventing pollution: protecting natural resources). The internal consistency of the biospheric value scale was $.87$ ($M = 4.73$, $SD = 1.32$).

3.1.2.2. Energy-saving self-identity. Energy-saving self-identity was measured with three items (Saving energy is an important part of who I am; I am the type of person who saves energy; I see myself as a person who saves energy), on a seven point scale ranging from *totally disagree* to *totally agree*. These items were very similar to measures of self-identity from previous research, however our items focused on the behaviour that is relevant for our study: energy saving (e.g., Fielding et al., 2008; Terry, Hogg, & White, 1999). Cronbach's alpha was $.82$ ($M = 4.55$, $SD = 1.19$).

3.1.2.3. Energy use. Respondents were asked to provide factual data on their behaviours whenever possible, to prevent socially desirable answers (cf. Gatersleben, Steg, & Vlek, 2002). Meat consumption was measured by asking respondents how many times per week they consume meat at their main meal of the day, and how many grams of meat they as a person eat on average when they have a meal with meat (see Staats, Harland, & Wilke, 2004). Both scores were multiplied, resulting in the total grams of meat consumed per person per week ($M = 653.25$, $SD = 446.49$). Similarly, showering time was measured by asking respondents how many times they take a shower per week, and how many minutes they shower each time on average. Again, both scores were multiplied, resulting in a score reflecting the total minutes of showering per person per week ($M = 40.87$, $SD = 30.16$). Driving style was measured with one item 'How often do you consistently drive in a fuel efficient way (look ahead, anticipate traffic, brake carefully and shift to a higher gear as soon as possible)?'. Scores ranged from 1 *never* to 7 *always* ($M = 4.88$, $SD = 2.06$). The intention to reduce energy consumption was measured with one item 'How much energy do you intend to save in the coming year?'. Responses could range from 1 *nothing at all* to 7 *a lot* ($M = 4.36$, $SD = 1.16$).

3.2. Results

We used the multiple group method (MGM) to test if biospheric values and energy-saving self-identity can not only be theoretically distinguished, but also empirically. We first computed the mean score for biospheric values and energy-saving self-identity. Next, we correlated all single items with the scale scores, after correcting for self-correlation (that is, the fact that items tend to correlate strongly with the scale to which they belong on theoretical grounds). If the items correlate strongest with the scale to which they are assigned on theoretical ground, the factor structure is supported (Nunnally, 1978). Table 1 shows that all biospheric value items correlated most strongly with the biospheric value scale and all energy-saving self-identity items correlated most strongly with the energy-saving self-identity scale, supporting Hypothesis 1.

Hypothesis 2 was also supported: biospheric values explained 25% of the variance in energy-saving self-identity ($F(1, 449) = 150.75$, $p < .001$). The stronger respondents endorsed biospheric values, the stronger their energy-saving self-identity ($\beta = .50$, $p < .001$).

Next, we tested if biospheric values and energy-saving self-identity predicted the dependent variables. Indeed, biospheric values and energy-saving self-identity were both significantly related to all energy-related actions as well as to the intention to save energy (see Table 2). Respondents who more strongly endorsed biospheric values and respondents with a stronger energy-saving self-identity consumed less meat, showered less, had a more fuel efficient driving style, and had a stronger intention to reduce their energy use. More importantly, we found the expected mediation effect for all dependent variables, providing support for Hypothesis 3. The relationship between biospheric values and meat consumption was fully mediated by energy-saving self-identity, the bias-corrected bootstrap estimate of the indirect effect had a 95% confidence interval from -58.596 to -24.054 , indicating that energy-saving self-identity significantly reduced the strength of the relationship between biospheric values and meat consumption. The effect of biospheric values on meat consumption was no longer significant ($\beta = -.08$, $p = .14$) when energy-saving self-identity was included in the model ($\beta = -.24$, $p < .001$). The relationship between biospheric values and showering time was fully mediated by energy-saving self-identity as well. The bias-corrected bootstrap estimate of the indirect effect had a 95% confidence interval from -3.157 to $-.607$. The effect of biospheric values on showering time reduced to non-significance ($\beta = -.06$, $p = .24$) when energy-saving self-identity was included in the model ($\beta = -.17$, $p < .01$). Also, energy-saving self-identity fully mediated the relationship between biospheric values and fuel-

Table 1

Corrected correlations between biospheric value and energy-saving self-identity items and biospheric value and energy-saving self-identity scales via multiple group method (Study 1).

	Biospheric values	Energy-saving self-identity
<i>Biospheric values</i>		
1. Respecting the earth	.73	.43
2. Unity with nature	.66	.36
3. Protecting the environment	.76	.45
4. Preventing pollution	.74	.47
Cronbach's alpha = .87		
<i>Energy-saving self-identity</i>		
5. Saving energy is an important part of who I am	.40	.63
6. I am the type of person who saves energy	.46	.71
7. I see myself as a person who saves energy	.44	.69
Cronbach's alpha = .82		

Note. Correlation coefficients are corrected for self-correlations. Highest correlations for each value item are printed in bold.

Table 2
Regression of energy-related behaviours and intention to reduce energy use on biospheric values and the energy-saving self-identity.

	Meat consumption			Showering time			Fuel efficient driving style			Intention to reduce energy use		
	β	<i>t</i>	R^2	β	<i>t</i>	R^2	β	<i>t</i>	R^2	β	<i>t</i>	R^2
Biospheric values	-.20	-4.27**	.04	-.14	-3.05*	.02	.17	3.58**	.03	.31	6.63**	.10
Energy-saving self-identity	-.27	-5.68**	.07	-.21	-4.51**	.04	.32	6.91**	.11	.55	13.46**	.30

* $p < .01$, ** $p < .001$.

efficient driving style. The bias-corrected bootstrap estimate of the indirect effect had a 95% confidence interval from .097 to .241. Biospheric values were not significantly related to one's fuel-efficient driving style ($\beta = .02$, $p = .69$) when energy-saving self-identity was controlled for ($\beta = .32$, $p < .001$). Finally, the relationship between biospheric values and intention to reduce energy consumption was fully mediated by energy-saving self-identity. The bias-corrected bootstrap estimate of the indirect effect had a 95% confidence interval from .170 to .289, indicating that energy-saving self-identity significantly reduced the strength of the relationship between biospheric values and meat consumption. Biospheric values were not significantly related to intention ($\beta = .04$, $p = .36$) when energy-saving self-identity was controlled for ($\beta = .52$, $p < .001$).

3.3. Discussion

The MGM supported our first hypothesis: energy-saving self-identity could empirically be distinguished from biospheric values. In addition, Study 1 provided support for our second hypothesis: energy-saving self-identity was stronger when biospheric values were strong. Hypothesis 3 was also supported: we found that energy-saving self-identity fully mediated the relationship between biospheric values and all energy-related behaviours and intentions.

Study 1 focused on energy-saving self-identity. Can we replicate these findings if we focus on a different type of self-identity? If identity mediates the relationship between values and preferences, intentions and behaviour we should be able to replicate our findings when we focus on a different measure of identity, in this case environmental self-identity. Environmental self-identity is the broadest category of identities in the environmental domain, and may thus be related to a wide range of environmental preferences, intentions and behaviours. Can this broad measure of identity also be empirically distinguished from biospheric values? Also, does it mediate the relationship between biospheric values and environmental preferences, intentions and behaviour? If so, this would provide additional support for our hypothesis that biospheric values are related to preferences, intentions and behaviour via environmental self-identity. We designed Study 2 to find out.

4. Study 2

Study 2 aimed to replicate the findings of Study 1 with a more general measure of self-identity: environmental self-identity. Also, to further examine the validity and robustness of our findings, we included different dependent variables. More specifically, in Study 2 we focused on the use of green or renewable energy sources. If people would use more renewable energy sources instead of oil, gas or coal, CO₂ emissions could be significantly reduced. To test if environmental self-identity is related to a range of preferences and intentions we included different types of preferences and intentions related to the use of green energy, including the importance of generating green energy, willingness to pay more for green energy, intentions to switch to green energy, and willingness to

reduce energy use when renewables would be used. We first tested whether biospheric values and environmental self-identity can be distinguished empirically. Second, we tested the relationship between biospheric values and one's environmental self-identity (Hypothesis 2a). Third, we examined whether environmental self-identity mediated the relationship between values and preferences and intentions (Hypothesis 3).

4.1. Method

4.1.1. Participants and procedure

Data were collected via an online questionnaire among a sample of the Dutch population. Participants were members of the panel of thesistools.com, and received a small reimbursement for their participation (less than 1 Euro). The questionnaire was online for 14 days in November 2010. The study was presented to participants as a study on energy use. In total, 138 participants filled in the questionnaire. The average age was 55 ($SD = 15$), 64% of the sample was male. The average net income of the sample was 2700 Euros per month, which is similar to the average Dutch household income of 2783 Euros (CBS, 2010). About 16% of the respondents did not complete any education, or completed primary education or vocational secondary school, 46% had completed the highest level of secondary school or a vocational education and 37% finished university.

4.1.2. Measures

4.1.2.1. Values. Participants first filled in the same value questionnaire as used in Study 1. Cronbach's alpha for the biospheric value scale was .87 ($M = 5.14$, $SD = 1.39$).

4.1.2.2. Environmental self-identity. The following three items were used to measure environmental self-identity: Acting environmentally-friendly is an important part of who I am; I am the type of person who acts environmentally-friendly; I see myself as an environmentally-friendly person. Note that the items were similar to the items in Study 1, only now they were focused on general environmental behaviour instead of saving energy. Respondents rated each item on a seven point scale, ranging from *totally disagree* to *totally agree*. Cronbach's alpha for this scale was .86 ($M = 4.93$, $SD = 1.06$).

4.1.2.3. Preferences and intentions. We included four indicators of preferences and intentions related to the use of green energy. First, participants indicated how important it is to them that green energy is generated, on a scale ranging from 1 *not important at all* to 7 *very important* ($M = 5.02$, $SD = 1.50$). Second, respondents indicated to what extent they are willing to pay more for green energy, on a seven point scale ranging from 1 *not willing at all* to 7 *very willing* ($M = 3.93$, $SD = 1.90$). Furthermore, participants indicated to what extent they are willing to cut down their energy use to reduce peak demand if their energy is green,³ on a seven point scale

³ By reducing peak demand the efficiency of the system can be increased, because less energy needs to be generated to meet peak demand.

Table 3

Corrected correlations between biospheric value and environmental self-identity items and biospheric value and environmental self-identity scales via multiple group method (Study 2).

	Biospheric values	Environmental self-identity
<i>Biospheric values</i>		
1. Respecting the earth	.73	.59
2. Unity with nature	.67	.59
3. Protecting the environment	.75	.56
4. Preventing pollution	.78	.59
Cronbach's alpha = .87		
<i>Environmental self-identity</i>		
5. Acting environmentally-friendly is an important part of who I am	.71	.74
6. I am the type of person who acts environmentally-friendly	.64	.77
7. I see myself as an environmentally-friendly person	.48	.70
Cronbach's alpha = .86		

Note. Correlation coefficients are corrected for self-correlations. Highest correlations for each value item are printed in bold.

ranging from 1 – not at all to 7 – totally ($M = 4.14$, $SD = 1.82$). Finally, respondents indicated how likely it is that they will switch to green energy in the next year, on a seven point scale ranging from 1 – very unlikely to 7 – very likely ($M = 4.89$, $SD = 1.95$).

4.2. Results

Table 3 shows that environmental self-identity could again be distinguished empirically from biospheric values, providing further support for Hypothesis 1. In addition, biospheric values explained 46% of the variance in environmental self-identity ($F(1, 136) = 117.59$, $p < .001$), supporting Hypothesis 2a. Respondents who strongly endorsed biospheric values had a stronger environmental self-identity ($\beta = .68$, $p < .001$).

Biospheric values and environmental self-identity were both significantly related to all dependent variables (see Table 4). The stronger respondents' biospheric values and environmental self-identity, the more important the generation of green energy was to respondents, the more they were willing to pay for green energy, the stronger their willingness to reduce energy use if the energy is green, and the stronger their intention to switch to green energy. In addition, as expected, the relationships between biospheric values and all dependent variables were fully mediated by environmental self-identity. The relationship between biospheric values and the importance of generating green energy became non-significant ($\beta = .15$, $p = .13$) when environmental self-identity was included in the regression analysis as well ($\beta = .39$, $p < .001$). The bias-corrected bootstrap estimate of the indirect effect had a 95% confidence interval from .120 to .481. The effect of values on willingness to pay for green energy reduced to non-significance ($\beta = .02$, $p = .83$) when environmental self-identity ($\beta = .28$, $p < .05$) was included in the model. The bias-corrected bootstrap estimate of the indirect effect had a 95% confidence interval from .024 to .478. Also, environmental self-identity fully mediated the relationship between biospheric values and willingness to reduce energy use if the energy is green. The bias-corrected bootstrap estimate of the indirect effect had a 95% confidence interval from .240 to .645. The effect of biospheric values on willingness to reduce energy use became non-significant ($\beta = .05$, $p = .60$) when environmental self-identity was controlled for ($\beta = .46$, $p < .001$). Finally, the relationship between biospheric values and the intention to switch to green energy in the next year was also fully mediated by environmental identity. The bias-corrected bootstrap

estimate of the indirect effect had a 95% confidence interval from .191 to .647. The effect of biospheric values on intentions to switch to green energy was no longer significant ($\beta = .01$, $p = .92$) when environmental self-identity was controlled for ($\beta = .44$, $p < .001$). Overall, we found that biospheric values are related to environmental self-identity, and values no longer significantly predicted preferences and behaviour when environmental self-identity is controlled for.

4.3. Discussion

Even though Study 2 focused on environmental self-identity, the broadest category of identities in the environmental domain, Hypothesis 1 was supported: environmental self-identity could be empirically distinguished from biospheric values. Hypothesis 2a was also supported: biospheric values were positively related to environmental self-identity. Also, we found clear support for Hypothesis 3: environmental self-identity mediated the relationship between biospheric values and the dependent variables. In all cases, full mediation was shown, suggesting that the relationship between biospheric values and preferences and intentions related to the use of green energy runs via one's environmental self-identity. Therefore, even for the broad environmental self-identity, all hypotheses were supported.

In Study 1 and 2 we measured biospheric values and environmental self-identity at the same time. Biospheric values are stable over time (e.g., Feather, 1995), and thus not likely to change over a short period of time. Self-identity on the other hand is more likely to change, for example because it is influenced by past behaviour (Lee et al., 1999). We proposed that biospheric values are indeed the stable factor influencing environmental self-identity. If true, values should not only predict environmental self-identity when measured at the same time (as we established in Study 1 and 2), but values should be related to environmental self-identity at a later moment in time as well. Therefore, in Study 3 we will test whether biospheric values predict environmental self-identity when values have been measured well ahead in time.

5. Study 3

In Study 3 we again tested if environmental self-identity is empirically distinct from biospheric values. Second, we tested if biospheric values are related to environmental self-identity several months later (Hypothesis 2b). Also, again we tested if the relationship between biospheric values and behaviour is mediated by environmental self-identity (Hypothesis 3). For this purpose, participants first filled in the short value questionnaire including biospheric values. A few months later, we asked participants to participate in a study in the lab in which we measured their environmental self-identity and environmental behaviour, which in this study involved a choice task between products with different environmental impacts.

5.1. Method

5.1.1. Participants and procedure

Respondents were undergraduates at a Dutch university who participated in the study in exchange for course credits. In total 99 respondents participated in this study, of which 16% was male. Age ranged from 18 to 48 ($M = 20.8$, $SD = 3.58$). Respondents first completed the value questionnaire online. One to three months later, they participated in the second part of the study in the lab that included measures of environmental self-identity and the product choice task.

Table 4

Regression of preferences and intention related to the use of green energy on biospheric values and the environmental self-identity.

	Importance of generating green energy			Willingness to pay for green energy			Willingness to reduce energy use if the energy is green			Intention to switch to green energy in the next year		
	β	<i>t</i>	R^2	β	<i>t</i>	R^2	β	<i>t</i>	R^2	β	<i>t</i>	R^2
Biospheric values	.42	5.38**	.18	.21	2.54*	.05	.37	4.63**	.14	.31	3.81**	.10
Environmental self-identity	.49	6.62**	.24	.29	3.59**	.09	.50	6.72**	.25	.45	5.84**	.20

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

5.1.2. Measures

5.1.2.1. Values. We used the same value questionnaire as used in Study 1 and 2. Cronbach's alpha for the biospheric values scale was .82 ($M = 4.23$, $SD = 1.28$).

5.1.2.2. Environmental self-identity. We used the same items to measure environmental self-identity as in Study 2. Cronbach's alpha was .88 ($M = 4.53$, $SD = 1.12$).

5.1.2.3. Product choice. Respondents were asked to choose one out of two options of a product. One option of the product was a sustainable choice, which was 10% more expensive than the unsustainable option. In total eight choices were offered. Respondents indicated for a pair of jeans, milk, a laptop, a pen, a writing pad, a bicycle, a pair of socks and a mobile phone if they would choose the sustainable or the unsustainable option. For example, participants chose between a pair of socks of 3 Euros which was produced in an unsustainable way and a pair of socks of 3.30 Euros which was produced sustainably, see Appendix A for a full description of the product choice task. We counted the number of times respondents chose the sustainable option ($M = 5.39$, $SD = 1.84$).

5.2. Results

The MGM again showed that environmental self-identity could be empirically distinguished from biospheric values, supporting Hypothesis 1 (see Table 5). In addition, as expected, biospheric values were related to environmental self-identity at a later time (Hypothesis 2b). Biospheric values explained 23% of the variance in environmental self-identity at a later time ($F(1, 94) = 28.12$, $p < .001$). The more strongly participants endorsed biospheric values, the stronger their environmental self-identity ($\beta = .48$, $p < .001$).

Table 5

Corrected correlations between biospheric value and environmental self-identity items and biospheric value and environmental self-identity scales via multiple group method (Study 3).

	Biospheric values	Environmental self-identity
<i>Biospheric values</i>		
1. Respecting the earth	.62	.35
2. Unity with nature	.56	.39
3. Protecting the environment	.73	.40
4. Preventing pollution	.65	.41
Cronbach's alpha = .82		
<i>Environmental self-identity</i>		
5. Acting environmentally-friendly is an important part of who I am	.54	.70
6. I am the type of person who acts environmentally-friendly	.33	.85
7. I see myself as an environmentally-friendly person	.39	.77
Cronbach's alpha = .88		

Note. Correlation coefficients are corrected for self-correlations. Highest correlations for each value item are printed in bold.

Five per cent of the variance in product choice was explained by biospheric values ($F(1, 94) = 4.79$, $p = .03$). The more strongly respondents endorsed biospheric values, the more often they chose sustainable products ($\beta = .22$, $p = .03$). Environmental self-identity explained 10% of the variance in product choice ($F(1, 95) = 11.01$, $p < .01$). The stronger one's environmental self-identity the more often one chose sustainable products ($\beta = .32$, $p < .01$).

The bias-corrected bootstrap estimate of the indirect effect had a 95% confidence interval from $-.001$ to $.355$, the 90% confidence interval ranged from $.008$ to $.325$. The effect of biospheric values on product choice was no longer significant ($\beta = .10$, $p = .36$) when environmental self-identity was controlled for ($\beta = .25$, $p = .03$).

5.3. Discussion

Again, the distinction between biospheric values and environmental self-identity was supported by the MGM, providing support for our first hypothesis. Study 3 showed that biospheric values measured at time 1 are related to environmental self-identity measured at time 2. This supports our hypothesis that values are the stable factor influencing environmental self-identity: even though environmental self-identity may change over time, it may be stable to a certain extent because it is related to values even when values are measured well before in time.

We also found support for our hypothesis that the relationship between biospheric values and behaviour is mediated by environmental self-identity, even though values had been measured well in advance, indicating that values are related to choices via environmental self-identity.

6. General discussion

In the present research we aimed to study the relationship between biospheric values, environmental self-identity, and environmental preferences, intentions and behaviour. Various authors suggested a relationship between values and identity, and some even suggested that they are similar to a certain extent (Crompton & Kasser, 2009; Sparks & Shepherd, 1992; Verplanken & Holland, 2002). We aimed to make a clear conceptual distinction between biospheric values and environmental self-identity, to study the relationship between the two, and to study how both are related to environmental preferences, intentions and behaviour. In all studies we found that biospheric values and environmental self-identity could not only be distinguished conceptually, but also empirically. We found this not only for energy-saving self-identity (Study 1), but also for the more general environmental self-identity (Studies 2 and 3).

We proposed that biospheric values are related to the strength of environmental self-identity. We found support for this hypothesis in all three studies: the more strongly one endorsed biospheric values, the more strongly one sees himself or herself as a person who acts pro-environmentally. This was not only true for environmental self-identity but also for energy-saving self-identity. In line with our prediction, in Study 3 we found that biospheric values

even predicted environmental self-identity and environmental actions at a later moment in time, suggesting that biospheric values are indeed the stable factor related to environmental self-identity. Thus, in all studies we found that although biospheric values and environmental self-identity could be distinguished empirically, there is a strong relationship between them. In the first study biospheric values explained 25% of the variance in energy-saving self-identity. In Study 2 we found that biospheric values explained more variance in environmental self-identity, namely 46%. However, this may be expected as environmental self-identity is a broader type of identity than energy-saving self-identity. The broader the self-identity, the stronger the relationship with biospheric values may be, because they are measured on a similar level of specificity. This is in line with the compatibility principle which states that the relationship between two variables is stronger when they are measured on the same level of specificity (Ajzen, 1996). In the last study values explained 23% of the variance in environmental self-identity measured much later in time. Therefore, even though biospheric values and environmental self-identity are clearly different constructs, there is a relationship between them.

We expected that environmental self-identity in turn relates to preferences, intentions and behaviour, and that the relationship between values and preferences, intentions and behaviour would be mediated by environmental self-identity. In all studies, we found consistent support for the mediating role of environmental self-identity. For all of our dependent variables, full mediation was found, suggesting that values are indeed related to preferences, intentions, and behaviour via environmental self-identity, although the effect was somewhat weaker in Study 3. This suggests that values influence behaviour via one's self-identity, and that this is more likely to be the case when the particular values are strongly endorsed. As our results are based on correlational data, future research is needed to test whether the results can be replicated with experimental designs, which would allow for more definite conclusions on causality. For example, future studies could test if biospheric values are still related to environmental self-identity after a manipulation of environmental self-identity (e.g., by reminding people of their past behaviour). Also, we relied on behavioural self-reports; future research is needed to test if environmental self-identity is related to actual behaviours as well, for example by observing environmental behaviour.

We studied the relationship between biospheric values, environmental self-identity and a wide range of environmental preferences, intentions and behaviours. We found that biospheric values and environmental self-identity were consistently related to a wide range of environmental preferences, intentions, and behaviours, including behaviours reflecting direct and indirect energy use, product choices, intentions to save energy, curtailment and efficiency behaviours, and preferences and willingness to pay for green energy. This suggests that environmental self-identity and biospheric values can both be considered a general antecedent of environmental preferences, intentions, and behaviour. It has been argued that values are difficult to change (e.g., Feather, 1995) while studies have shown that self-identity is influenced by past-behaviour (Lee et al., 1999) suggesting that it can be changed more easily. Therefore, interventions targeting environmental self-identity may be a more promising approach to promote pro-environmental behaviour than interventions targeting biospheric values, as the former will probably be more easily changed. An important question for future research is whether environmental self-identity can be changed more easily than values (for example by influencing past behaviour, or reminding people of their past pro-environmental actions) and whether campaigns or policies that address environmental self-identity result in several pro-environmental actions.

In the present study we integrated two lines of research: research on values and self-identity, respectively. Our results showed that the relationship between biospheric values and environmental preferences, intentions and behaviour is mediated by environmental self-identity. We expect that this finding can be generalized to other types of values and identities. A study by Hitlin (2003) provides some initial support that this relationship may be generalized. Hitlin found that self-transcendent values, which reflect universalism and benevolence values, are positively related to the strength of volunteer identity. However, more research is needed to test if our findings can be generalized to other types of values and identities. For example, do altruistic values predict preferences, intentions and behaviour via the altruistic self-identity?

Recent research suggests that self-identity may be an important factor in explaining environmental behaviour (e.g., Gatersleben et al., 2012; Nigbur et al., 2010; Whitmarsh & O'Neill, 2010). We found further evidence for the importance of self-identity in the environmental domain. In addition we examined which factors are related to environmental self-identity. Not much was known about environmental self-identity and how it is related to other constructs in environmental psychology. The aim of our research was to take a first step in studying the relationship between biospheric values and environmental self-identity, and examining how both are related to environmental preferences, intentions and behaviour. Importantly, we replicated our findings using different indicators of self-identity and preferences, intentions, and behaviour in the environmental domain, indicating that the findings are robust. Also, in two of the three studies we tested our hypotheses in general samples of the Dutch population. To further test the validity of our findings future research could examine how environmental self-identity is related to other important concepts related to environmental behaviour, such as connectedness to nature, environmental concern, environmental attitudes and personal norms (e.g., Clayton, 2012; Schultz & Tabanico, 2007; Thøgersen, 2009; Weigel & Weigel, 1978). We expect that environmental self-identity is influenced by other general antecedents of environmental behaviour such as connectedness to nature and environmental concern as well. Furthermore, we expect that personal norms will be influenced by environmental self-identity, because they are more behaviour specific antecedents. This may imply that people consider moral implications of not acting in line with their view of self.

In sum, we studied the relationship between biospheric values, environmental self-identity and environmental preferences, intentions, and behaviour. Our results revealed that environmental self-identity is related to biospheric values and values are related to preferences, intentions and behaviour via environmental self-identity.

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Appendix A

Product choice task

Imagine that you want to buy the products described below. For every product you can choose between 2 options. The first option is

cheap, but not sustainably produced. The second option is sustainably produced, but more expensive. Please indicate for each product which option you would choose.

- a A designer pair of jeans of 100 euros, which is produced unsustainably.
- b A designer pair of jeans of 110 euros, which is produced sustainably.
- a A liter of milk of 65 cents, which is produced unsustainably.
- b A liter of milk of 72 cents, which is produced sustainably.
- a A new laptop of 900 euros, which is produced unsustainably.
- b A new laptop of 990 euros, which is produced sustainably.
- a A pen of 1 euro, which is produced unsustainably.
- b A pen of 1.10 euros, which is produced sustainably.
- a A writing pad of 3 euros, which is produced unsustainably.
- b A writing pad of 3.30 euros, which is produced sustainably.
- a A bicycle of 400 euros, which is produced unsustainably.
- b A bicycle of 440 euros, which is produced sustainably.
- a A pair of socks of 3 euros, which is produced unsustainably.
- b A pair of socks of 3.30 euros, which is produced sustainably.
- a The newest model mobile phone of 500 euros, which is produced unsustainably.
- b The newest model mobile phone of 550 euros, which is produced sustainably.

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