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# The Normative Route to a Sustainable Future: Examining Children's Environmental Values, Identity and Personal Norms to Conserve Energy

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## Abstract

Environmental problems could be reduced if individuals act pro-environmentally. Typically, studies have examined factors explaining pro-environmental behavior among adults, but not among children. As children are the future generations that must meet the targets set by the 2015 Paris climate agreement, it is important to understand which factors influence their engagement in pro-environmental behaviors, such as their energy saving behavior. In two correlational studies among primary and secondary school children ( $n_{\text{study1}} = 69$ ,  $n_{\text{study2}} = 958$ ), we tested if normative considerations proposed by the Value-Identity-Personal Norm (VIP) model can explain children's self-reported energy-saving behaviors. Our results revealed that in line with research among adults, children's biospheric values were related to their energy-saving self-identity, in turn associated with their personal norms to save energy. Furthermore, we found partial support for the

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proposed relationship between the variables of the VIP model and a range of self-reported energy-saving behaviors.

### **Keywords**

energy-conservation, children, values, self-identity, personal norms

## **Introduction**

Environmental problems stem from a large part from human behavior. In an effort to mitigate the negative consequences of such environmental problems, large scale changes in behavior need to take place (IPCC, 2018). Realizing these large-scale behavioral changes requires a thorough understanding of what motivates people to engage in environmentally friendly behaviors. Previous research has identified a number of general factors that play an important role in influencing and stimulating a range of pro-environmental behavior. Specifically, research has suggested that as pro-environmental actions are oftentimes somewhat costly or effortful, particularly people's normative considerations, such as their biospheric values, environmental self-identity and personal norms, are important predictors of pro-environmental behavior (Ruepert et al., 2016; Steg et al., 2014; Steg & Vlek, 2009; Stern et al., 1999; Van der Werff & Steg, 2015, 2016). Yet, most studies examine how these factors influence pro-environmental behavior of adults, but have not studied children. As children are the future generations that would need to adopt large scale behavioral changes to mitigate climate change, understanding which factors encourage children to engage in pro-environmental behavior is pivotal to reduce environmental problems. The current research aims to gain insights into factors influencing children's pro-environmental behaviors, and specifically examining the role of normative considerations. In the following sections, we first provide an overview of which normative factors can influence pro-environmental behavior and introduce the Value-Identity-Personal norms model (VIP model; Ruepert et al., 2016), which has been successfully used to predict pro-environmental behavior in adults. Next, we introduce our studies that aimed to examine whether the VIP model may also be relevant in explaining pro-environmental behavior in children.

## **Normative Considerations and Pro-Environmental Behavior**

Acting pro-environmentally is often considered somewhat costly or effortful. For example, switching off electronic appliances might be more of a hassle

than leaving them on standby and taking shorter showers may be less comfortable than taking a long shower. Yet, despite such costs, many people engage in pro-environmental actions. It has been suggested that one reason for doing so is that people universally value the environment, and act pro-environmentally because they feel that it is the right thing to do (Steg et al., 2014; Stern et al., 1999; Van der Werff, Keizer & Steg, 2013a). Indeed, several theories and models have shown that pro-environmental behaviors are predicted by normative considerations. For example, the norm activation model (NAM; Schwartz, 1977; Steg & De Groot, 2010) proposes that higher problem awareness (the level of awareness of the adverse consequences of not acting environmentally friendly), ascription of responsibility (feeling responsible for the negative consequences of not acting environmentally friendly), outcome efficacy (identification of actions to reduce environmental problems) and self-efficacy (the recognition of one's own ability to reduce environmental problems) activate one's personal norms, reflecting feelings of moral obligation to engage in pro-environmental action. In turn, these feelings of moral obligation motivate people to act pro-environmentally. The NAM appeared successful in explaining different types of pro-environmental behaviors, such as intention to reduce car use (Abrahamse et al., 2009), willingness to pay for environmental protection (Guagnano et al., 1994), using the car for shorter distances and turning off the tap whilst brushing one's teeth (Harland et al., 1999) and general environmental behavior (Nordlund & Garvill, 2002).

An extension of the NAM, namely the Value-Belief-Norm theory (VBN theory), proposes that problem awareness depends on more general antecedents of pro-environmental behavior, namely values, which are general goals that serve as guiding principles that people strive for in their lives, and ecological worldviews, which are beliefs on the relationship between humans and the environment (as reflected in the New Ecological Paradigm), which in turn influence people's feelings of moral obligation to act (Stern et al., 1999). Specifically, the VBN theory proposes that the more strongly people value nature and the environment (i.e., strong biospheric values) and other people (i.e., strong altruistic values), and the less they think people have the right to rule over nature, the more likely they are aware of environmental problems caused by their behavior, and to feel responsible and morally obliged to reduce these problems. The VBN theory proposes a sequential model, in which each variable is causally related to the next variable, but each variable may also be directly related to the other variables in the model. The VBN theory has been successfully used to explain many specific pro-environmental behaviors, such as household energy use (Abrahamse & Steg, 2011) as well as sustainable travel mode choices (Lind et al., 2015).<sup>1</sup>

Studies testing the NAM and VBN theory typically included behavior-specific antecedents of pro-environmental behavior, namely awareness of problems caused by one's specific actions, perceived efficacy to reduce these problems, and personal norms regarding specific behavior. Whereas behavior-specific antecedents are generally more strongly related to related pro-environmental actions than general antecedents, they are not likely to predict other types of pro-environmental actions (Ajzen, 1988; Ajzen & Fishbein, 1977). Hence, targeting behavior-specific actions is likely to change the related behavior, but not other types of pro-environmental behavior. Therefore, it is also important to identify and test general antecedents of pro-environmental behavior, as targeting such general antecedents is more likely to encourage a wide range of behaviors.

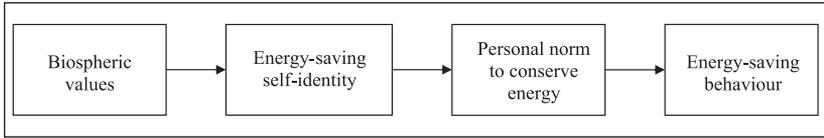
Recently, a more parsimonious model consisting of general normative antecedents of pro-environmental behavior has been proposed and tested, namely the Value-Identity-Personal norms model (VIP model; Ruepert et al., 2016; Van der Werff & Steg, 2016). Similar to the VBN theory, the VIP model proposes that the extent to which people endorse biospheric values, that is, the extent to which they find it important to protect the quality of nature and the environment, is an important and consistent predictor of various pro-environmental behaviors. As values are rather general guiding principles in people's lives, they mainly affect behavior indirectly. More specifically, the VIP model proposes that biospheric values influence people's environmental self-identity, that is, the extent to which people see themselves as environmentally-friendly persons (Van der Werff, Steg & Keizer, 2013b; Whitmarsh & O'Neill, 2010). The stronger individuals endorse biospheric values, the more likely they are to see themselves as an environmentally friendly person, which motivates them to act accordingly. Specifically, environmental self-identity appears to strengthen one's personal norms (Schwartz, 1977; Thøgersen, 2006; Van der Werff et al., 2013a). In turn, similar to the NAM and VBN theory, the VIP model proposes that people's feelings of moral obligation to engage in behavior predicts their pro-environmental behaviors (De Groot & Steg, 2010; Stern, 2000; Stern et al., 1993; Van der Werff et al., 2013a; Van der Werff & Steg, 2016). Thus, the VIP model proposes that pro-environmental behavior is predicted by people's personal norms, which in turn are predicted by the strength of their environmental self-identity, which depends on the strength of their biospheric value endorsement. While the VIP model assumes that the variables are related to one another in a sequential chain, each variable may also have direct effects on variables further down the chain.

The VIP model was successful in explaining a variety of pro-environmental behaviors among adults, including different types of pro-environmental

behavior in the workplace (Ruepert et al., 2016), and participation in smart energy systems (Van der Werff & Steg, 2016). Interestingly, it was found that the VIP model and the VBN theory explained a similar proportion of variance in participation in smart energy systems (Van der Werff & Steg, 2016), suggesting that a more parsimonious model like the VIP is as successful in explaining pro-environmental actions as a more extended model like VBN theory.

Although there is empirical support for the VIP model in predicting pro-environmental behavior in adults, the question remains whether the normative factors proposed by the VIP model are also predictive of children's pro-environmental behaviors. It has been shown that from the age of seven, children have similar value structures as adults do (Döring et al., 2015), suggesting that children may have developed biospheric values by that age. However, it is yet unclear to what extent children endorse biospheric values and whether such values are related to their pro-environmental behavior. In line with previous research in adults, we expect that children's biospheric value endorsement influences the strength of their environmental self-identity. By testing this, we extend previous research, as to the best of our knowledge, there are no studies examining environmental self-identity in children. Drawing on theories of moral development (Kohlberg, 1969), we further propose that children's biospheric value endorsement and strength of environmental self-identity affect the strength of their personal norms to act environmentally friendly. To the authors' knowledge studies have not examined personal norms to act environmentally friendly in children. Yet, research by Kohlberg (1969) suggests that around the age of 10, children have developed into a stage in which they can independently reflect on their values and on which actions are considered morally right or wrong depending on societal rules. This reasoning is in line with a recent study that found that external moral motivations become less predictive of behavior with increasing age of children, and that internal moral motivations become more predictive, suggesting that younger children look to their parents and peers to guide their moral actions, whereas older children are more likely to act on their personal norms in their moral actions (Krettenauer & Victor, 2017).

We propose that biospheric values, environmental self-identity and personal norms are relevant in explaining children's pro-environmental behavior. Although studies have not tested whether the VIP model can explain pro-environmental behavior among children, some studies provide initial evidence for parts of the model (Ando et al., 2015; Krettenauer & Victor, 2017; Matthies et al., 2012). For example, personal norms to engage in pro-environmental behavior were positively associated with recycling and reusing paper among children (Ando et al., 2015). However, to the best of our



**Figure 1.** The Value-Identity-Personal norm model to predict energy-saving behavior.

knowledge, it is still unclear whether children's biospheric value endorsement and environmental self-identity explain their pro-environmental behaviors via their personal norms.

## The Current Research

We aim to gain insight into children's normative considerations with respect to the environment, and more specifically, whether factors included in the VIP model are successful in explaining their self-reported energy-saving behaviors (see Figure 1). We aim to do this by testing the VIP model in primary and secondary school children. As we examined the VIP model in relation to energy-saving behaviors, we focused on energy-saving self-identity as well as personal norms to save energy, and examined whether these are related to a range of energy-saving behaviors. First, we test whether similar relationships among the variables in the VIP model are found in children, as they have previously been found in adults. Specifically, we first examine whether children's biospheric value endorsement influences the strength of their energy-saving self-identity, and whether this in turn predicts their personal norms to conserve energy (*Research Question 1*). Second, we examine whether the normative factors in the VIP model predict a range of self-reported energy-saving behaviors in children (*Research Question 2*). We addressed these research questions in two studies. In Study 1, we tested our model among a sample of Dutch primary school children before they would take part in a water and energy conservation educational program. In Study 2, we tested the VIP model among a larger sample of Dutch primary and secondary school children before they took part in an educational energy conservation program.

## Study 1

### Method

**Participants and design.** This research was approved by the Ethics Committee of the Department of Psychology at the University of Groningen.

The first study was conducted in collaboration with the Missing Chapter Foundation that developed the WaterSpaarders<sup>2</sup> program, aiming to stimulate children and their families to conserve energy and water by taking shorter showers. Our study aimed to understand which factors are related to shower behavior before the intervention took place. Participants were students of primary schools that signed up to participate in the WaterSpaarders program, but did not participate in the program yet, meaning they had not received any information on energy or water conservation yet. Information about the study aims, along with an informed consent form was given to all students in the participating primary schools to take home to their parents. Prior to any data collection, we asked all participating children, as well as one of their primary care givers, to provide written informed consent. A total of 69 primary school students from three schools in the north of the Netherlands took part in a paper and pencil questionnaire study. Of those, 57% were boys and their age ranged from 10 to 13 ( $M = 11.11$ ,  $SD = 0.78$ ).

### Measures

**Biospheric values.** Students' biospheric values were measured within a value questionnaire consisting of 16 value items (adapted from Steg et al., 2012).<sup>3</sup> Children were asked to rate how important each value was to them, on a 6-point Likert scale ranging from 1 "not important" to 6 "extremely important." Four items within this questionnaire reflected biospheric values, namely "That we respect nature and live in harmony with other species," "That I feel that I am part of nature and that I belong to nature," "That nature and the environment is protected and preserved," and "That nature and the environment are not polluted." Mean scores on these items were computed as they formed a reliable scale ( $\alpha = .78$ ;  $M = 4.71$ ,  $SD = 0.72$ ). The other items measured egoistic, hedonic and altruistic values; these will not be discussed further, as they are not relevant for the purpose of the present research (descriptive information on these items can be found in the supplementary information).

**Energy-saving self-identity.** Environmental self-identity was specified to energy-saving self-identity as the WaterSpaarders intervention targeted energy conservation. Two items were included to measure energy saving self-identity: "I am the type of person that saves energy" and "Energy saving is an important part of who I am" (based on Van der Werff et al., 2013b). Participants had to indicate on a 6-point Likert scale the extent to which the statements were true for them, with 1 "not at all true" to 6 "completely true" ( $r = .78$   $M = 2.92$ ,  $SD = 1.00$ ).

*Personal norms to save energy.* Personal norms were assessed with the following three items: “I would feel guilty if I would not save energy,” “I would feel regret if I would not save energy,” and “I would feel proud if I would save energy.” Students were asked to indicate on a 6-point Likert scale the extent to which the statements were true for them, ranging from 1 “not at all true” to 6 “completely true” ( $\alpha = .80$ ;  $M = 2.80$ ,  $SD = 1.15$ ).

*Self-reported shower behavior.* The dependent variable shower behavior was assessed by asking students to indicate how many minutes each shower they take takes on average. The average shower times ranged from 3 to 35 min ( $M = 9.75$ ,  $SD = 5.46$ ).

## Results

First, bivariate correlations were examined between the VIP model variables. As expected, the three predictor variables were significantly correlated. More specifically, stronger biospheric values were associated with a stronger energy-saving self-identity ( $r = .47$ ,  $p < .001$ ) and a stronger personal norm to conserve energy ( $r = .34$ ,  $p < .01$ ). Moreover, a stronger energy-saving self-identity was related to a stronger personal norm ( $r = .55$ ,  $p < .001$ ). However, no significant correlations were found between any of the predictor variables and showering time.

Next, we tested whether biospheric values and energy-saving self-identity predicted children’s personal norms to conserve energy (*Research Question 1*) via series of regression analyses with the PROCESS MACRO extension for SPSS (Hayes, 2013; see Table 1). As expected, biospheric values were significantly associated with energy-saving self-identity. Furthermore, biospheric values and energy-saving self-identity together accounted for 30% of the variance in personal norms. Mediation analysis revealed a fully mediated indirect effect of biospheric values on personal norms via energy-saving self-identity ( $a_i * b_i = 0.23$ ). The bias-corrected bootstrap confidence estimate of the indirect effect had a 95% confidence interval ranging from 0.09 to 0.42, indicating that the more children endorsed biospheric values, the more they saw themselves as persons that save energy, and in turn the more morally obliged they felt to conserve energy.

Next, we tested the full VIP model (*Research Question 2*), with biospheric values, energy-saving self-identity and personal norms to conserve energy as independent variables predicting students’ shower behavior. This model was not statistically significant and none of the predictors was significantly associated with students’ shower behavior (see Table 1). Furthermore, double

**Table 1.** Regression of Shower Behavior on the Value-Identity-Personal Norm Model Variables (Study 1).

	$\beta$	$t$	$p$	$R^2$	$df$	$F$	$p$
<i>DV: Environmental self-identity</i>							
Biospheric values	.46	4.10	< .001	.23	1, 57	16.59	< .001
<i>DV: Personal norms</i>							
Environmental self-identity	.49	3.82	< .001	.30	2, 56	11.91	< .001
Biospheric values	.11	0.85	<i>n.s.</i>				
<i>DV: Shower time</i>							
Personal norm	.71	0.82	<i>n.s.</i>	.03	3, 55	0.55	<i>n.s.</i>
Environmental self-identity	-.71	-0.75	<i>n.s.</i>				
Biospheric values	.74	0.90	<i>n.s.</i>				

mediation analyses revealed no significant indirect effects of the VIP model variables predicting shower time in children.

### Discussion

Study 1 provides a first indication that children’s biospheric value endorsement influences the strength of their energy-saving self-identity, which in turn predicts their personal norms to conserve energy. Yet, our results revealed that self-reported showering behavior in children was not significantly associated with the VIP model variables. This could be due to showering behavior being somewhat out of children’s control, as their parents are likely to have a say in how often and how long they take showers. Perhaps showering behavior is only influenced by normative factors when children are a bit older and have more control over this behavior. Besides, our measure of showering time may have its limitations. Our participants were asked to indicate how many minutes they take for an average shower. We chose this dependent variable as the current study was part of an evaluation study for an educational intervention aimed at decreasing the number of minutes that children shower. However, estimating the number of minutes spent on showering may be difficult for children. Therefore, in Study 2, children were asked to indicate how often they shower more than 5 min per shower. Moreover, it could be argued that primary school children might not link energy use with showering behavior; they may simply not know that taking long showers implies a higher energy use, as they might primarily associate showering with water use. In Study 2, we therefore tested the predictive power of the VIP model for a range of different energy-saving behaviors. Lastly, in order to address a

**Table 2.** Mean, Standard Deviation and Cronbach's Alpha for VIP Model Variables (Study 2).

	<i>M</i>	<i>SD</i>	$\alpha$
Biospheric values	3.92	0.78	.77
Energy-saving self-identity	2.47	1.12	.73*
Personal norms to conserve energy	2.38	1.10	.78

Note. \*As energy-saving self-identity was measured on a 2 item scale, we reported the bivariate correlation here ( $p < .001$ ).

possible lack of statistical power due to the relatively small sample size of Study 1, we included a larger sample with not only primary school children, but also secondary school children in Study 2.

## Study 2

### Method

**Participants and design.** This research was approved by the Ethics Committee of the Department of Psychology at the University of Groningen.

Study 2 was conducted among primary and secondary school children in schools that signed up to take part in an education program called the Energy Challenges.<sup>4</sup> The Energy Challenges program aims to encourage energy conservation in students at school and at home. The study took place before the program was implemented in each school, meaning that the participants of our study had not received any prior information or instruction on energy conservation. Information about the study aims, along with an informed consent form was given to all students in the participating primary schools to take home to their parents. Prior to data collection, we asked all participating children, as well as one of their primary care givers, to provide written informed consent.

A total of 976 Dutch primary and young secondary school students from approximately 38 schools in the northern regions of the Netherlands took part in a paper and pencil questionnaire study. Approximately 47% of the sample was male and 53% female; four students did not indicate their gender. The students were between the ages of 8 and 17 years ( $M = 10.77$ ,  $SD = 1.57$ ).

**Measures.** Biospheric values, energy-saving self-identity and personal norms to conserve energy were measured identically as in Study 1.<sup>5</sup> Means, standard deviations and scale reliabilities can be found in Table 2.

**Table 3.** Correlations between Biospheric Values, Environmental Self-Identity, Personal Norms and Energy-Saving Behaviors (Study 2).

	Biospheric values	Energy-saving self-identity	Personal norms
Energy-saving self-identity	0.38*		
Personal norms to conserve energy	0.39*	0.63*	
Turning off the lights when leaving the room	0.12*	0.20*	0.15*
Turning off appliances when not in use	-0.13*	-0.20*	-0.16*
Plugging out the charger when not in use	-0.12*	-0.27*	-0.22*
Lowering the thermostat when leaving the room	0.14*	0.30*	0.23*
Showering more than 5 minutes	-0.15*	-0.27*	-0.24*

Note. \* $p < .001$ .

*Self-reported energy-saving behaviors.* Participants had to indicate how often they engage in the following five energy-saving behaviors on a 5 point Likert scale, ranging from 1 “never” to 5 “very often:” *turning off the lights when leaving the room* ( $M = 4.18, SD = 0.97$ ), *leaving on electric appliances when not in use* ( $M = 2.53, SD = 1.13$ ), *charging electric appliances despite the appliance being completely charged* ( $M = 3.06, SD = 1.50$ ), *lowering the thermostat when leaving the room* ( $M = 2.67, SD = 1.57$ ), and *how often they take showers longer than 5 min* ( $M = 2.00, SD = 1.12$ ). These energy saving behaviors corresponded to energy saving behaviors that the children would learn about when participating in the Energy Challenges program. Moreover, these behaviors were considered to be energy conservation behaviors that most children would be able to engage in within the household.

## Results

First, bivariate correlations were examined between the VIP variables and all five behaviors (see Table 3). As expected, again, stronger biospheric values were related to a stronger energy-saving identity and a stronger personal norm to save energy. Also, a stronger energy-saving identity was related to stronger personal norms to save energy. Moreover, all VIP variables were significantly correlated to all behaviors. Specifically, the stronger participants’ biospheric values, energy-saving self-identity and personal norms were, the more they reported turning off the lights when leaving the room and

lowering the thermostat. Furthermore, stronger biospheric values, a stronger energy-saving self-identity and personal norms were associated with decreased likelihood of leaving on appliances that are not in use, charging devices despite being fully charged and taking showers longer than 5 min.

To test whether biospheric values predicted personal norms to conserve energy via energy-saving identity (*Research Question 1*), a series of regression analyses were conducted, similar to Study 1 (see Table 4). Biospheric values explained 15% of the variance in energy-saving self-identity. Next, a regression model with biospheric values and energy-saving self-identity as independent variables predicting personal norms revealed that both predictors explained 42% of the variance in personal norms. Mediation analysis revealed that energy-saving self-identity partially mediated the relationship between biospheric values and personal norms ( $a_i * b_i = 0.20$ ). The bias-corrected bootstrap confidence estimate of the indirect effect had a 95% confidence interval ranged from 0.16 to 0.24, indicating that the more children endorsed biospheric values, the more they saw themselves as a person that saves energy, which in turn strengthened their personal norms to conserve energy.

Next, we examined to what extent the VIP model explained each of the five energy use behaviors<sup>6</sup> (*Research Question 2*; see Table 4). The variables proposed by the VIP model were significantly associated with turning off the lights when leaving the room ( $R^2 = .04$ ). A mediation analysis revealed a significant indirect effect of biospheric values via environmental self-identity on turning off the lights when leaving the room ( $a_i * b_i = 0.06$ ), with the 95% confidence interval ranging from 0.03 to 0.10. This suggests that the more children endorsed biospheric values, the more they see themselves as a person that conserves energy, in turn making them more likely to turn off the lights when leaving a room. Yet, personal norms did not significantly mediate the relationship between biospheric values and energy-saving self-identity on the one hand and turning off the lights on the other (indirect effect  $a_1 * d_{12} * b_2 = ns.$ ), suggesting that biospheric values and energy-saving self-identity did not significantly predict children turning off lights via personal norms.

The VIP model explained 5% of the variance in leaving electric appliances on when not in use. Mediation analyses revealed a fully significant negative indirect effect biospheric values on leaving electric appliances on when not in use via energy-saving self-identity ( $a_i * b_i = -0.06$ ), with the 95% bootstrap confidence interval ranging from  $-0.09$  to  $-0.03$ . This suggests that the stronger children endorsed biospheric values, the stronger their energy-saving self-identity, the less likely they are to leave electric appliances on when not in use. Again, personal norms were not a significant mediator in the model.

**Table 4.** Regression of Energy-Saving Behaviors on the Value-Identity-Personal Norm Model Variables (Study 2).

	$\beta$	$t$	$p$	$R^2$	$df$	$F$	$p$
<i>DV: Energy-saving self-identity</i>							
Biospheric values	.40	12.41	< .001	.15	1, 902	154.03	< .001
<i>DV: Personal norm</i>							
Energy-saving self-identity	.56	20.45	< .001	.42	2, 901	323.67	< .001
Biospheric values	.18	6.18	< .001				
<i>DV: Turning off the lights when leaving the room</i>							
Personal norm	.04	0.93	<i>n.s.</i>	.05	3, 897	13.39	< .001
Energy-saving self-identity	.17	3.86	< .001				
Biospheric values	.03	0.84	<i>n.s.</i>				
<i>DV: Turning off appliances when not in use</i>							
Personal norm	-.04	-1.05	<i>n.s.</i>	.05	3, 897	14.21	< .001
Energy-saving self-identity	-.15	-3.63	< .001				
Biospheric values	-.05	-1.47	<i>n.s.</i>				
<i>DV: Plugging out the charger when not in use</i>							
Personal norm	-.09	-2.06	< .05	.08	3, 790	22.54	< .001
Energy-saving self-identity	-.21	-4.67	< .001				
Biospheric values	-.01	-0.25	<i>n.s.</i>				
<i>DV: Lowering the thermostat when leaving the room</i>							
Personal norm	.05	0.94	<i>n.s.</i>	.10	3, 680	25.80	< .001
Energy-saving self-identity	.28	5.93	< .001				
Biospheric values	.01	0.28	<i>n.s.</i>				
<i>DV: Showering more than 5 min</i>							
Personal norm	-.12	-2.84	< .001	.08	3, 891	25.63	< .001
Energy-saving self-identity	-.17	-3.99	< .001				
Biospheric values	-.06	-1.33	<i>n.s.</i>				

The VIP model explained 8% of variance in charging appliances despite the appliance being fully charged. The mean indirect effect of biospheric values on charging behavior via energy-saving self-identity and personal norms was significant ( $a_1 * d_{12} * b_2 = -0.02$ ), with the 95% confidence interval ranging from  $-0.04$  to  $-0.01$ , indicating full mediation. This suggests that the stronger children endorse biospheric values, the stronger energy-saving

self-identity, which in turn strengthens their personal norms to conserve energy, in turn making them less likely to charge their electric appliances when they are already fully charged.

The VIP model significantly explained lowering the thermostat when leaving the room ( $R^2 = .10$ ). A significant indirect effect of biospheric values via energy-saving self-identity predicting lowering the thermostat was found ( $a_i * b_i = 0.12$ ; 95% CI = 0.09, 0.17), suggesting that the stronger children endorsed biospheric values, the stronger their energy-saving self-identity and the more likely there were to turn down the thermostat when leaving the room. Personal norms were not found to mediate any relationships in the model.

Finally, we found that the VIP model explained 8% of children's shower behavior. The indirect effect of biospheric values on showering behavior via energy-saving self-identity and personal norms was negative and significant ( $a_1 * d_{12} * b_2 = -0.03$ ), with a 95% bootstrap confidence interval ranging from  $-0.05$  to  $-0.01$ . These findings indicate that biospheric values strengthen children's energy-saving self-identity, which in turn strengthens their personal norms to conserve energy, in turn increasing the likelihood that they shower less than 5 min per shower.

## Discussion

In Study 2, we found further support for the VIP model in children, as previously found in adults. Notably, our correlational analyses showed that all VIP model variables were significantly related to the self-reported energy-saving behaviors, including turning off the lights when leaving the room, turning off electric appliances when not in use, removing the charger when electronic devices are fully charged, lowering the thermostat when leaving the room, and showering less than 5 min. Mediation analyses revealed that across all behaviors, children's energy-saving self-identity significantly mediated the relationship between their biospheric values and self-reported energy-saving behavior. However, interestingly, children's personal norms only significantly mediated the relationship between biospheric value endorsement and energy-saving self-identity on the one hand and unplugging electrical appliances when fully charged and showering behavior, respectively. These findings suggest that the normative factors proposed by the VIP model are relevant in predicting a range of self-reported energy-saving behaviors in children.

## General Discussion

Most research that examines factors explaining energy-saving behavior studied these effects among adults. However, given the seriousness and urgency

of environmental problems that requires future generations to engage in environmentally responsible behavior as well, it is also important to examine what factors explain energy-saving behavior in children. The current research aimed to address this gap in the literature and test to what extent normative considerations affect children's energy-saving behavior, as these considerations have been found to be important predictors of pro-environmental behavior among adults. More specifically, we aimed to test to what extent the normative factors proposed by the Value-Identity-Personal norm model (Ruepert et al., 2016; Van der Werff & Steg, 2016) explain a range of self-reported energy-saving behaviors in children.

First, our aim was to examine whether the strength of children's biospheric value endorsement influences the strength of their energy-saving self-identity, and in turn predicts their personal norms to conserve energy. We found support for these relationships across both studies. These findings are in line with earlier research among adults (Ruepert et al., 2016, Van der Werff & Steg, 2016). However, this study is the first to show that these relationships also hold among children.

Second, we aimed to test whether the normative factors in the VIP model are relevant in predicting children's energy-saving behaviors. Overall, our findings suggest that these normative factors are relevant predictors of energy-saving behavior in children, although the relationships are not always fully in line with the VIP model. Notably, in Study 1, we found that the normative factors proposed by the VIP model were not significantly associated with children's showering behavior. This may be due to the relatively small sample size in Study 1, as in Study 2, all VIP-model variables were significantly related to a range of energy use behaviors, including showering behavior. Besides, we measured showering behavior in a different way in Study 2, as compared to in Study 1. We asked participants to indicate how often they shower more than 5 min, which we reason might have been easier for children to assess than the number of minutes they shower.

To test robustness of the model and whether the normative factors proposed by the VIP model predict a wide range of energy-saving behaviors, we measured four additional energy-saving behaviors in Study 2 including switching off the lights when leaving the room, turning off appliances when not using them, plugging out the charger when the appliance is fully charged and lowering the thermostat. Our results show consistently that the normative factors proposed by the VIP model were related to all five specific energy-saving behaviors, suggesting that overall such normative factors can have a substantial impact on energy use by influencing many different energy-saving behaviors. These findings are in line with previous research among adults that has found that general normative factors, notably biospheric values,

environmental self-identity and personal norms are related to many specific energy saving behaviors (Ruepert et al., 2016; Van der Werff & Steg, 2015).

Mediation analyses largely provided empirical support for the causal structure proposed in the VIP model, with some exceptions. Notably, Study 2 consistently found that energy-saving self-identity mediates the relationship between biospheric values and the energy-saving behaviors. Yet, personal norms only mediated the relationships between biospheric values and energy-saving self-identity with two of the energy-saving behaviors, namely unplugging electric appliances when fully charged and showering less than 5 min. These findings are interesting from a theoretical point of view, and are not fully in line with previous research among adults. Specifically, studies that have tested the VIP model among adults have consistently found that personal norms mediate the relationship between pro-environmental behavior and environmental self-identity and biospheric values (Ruepert et al., 2016; Van der Werff & Steg, 2016). Our findings among children, however, suggest that environmental self-identity is important in explaining their pro-environmental behavior. It seems that in children, strong biospheric values are associated with a stronger energy-saving self-identity, but this may not yet translate consistently into feelings of moral obligation to engage in all five energy-saving behaviors that we measured.

The question thus is under which conditions energy-saving self-identity affects energy-saving behaviors by strengthening personal norms. The type of energy behavior may play a role in this respect, as well as age. Findings from the developmental psychology literature suggest that before the age of 10, children typically look to their parents and peers to guide their moral actions, whereas from around the age of 10, children have developed into a stage in which they can independently reflect on their values and on which actions are considered morally right or wrong (Kohlberg, 1969; Krettenauer & Victor, 2017). It could thus be argued that social or subjective norms may be more important predictors of pro-environmental behavior in younger children, whereas older children may act on their personal moral norms.

Our findings warrant for future exploration, especially as research in adults has shown that personal norms are important predictors of many pro-environmental behaviors. Moreover, future research could examine how the normative factors proposed by the VIP model develop over time. Recent research has gained insight into how pro-environmental behavior develops from childhood to adulthood (Evans et al., 2018), however, future work could also examine how stable children's biospheric value endorsement, environmental self-identity and personal norms are, and when and how these factors develop in childhood and across adulthood. Besides advancing theoretical knowledge, it is also warranted that the reliability and validity of measures of

normative factors and environmental behaviors in children are further developed and tested. The current research adapted measures that have been validated among adults with the help of developmental psychologists as well as teachers experienced in working with the target age group. While the measures used in the current research formed reliable scales and relationships between variables included in our study are in line with those found in adults, we recognize that future work among children and their pro-environmental behaviors could benefit from thoroughly validated measures that can be used among children. Specifically, our measure of personal norm had a strong emotional focus, in which we examined the extent that participants would experience pride, guilt or regret if they would or would not save energy. It could be argued that children may not fully grasp such emotions clearly and that thus a different measure for personal norms may be more appropriate for the age group. Future research could employ different operationalisations of the key variables included in the VIP model, and test whether these matter in explaining children's pro-environmental behavior. Finally, while the current research makes an important theoretical contribution in testing the VIP model in children and how such normative factors can explain their energy conservation behaviors, it is important to reflect on the context in which children's energy conservation takes place as well. That is, factors such as household norms and routines, socio-economic background, as well as parents' normative considerations are all likely to shape the context in which children engage in energy conservation (Collado et al., 2017; Grønhøj & Thøgersen, 2012; Matthies et al., 2012). Thus, future studies could examine to what extent such household contextual factors influence children's normative considerations and how this in turn influences their energy conservation behavior. Furthermore, future research could further test the VIP model among both children and their parents, and examine whether there are relationships between children's and parent's normative considerations, and whether these in turn influence energy saving behaviors among children and parents.

Although relationships between the normative factors included in the VIP model and the specific energy saving behaviors included in our study were relatively weak among children, we found consistent relationships for a wide range of energy-saving behaviors. Our findings are in line with research that has found that the general normative considerations that are included in the VIP model affect a wide range of environmental and energy-saving behaviors of adults, although the predictive power was not high (Ruepert et al., 2016; Van der Werff et al., 2013a, 2013b; Van der Werff & Steg, 2016). Yet, although relationships with each single behavior may be relatively weak, targeting factors that can affect a wide range of energy-saving behaviors may ultimately amount to overall substantial impacts.

Our findings could have important practical implications, as they provide initial insights for designing effective interventions to encourage energy-saving behavior in children. Whereas current intervention programs often primarily rely on knowledge provision, our research suggests that targeting normative considerations, such as children's biospheric values and their energy-saving self-identity might be particularly effective in encouraging a range of energy-saving behaviors of children. Future research could test the effectiveness of interventions that target normative considerations, for example educational programs at school that aim to foster biospheric values and environmental self-identity, and compare their effectiveness to common educational programs.

In conclusion, the current research aimed to test to what extent the Value-Identity-Personal norm model is relevant in explaining a range of energy saving behaviors among children. Generally, we found support for the VIP model, suggesting that similar normative considerations are related to energy saving behavior of children and adults. Yet, personal norms seem not always to play a central role in explaining energy saving behaviors in children as in adults.

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### **Supplemental Material**

Supplemental material for this article is available online.

### **Notes**

1. For an overview of theories explaining pro-environmental behavior, see Steg and de Groot (2019, p. 217).

2. For more information on the WaterSpaarders program, see [www.waterspaarders.nl](http://www.waterspaarders.nl)
3. All measures were adapted and simplified to ensure comprehensibility for children. As our sample consisted of children between the ages of 10 and 13, we could be sure that they were old enough to read and write. Moreover, we consulted with the Missing Chapter Foundation, the teachers in the classrooms as well as a developmental psychologist, all of whom agreed that our questionnaires were comprehensible for students of that age group.
4. For more information on the Energy Challenges project, see <http://energychallenges.nl/>
5. All measures were adapted and simplified to ensure comprehensibility for children. The questionnaires were filled out with teachers in the classrooms that agreed that our questionnaires were comprehensible for all students.
6. Our sample in Study 2 consisted of primary school and secondary school children. Therefore, we ran the same analyses a second time and included age as a control variable to examine any potential effects of age. The analyses yielded similar findings as we report here, suggesting that when controlling for age, the normative factors proposed by the VIP model are predictive of the five energy use behaviors. Additionally, we find a main effect of age on children unplugging electric devices once fully charged, turning down the thermostat when leaving the room and taking showers shorter than 5 min, meaning that with increasing age, participants were more likely to perform these behaviors. These effects may have been observed as older children are likely to have more control over such energy behaviors. We did not find any positive main effects of age on children turning off electric appliances when not in use and turning off the lights, which may be due to the fact that children of all ages can engage such energy saving behaviors.

## References

- Abrahamse, W., & Steg, L. (2011). Factors related to household energy use and intention to reduce it: The role of psychological and socio-demographic variables. *Human Ecology Review, 18*(1), 30–40.
- Abrahamse, W., Steg, L., Gifford, R., & Vlek, C. (2009). Factors influencing car use for commuting and the intention to reduce it: A question of self-interest or morality? *Transportation Research Part F: Traffic Psychology and Behaviour, 12*(4), 317–324.
- Ajzen, I. (1988). *Attitudes, personality, and behavior*. Dorsey Press.
- Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological bulletin, 84*(5), 888–918.
- Ando, K., Yorifuji, K., Ohnuma, S., Matthies, E., & Kanbara, A. (2015). Transmitting pro-environmental behaviours to the next generation: A comparison between Germany and Japan. *Asian Journal of Social Psychology, 18*(2), 134–144. <https://doi.org/10.1111/ajsp.12078>
- Collado, S., Evans, G. W., & Sorrel, M. A. (2017). The role of parents and best friends in children's pro-environmentalism: Differences according to age and gender. *Journal of Environmental Psychology, 54*, 27–37.

- De Groot, J. I., & Steg, L. (2010). Relationships between value orientations, self-determined motivational types and pro-environmental behavioural intentions. *Journal of Environmental Psychology, 30*(4), 368–378. <https://doi.org/10.1016/j.jenvp.2010.04.002>
- Döring, A. K., Schwartz, S. H., Cieciuch, J., Groenen, P. J., Glatzel, V., Harasimczuk, J., Janowicz, N., Nyagolova, M., Scheefer, E. R., Allritz, M., Milfont, T. L., & Bilsky, W. (2015). Cross-cultural evidence of value structures and priorities in childhood. *British Journal of Psychology, 106*(4), 675–699. <https://doi.org/10.1111/bjop.12116>
- Evans, G. W., Otto, S., & Kaiser, F. G. (2018). Childhood Origins of Young Adult Environmental Behavior. *Psychological science, 29*(5), 679–687. <https://doi.org/10.1177/0956797617741894>
- Grønhoj, A., & Thøgersen, J. (2012). Action speaks louder than words: The effect of personal attitudes and family norms on adolescents' pro-environmental behaviour. *Journal of Economic Psychology, 33*(1), 292–302.
- Guagnano, G. A., Dietz, T., & Stern, P. C. (1994). Willingness to pay for public goods: A test of the contribution model. *Psychological Science, 5*(6), 411–415.
- Harland, P., Staats, H., & Wilke, H. A. (1999). Explaining proenvironmental intention and behavior by personal norms and the Theory of Planned Behavior 1. *Journal of applied social psychology, 29*(12), 2505–2528.
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Publications.
- IPCC. (2018). *Summary for Policymakers: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Geneva: World Meteorological Organization.
- Kohlberg, L. (1969). Stage and sequence: The cognitive developmental approach to socialization. In D. Goslin (Ed.), *Handbook of socialization theory and research* (pp. 347–480). Rand McNally.
- Krettenauer, T., & Victor, R. (2017). Why be moral? Moral identity motivation and age. *Developmental Psychology, 53*(8), 1589–1596. <https://doi.org/10.1037/dev0000353>
- Lind, H. B., Nordfjærn, T., Jørgensen, S. H., & Rundmo, T. (2015). The value-belief-norm theory, personal norms and sustainable travel mode choice in urban areas. *Journal of Environmental Psychology, 44*, 119–125.
- Matthies, E., Selge, S., & Klöckner, C. A. (2012). The role of parental behaviour for the development of behaviour specific environmental norms—The example of recycling and re-use behaviour. *Journal of Environmental Psychology, 32*(3), 277–284. <https://doi.org/10.1016/j.jenvp.2012.04.003>
- Nordlund, A. M., & Garvill, J. (2002). Value structures behind proenvironmental behavior. *Environment and behavior, 34*(6), 740–756.
- Ruepert, A., Keizer, K., Steg, L., Maricchiolo, F., Carrus, G., Dumitru, A., Mira, R. G., Stancu, A., & Moza, D. (2016). Environmental considerations in the

- organizational context: A pathway to pro-environmental behaviour at work. *Energy Research & Social Science*, 17, 59–70. <https://doi.org/10.1016/j.erss.2016.04.004>
- Schwartz, S. H. (1977). Normative influences on altruism. *Advances in Experimental Social Psychology*, 10(1), 221–279. [https://doi.org/10.1016/S0065-2601\(08\)60358-5](https://doi.org/10.1016/S0065-2601(08)60358-5)
- Steg, L., Bolderdijk, J. W., Keizer, K., & Perlaviciute, G. (2014). An Integrated framework for encouraging pro-environmental behaviour: The role of values, situational factors and goals. *Journal of Environmental Psychology*, 38, 104–115. <https://doi.org/10.1016/j.jenvp.2014.01.002>
- Steg, L., & De Groot, J. (2010). Explaining prosocial intentions: Testing causal relationships in the norm activation model. *British journal of social psychology*, 49(4), 725–743.
- Steg, L., & de Groot, J. I. M. (2019). *Environmental psychology: An introduction* (2nd ed.). Wiley
- Steg, L., Perlaviciute, G., Van der Werff, E., & Lurvink, J. (2012). The significance of hedonic values for environmentally relevant attitudes, preferences, and actions. *Environment and Behavior*, 46(2), 163–192. <https://doi.org/10.1177/0013916512454730>
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29(3), 309–317. <https://doi.org/10.1016/j.jenvp.2008.10.004>
- Stern, P. C. (2000). New environmental theories: Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3), 407–424. <https://doi.org/10.1111/0022-4537.00175>
- Stern, P. C., Dietz, T., Abel, T. D., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review*, 6(2), 81–97.
- Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behavior*, 25(5), 322–348. <https://doi.org/10.1177/0013916593255002>
- Thøgersen, J. (2006). Norms for environmentally responsible behaviour: An extended taxonomy. *Journal of Environmental Psychology*, 26(4), 247–261. <https://doi.org/10.1016/j.jenvp.2006.09.004>
- Van der Werff, E., & Steg, L. (2015). One model to predict them all: Predicting energy behaviours with the norm activation model. *Energy Research & Social Science*, 6, 8–14. <https://doi.org/10.1016/j.erss.2014.11.002>
- Van der Werff, E., & Steg, L. (2016). The psychology of participation and interest in smart energy systems: Comparing the value-belief-norm theory and the value-identity-personal norm model. *Energy Research & Social Science*, 22, 107–114. <https://doi.org/10.1016/j.erss.2016.08.022>
- Van der Werff, E., Steg, L., & Keizer, K. (2013a). It is a moral issue: The relationship between environmental self-identity, obligation-based intrinsic motivation and pro-environmental behaviour. *Global Environmental Change*, 23(5), 1258–1265. <https://doi.org/10.1016/j.gloenvcha.2013.07.018>

- Van der Werff, E., Steg, L., & Keizer, K. (2013b). The value of environmental self-identity: The relationship between biospheric values, environmental self-identity and environmental preferences, intentions and behaviour. *Journal of Environmental Psychology, 34*, 55–63. <https://doi.org/10.1016/j.jenvp.2012.12.006>
- Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology, 30*(3), 305–314. <https://doi.org/10.1016/j.jenvp.2010.01.003>

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