Environmental Education as a Moderator Between Values and Pro-conservation Intentions

Hilmi Deniz Ertem

S3991989

Department of Psychology, University of Groningen

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Group number: 2122_2a_36

Supervisor: Dr. Thijs Bouman

Second evaluator: Dr. Nanxi Yan

In collaboration with: Alexandra Huitfeldt, Svenja Martens, Janna Nottebom, Aqsa Shakeel, Dagmar Wolf, Justus Thiedemann, Sarah van den Bosch and Vester van Beek

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Abstract

Many environmental problems are deeply rooted in human behavior. It is well known that certain personal values play a key role in relation to environmental intentions and behavior. However, the potential moderating effects of environmental education on this relationship is unknown. In this study, the relationship between biospheric/hedonic values and pro-conservation intentions were investigated and the possible moderating effect of environmental education on this relationship was examined. Participants were recruited for this online study using a convenience sampling method and an experimental value activation manipulation was applied using an educational video. This manipulation was aimed towards making target values more salient and increasing the likelihood of value-congruent actions. The data indicated a positive relationship between biospheric values and pro-conservation intentions. We did not find evidence of a significant relationship for hedonic values. The results did not provide support for the presence of a moderating effect of environmental values. The results of this study helped to gain a better understanding of the processes that drive behavior change and offered important practical implications for intervention programs and directions for future research.

Keywords: values, value activation, behavior change, environmental education, pro-environmental behaviors, pro-conservation intentions, hedonic values, biospheric values

Environmental Education as a Moderator Between Values and Pro-conservation Intentions

The rapid advancement of human civilization has had a severe impact on our environment. According to the World Wildlife Foundation's Living Planet Report (2020), the population sizes of mammals, fish, birds, reptiles, and amphibians have declined an average of 68% between 1970 and 2016. Human activity is testing ecological boundaries in ways that may permanently damage the systems that support life on Earth (Ardoin et al., 2020). Many of the problems that plague our planet are deeply rooted in human behavior (Kollmuss & Agyeman, 2002). Thus, increasing public engagement in pro-conservation behaviors (e.g. recycling, conserving energy, donating money for conservation, political activism) can play a key role in mitigating the negative effects of anthropogenic activities and climate change.

Although traditional theories consider cost-benefit analysis to be a fundamental component of decision-making processes, Thøgersen (1996) argues that in regards to environmental behavior, intentions are not dependent on thorough calculations (conscious or unconscious) of the consequences; but are rather based on moral judgments of what is right and wrong. This suggests that personal values play a key role in influencing people's willingness to engage in environmentally-friendly behavior. Indeed, past research has found that values can influence a wide range of environmental beliefs, attitudes, preferences and behaviors (Stern & Dietz, 1994).

Identifying and understanding the drivers of environmental behavior is an important aspect of environmental research (Bouman et al., 2018). In addition to this, it is also important to have interventions that interpret and apply these research findings in a practical way (Ardoin et al., 2020). Environmental education programs can play a vital role in enhancing public environmental awareness, fostering a culture of respect towards nature and increasing engagement in sustainable behaviors (UNESCO, 2021). Groot & Steg (2009) argue that these

interventions will be more effective in producing long-term behavioral changes if they take personal values into account. Previous research suggests that environmental education programs that target and activate specific values could strengthen the association between values and value-congruent actions (see Bolderdijk et al., 2012; Bolderdijk et al., 2013a). However, relatively few studies have investigated the impact of environmental education programs on the relationship between values and environmental actions. This study aims to explore this relationship, in order to gain a better understanding of the mechanisms involved in influencing public awareness and behavior change.

Schwartz (1992) was the first to theorize and show empirical support for the existence of several basic human values that serve as guiding principles in a person's life. Values act like glasses through which people perceive the world. They influence what people pay attention to, how they interpret the world around them and how they choose to act based on the information that they perceive. Although everyone endorses the same values to some extent, people vary in the degree to which they prioritize certain values over others. This suggests that when people are faced with a situation that triggers conflicting values, they will make their decisions based on the value that they consider to be the most important; resulting in different outcomes for people with different value priorities (Steg et al., 2014). This process is often unconscious and is widely applicable across various situations. Values are also relatively stable over time and play a fundamental role in the decision-making process (Clayton, 2012; Steg & Groot, 2019).

This study focuses on two value orientations (biospheric and hedonic) that appear to be particularly relevant in environmental research (Steg et al., 2012). People with high biospheric values show a greater concern for the state of the environment and tend to judge situations based on their costs and benefits for the biosphere. Biospheric values have been shown to be positively associated with a range of environmentally-friendly attitudes, norms,

and behaviors (Steg & Groot, 2019). On the other hand, people with strong hedonic values are driven toward attaining and maintaining pleasure, increasing their positive feelings, and reducing effort. This suggests that hedonic consequences of certain actions might in fact act as barriers to behavior change. Previous research has found that hedonic values appear to be significantly and negatively related to a wide range of pro-environmental behaviors and beliefs (Bouman et al., 2018; Groot & Steg, 2009; Steg et al., 2012).

Values play an important role in how people perceive situations and decide to act on the information they receive. It has been suggested that values influence behavior by directing attention towards value-congruent information (Stern & Dietz, 1994). This can alter how people weigh information and influence their willingness to engage in pro-environmental behaviors (Steg & Groot, 2012). Studies have shown that it is possible to make values more salient or to increase their cognitive accessibility. Although this does not necessarily change people's values, it can affect the way people prioritize certain values in specific situations (Groot & Steg, 2008). This implies that by activating certain values, it is possible to direct attention to value-congruent information, thus strengthening an argument and influencing a range of environmental beliefs, norms, intentions, and behaviors. (Steg & Groot, 2019). Such an activation can increase the likelihood of value-congruent actions. However, this priming is thought to be less effective when the person does not strongly endorse the values to begin with (Steg & Groot, 2012). In line with this argument, Bolderdijk et al. (2012) found that campaigns highlighting biospheric arguments were particularly effective in motivating environmental behavior in individuals who strongly endorse biospheric values (Bolderdijk et al., 2012).

Environmental education programs use actionable research findings to educate the public and develop effective interventions that address a variety of conservation-related issues. Environmental education refers to initiatives, programs and resources that foster and

support environmental attitudes, awareness, knowledge and skills that prepare individuals and communities to undertake positive environmental action. Stern et al.'s (2014) review of 66 environmental education programs found that they were associated with several positive environmental outcomes such as environmental knowledge, awareness, skills, attitudes, intentions, behavior, as well as enjoyment. These programs will be most successful when interventions and policies are informed by a solid understanding of what causes the target behaviors. The causal impact of biospheric and hedonic values on environmental actions has been reliably documented (Steg & Groot, 2019; Thøgersen & Ölander, 2002). However, the role environmental education plays in this relationship has not been explored and the effectiveness of environmental education programs for people with different values remains unclear (Ballantyne and Packer, 2016).

Previous research suggests that environmental education programs that activate biospheric values could make people focus on the environmental consequences of their actions and increase their likelihood of engaging in pro-conservation behaviors (see Bolderdijk et al., 2012; Bolderdijk et al., 2013a). On the other hand, arguments activating hedonic values could direct attention towards the hedonic costs associated with environmental actions and act as barriers for engaging in such behaviors. For example, if a person is told that eating less red meat is the most significant action they could take to help the environment, this information could produce different outcomes depending on the value that is most cognitively accessible to them at that moment. If hedonic values are made more salient prior to this, the hedonic costs (e.g. restricted diet, less pleasure) of eating less red meat could be more influential in the decision-making process than the environmental benefits (e.g. reducing greenhouse gas emissions, deforestation, and soil degradation) and could decrease the likelihood of engaging in the behavior; and vice versa. This suggests that environmental education programs might not only provide people with the necessary environmental

knowledge to better understand and consider the consequences of their actions, but could also play a role in influencing the relationship between environmentally-relevant values and value-congruent actions. Further exploration of this relationship is necessary to gain a better understanding of the processes that play a part in influencing public awareness and behavior change. This information can be used to optimize the design of environmental education programs and can have practical implications for zoos and other institutions that aim to educate the public about environmental issues and promote sustainable behaviors.

This study aimed to address a gap in the scientific literature and explore how the relationship between environmentally-relevant values and pro-conservation behavior is influenced by environmental education. An experimental design was used to assess the effects of a value-activation manipulation on the relationship between participants' environmentally-relevant values and their willingness to engage in pro-conservation behaviors. Due to difficulties in measuring actual behavior, the experiment took place in a virtual environment and the participant's pro-conservation intentions were measured as an outcome variable that is similar to actual behavior. All participants were asked to watch a short video of tigers playing in a zoo enclosure. Depending on their group, the participants in the experimental conditions were also subjected to different types of environmental education, consisting of either conservation-focused or entertainment-focused information. These experimental conditions were meant to activate either biospheric or hedonic values in the participants, thereby increasing the likelihood of value-congruent intentions and actions.

The main research question explored in this study was whether environmental education moderates the relationship between environmentally-relevant values and pro-conservation intentions, thereby influencing the strength and/or direction of this relationship. Several hypotheses were formulated to investigate this research question:

Hypothesis 1. Biospheric values are significantly and positively related to pro-conservation intentions.

Hypothesis 2. Hedonic values are significantly and negatively related to pro-conservation intentions.

Hypothesis 3. Receiving conservation-focused education strengthens the positive relationship between biospheric values and pro-conservation intentions.

Hypothesis 4. Receiving entertainment-focused education strengthens the negative relationship between hedonic values and pro-conservation intentions.

If the results support these hypotheses, this would suggest that environmental education programs could have varying effects on people with different values and point towards the importance of designing interventions that take personal values into account.

Methods

Participants

Participant recruitment took place after the study received approval from the ethics committee of the University of Groningen. A total of 567 participants were recruited for the study using a convenience sampling method. The sample mainly consisted of individuals from the social network of the researchers. The survey link was shared through email, instant messaging, and/or social media. There was no compensation for participating in this study. Only the participants that reliably completed the survey were included in the analysis. Participants did not meet the reliability criteria if they did not give consent (78 participants), were under the age of 18 (101 participants), failed to finish the survey (150 participants), did not pass the attention check (191 participants) or took less than the minimum amount of time (10 minutes) deemed plausible to complete the survey reliably (172 participants). Due to the large overlap between these criteria, a total of 220 participants were excluded from the study. The final sample consisted of 347 participants of which 39.8% were male, 58.5% were female

and 1.7% were non-binary. The mean age was 38.7 years (SD = 16.3), with ages ranging from 18 to 85. The sample consisted of participants from Germany (41.8%), the Netherlands (23.9%), and other countries (34.3%) including Albania, Austria, Azerbaijan, Basque, Croatia, Czech Republic, Egypt, France, Great Britain, Luxembourg, India, Ireland, Israel, Italy, Mexico, Norway, Pakistan, Portugal, Romania, Scotland, Slovakia, Sweden, Syria, Turkey and the United States of America. In the final sample, there were 119 participants in the conservation-focused education condition, 115 participants in the entertainment-focused education condition and 113 participants in the control condition.

Research Design and Procedure

The study utilized a between-subjects experimental design. Participants were randomly assigned to one of two experimental conditions (conservation-focused education or entertainment-focused education), or a control condition. Participants were asked to specify their language preference (English, Dutch or German) and were provided basic information about the study (goals, duration, confidentiality, etc.). After agreeing on informed consent, the participants could start the online questionnaire. Participants were first asked to provide their demographic information (age, gender and nationality), after which they were asked to complete the Environmental-Portrait Value Questionnaire (E-PVQ). This was followed by the video manipulation where depending on their random condition, participants were subjected to watching the same video with conservation-focused education, entertainment-focused education or no educational information. Following the video manipulation, the participants were asked to complete the Conservation Caring scale that measured their pro-conservation intentions. In this experimental study, the values of the participants were the independent variable (IV) and their pro-conservation intentions were the dependent variable (DV). The experimental conditions were hypothesized to influence the relationship between these

variables and were considered as a moderator variable. The hypothesized moderation models were tested using the “PROCESS" macro, model 1, v4.1, for SPSS 27 (Hayes, 2022).

Measures

The study took place online and was conducted through Qualtrics XM (https://www.qualtrics.com). As this study was conducted as part of a larger bachelor’s thesis project, the specific variables of interest were chosen from a larger list of materials (see Appendix A for full list of materials used in this study).

Values were measured using the Environmental-Portrait Value Questionnaire (E-PVQ) (Bouman et al., 2018). The E-PVQ consists of 17 items that measure biospheric, altruistic, hedonic and egoistic values. The items contain descriptions of people with certain values and participants are asked to respond on a 7-point scale, ranging from 1 (not like me at all) to 7 (very much like me), depending on how much the person in the description was similar to themselves. The E-PVQ was found to be a reliable measure of the relevant values. The biospheric values subscale consisted of items 1-4 and had a Cronbach’s alpha of .83. The hedonic values subscale consisted of items 10-12 and had a Cronbach’s alpha of .90.

The **experimental video manipulation** consisted of a 4:27 minute long video of Siberian tigers (*Panthera tigris altaica*) playing in their enclosure in Leipzig zoo. In this study, the experimental conditions differed related to the content of the information within these videos. The group receiving conservation-focused education was presented with ten statements that provided information concerning tiger habitats, endangerment and conservation-related efforts (see Appendix B for full list of items used for value activation). The information presented for this group consisted of facts such as “Non-sustainable palm oil production is destroying tiger habitats in Indonesia and threatening the tiger population.” The participants in the entertainment-focused education group were presented with ten “fun” facts about tigers in the wild and in the zoo. The facts consisted of information such as “A tiger’s

roar can be heard about 3 kilometers away" or "A tiger's pee smells like popcorn." These statements were generated by the researchers through an online search and were categorized depending on their content. "Fun" information was expected to elicit positive feelings from the participants and was utilized to activate hedonic values. Conservation related information was expected to elicit environmental concern from the participants and was used to activate biospheric values. The control group did not receive any additional information and was only presented with the video.

Participants' **pro-conservation intentions** were measured using the Conservation Caring scale (Skibins & Powell, 2013). The Conservation Caring scale consists of 21 items that measure participants' existing connection to wildlife, conservation caring, species-oriented conservation behavior and biodiversity-oriented conservation behavior. The average of the items belonging to the conservation-related behavior subscales was used to operationalize the pro-conservation intentions of the participants. These items were found to be a reliable measure of pro-conservation intentions (α = .897), and included statements such as "I will become a member of an organization committed to protecting this species within the next 6 months" and "I will endorse public policy that severely restricts future growth and development in order to protect wildlife". The items were rated as agreement on a 9-point Likert scale, ranging from 1 (strongly disagree) to 9 (completely agree). An **attention check** was also embedded within the Conservation Caring scale, where participants were asked to select "agree" to prove that they were paying attention.

Results

The purpose of this research was to investigate whether environmental education moderated the relationship between personal values and pro-conservation intentions (PCI). To do this, first the individual relationship between the two types of values and pro-conservation intentions was examined.

To test the first hypothesis which predicted that biospheric values would be significantly and positively related to PCI, a linear regression analysis was conducted using biospheric values as the independent variable (IV) and PCI as the dependent variable (DV). To do so, the data was first checked to see that the linearity, normality, independence and homoscedasticity assumptions were met. An analysis of standard residuals was carried out and revealed that the data did not contain any outliers (Std. Residual Min = -2.71, Std. Residual Max = 2.91). The data met the assumption of independent errors (Durbin-Watson value = 2.32). The normality assumption was checked by considering the histogram of the standardized residuals, which indicated that the data contained approximately normally distributed errors, along with the P-P plot, which showed points on an approximately straight line. The homoscedasticity and linearity assumptions were checked using the scatterplot of standardized residuals, which did not reveal any significant indications to suggest that the assumptions had been violated and thus, a linear regression analysis was deemed appropriate. The results were consistent with our first hypothesis and revealed that biospheric values were significantly and positively related to PCI scores, $b = 0.65$, $t(345) = 8.79$, $p < .001$. Biospheric values were also moderately correlated with PCIs, $r(347) = .44$, $p < .01$ and explained a significant proportion of the variance in PCI scores, $R^2 = .18$, $F(1,345) = 77.3$, $p < .001$. Thus, the data indicated that participants with high biospheric values were also more likely to have higher pro-conservation intentions.

To test our second hypothesis which predicted that hedonic values would be significantly and negatively related to PCI, a hierarchical linear regression analysis was conducted using hedonic values as the IV, while controlling for biospheric values. Once again, the data was checked to see that the assumptions for a hierarchical linear regression analysis had been met. An analysis of standard residuals was carried out and revealed that the data did not contain any outliers (Std. Residual Min = -2.1, Std. Residual Max = 2.7). The

data met the assumption of independent errors (Durbin-Watson value = 2.26). Although hedonic values and biospheric values were significantly correlated, $r(377) = .193$, $p < .001$, the variance inflation factor did not point towards the presence of multicollinearity (VIF = 1.06). The normality assumption was checked by considering the histogram of the standardized residuals, which indicated that the data contained approximately normally distributed errors, along with the P-P plot, which showed points that were not completely on the line, but close enough. An examination of the scatterplot of the standardized residuals suggested that the homoscedasticity and linearity assumptions were met. The results did not provide support for our second hypothesis; the linear regression analysis did not indicate a significant relationship between hedonic values and PCI scores, $b = 0.068$, $t(345) = 0.99$, $p = .322$ and there was no significant correlation between the two variables, $r(347) = .056$, $p = .30$. Thus, the data revealed that participants with higher hedonic values did not necessarily report lower pro-conservation intentions.

In order to test our main research question, we then examined the possible moderation effect of environmental education on the relationship between personal values and PCIs. Our third hypothesis predicted that receiving conservation-focused education would have an enhancing effect on the positive relationship between biospheric values and PCIs. This was investigated using the PROCESS macro, model 1; which tested a model where the type of environmental education moderated the relationship between biospheric values and PCIs. The experimental conditions were dummy coded (using the conservation-focused education condition as the reference category), in order to compare the strength of the relationship between biospheric values and PCIs for the conservation-focused education condition in relation to the other conditions. The results did not demonstrate sufficient evidence for a moderating effect of environmental education on the relationship between biospheric values and PCIs. Adding the interaction terms between biospheric values and environmental

education to the model did not account for a significantly higher proportion of the variance in PCI scores, $\Delta R^2 = .003$, $F(2,341) = 0.55$, p = .58. Further examination of the interaction effects between biospheric values and the two dummy variables revealed that the strength of the relationship between biospheric values and PCIs for the conservation-focused education condition was not significantly stronger than that of the entertainment-focused education condition ($b = -0.06$, $SE = 0.18$, $t = -0.32$, $p = .75$), or the control condition ($b = -0.20$, $SE = 0.19$, $t = -1.02$, $p = .31$). Thus, exposure to different types of environmental education did not have any significant influence on the direction and/or strength of the relationship between the participant's biospheric values and their pro-conservation intentions.

Our fourth and final hypothesis predicted that receiving entertainment-focused education would have an enhancing effect on the negative relationship between hedonic values and PCIs. This was investigated using the PROCESS macro, model 1; which tested a model where the type of environmental education moderated the relationship between hedonic values and PCIs. Our data had already revealed that the main effect of hedonic values on PCI was non-significant. The results of the moderation analysis did not reveal evidence of a moderating effect of EE on the relationship between hedonic values and PCIs. The experimental conditions were dummy coded (using the entertainment-focused education condition as the reference category), in order to compare the strength of the relationship between hedonic values and PCIs for the entertainment-focused education condition in contrast to the other conditions. The results did not demonstrate sufficient evidence for a moderating effect of environmental education on the relationship between hedonic values and PCIs. Adding the interaction terms between hedonic values and environmental education to the model did not account for a significantly higher proportion of the variance in PCI scores, $\Delta R^2 = .002$, $F(2,341) = 0.27$, $p = .76$. Further examination of the interaction effects between hedonic values and the two dummy variables revealed that the strength of the relationship

between hedonic values and PCIs for the entertainment-focused education condition was not significantly stronger than that of the conservation-focused education condition (b = -.012, SE = 0.18, t = -0.69, p = .49), or the control condition (b = -0.38, SE = 0.18, t = -0.21, p = .83). These results failed to provide support for our main hypothesis, as exposure to different types of environmental education did not have any significant influence on the direction and/or strength of the relationship between the participant's hedonic values and their pro-conservation intentions.

Discussion

Given the catastrophic consequences of climate change and the immediate need to address environmental problems, it is crucial to gain a better understanding of the processes that drive behavior change and explore ways of increasing public engagement in sustainable behaviors. Personal values can play a key role in influencing decision-making processes and behavior. In order to promote a change towards conservation-friendly behaviors, environmental education programs must account for the influence that people's values have on their willingness to engage in such behaviors. The main purpose of this study was to investigate how environmental education programs impact the relationship between personal values and pro-conservation intentions. In order to investigate the main research question, we first examined the association of two environmentally-relevant value orientations (biospheric and hedonic) with pro-conservation intentions. This was followed by an exploration of the possible moderating effect of environmental education on these relationships. Although the findings showed a positive relationship between biospheric values and pro-conservation intentions, there was no indication to suggest that hedonic values had any significant influence on participants' pro-conservation intentions. The results of the experiment did not provide sufficient evidence to suggest that environmental education has a moderating effect on the relationship between personal values and pro-conservation intentions.

Personal values have received a considerable amount of attention within the environmental domain. Biospheric values are typically associated with a wide range of environmentally-friendly beliefs, attitudes and behaviors (Steg & Groot, 2019). The findings of this study supported this claim and found that biospheric values were positively and significantly associated with pro-conservation intentions. This was in line with expectations and can be explained by Stern & Dietz's (1994) definition of the biospheric value orientation, which states that "people judge phenomena on the basis of costs or benefits to ecosystems or the biosphere". This suggests that people who strongly endorse biospheric values prioritize the environmental consequences of their actions when making decisions and therefore, could be more likely to engage in pro-conservation behaviors such as recycling, conserving energy at home and donating money to conservation organizations.

On the other hand, previous research suggests that hedonic values appear to be significantly and negatively associated with a wide range of environmentally relevant attitudes, preferences and behaviors and may in fact act as important barriers to behavior change (see Clayton, 2012; Steg et al., 2012; Steg & Groot, 2019). These studies stress the importance of including hedonic values in environmental research and suggest that hedonic values may play a key role in inhibiting environmental actions. A reason for this could be because environmentally-friendly behaviors are often considered to have personal costs in terms of time investment, comfort loss, money or effort. These costs are highly relevant within the context of hedonic values and might in fact facilitate the negative relationship between hedonic values and pro-conservation behaviors. However, based on the results of this study, there was no evidence to suggest that hedonic values had any influence on the participants' willingness to engage in pro-conservation behaviors, even when biospheric values were controlled for. This was surprising due to the personal costs (in terms of time, money and effort) that were associated with the items that were used to measure pro-

conservation intentions (see Appendix A). We would have expected participants who strongly endorse hedonic values to report lower levels of pro-conservation intentions after taking the hedonic costs into account. However, most of the items used to measure pro-conservation intentions indicated monetary costs as the main deterrent for engaging in pro-conservation behaviors. A field experiment by Bolderdijk et al., (2012) found that emphasizing economic appeals in an environmental campaign led to significantly less compliance in the target behavior than biospheric or neutral appeals. This suggests that people could be generally more motivated by the environmental benefits associated with their actions, instead of the monetary costs. This could provide an explanation for why our study was unable to find a negative relationship between hedonic values and pro-conservation intentions.

After assessing the relationships between participants' values and pro-conservation intentions, I explored whether environmental education had a moderating effect on these relationships. It was expected that the conservation-focused informational intervention would activate biospheric values, emphasize the environmental benefits of engaging in pro-conservation behavior and strengthen the positive relationship between biospheric values and pro-conservation intentions. On the other hand, it was intended that the "fun" information presented with the entertainment-focused informational intervention would activate hedonic values, draw attention towards the hedonic costs associated with engaging in pro-conservation behavior and amplify the influence hedonic values has on pro-conservation intentions. However, the results of this study did not reveal any indication to suggest that the participants had been impacted by the informational interventions and environmental education did not have a moderating effect on the relationship between the participants' values and their pro-conservation intentions. These findings were inconsistent with existing studies that were able to demonstrate a link between values, environmental behavior and informational interventions (see Bolderdijk et al., 2012; Bolderdijk et al. 2013a; Verplanken & Holland, 2002). Research

by Bolderdijk et al. (2013a) found that campaigns highlighting biospheric values were particularly effective in promoting environmentally-friendly actions among people who strongly endorsed biospheric values. However, the effects of these campaigns were stronger when participants were stimulated to link the actions to their self-identities. The findings by van der Werff et al. (2013) provide further support for this argument and showed that environmental self-identity fully mediated the relationship between biospheric values and environmental intentions. These studies suggest that a person's self-identity could be the main facilitator in the link between personal values and value-congruent actions. Thus, targeting the self-identity of participants could be the key to controlling how and when a value activation manipulation triggers value-congruent behavior (Verplanken & Holland, 2002). This could explain why the informational intervention used in this study was ineffective in influencing the relationship between the participant's values and their pro-conservation intentions. The information that was presented to the participants was intended to highlight either the environmental benefits or the hedonic costs related to their actions. However, neither of these informational interventions targeted aspects related to the participant's self-identities. Previous research has demonstrated that past behaviors can influence a person's self-identity and reminding them of past pro-environmental actions can strengthen their environmental self-identities and lead to further pro-environmental behavior (see van der Werff et al., 2013a; van der Werff et al., 2014). Thus, getting the participants to engage in deliberate thinking about past behaviors could reinforce their self-identity and increase the effectiveness of value activation manipulations. These suggest that fostering an environmental self-identity may be a particularly useful goal for environmental campaigns and targeting individuals' self-identities could be the key to optimizing environmental education programs. Designing interventions that provide individuals with opportunities to engage in pro-conservation behaviors could help

foster environmental self-identities and increase the likelihood of future engagement in environmentally-friendly behaviors.

The randomized experimental design and relatively large sample size are the main strengths of this study. However, there were several important limitations to this study that deserve attention while interpreting findings and that should be considered in future research. The first limitation is related to sampling. A convenience sampling method was used and therefore the participants were not representative of or generalizable to any population at large. Our participants were required to speak either English, Dutch or German and our final sample mainly consisted of European citizens. The respondents were contacts of students who chose environmental psychology as their thesis topic, this may leave room for selection bias towards including a larger number of individuals with biospheric values than the population at large. Our exclusion criteria were strict and involved participants who passed the attention check and completed the entire study. We are therefore unable to make inferences to general populations. The next group of limitations are related to our experiment. Our experimental priming manipulation had not been priorly tested for effectiveness in activating target values. Furthermore, we could only assess participants' environmental intentions through self-reports, which might not reflect actual behavior in real-life settings. Since we measured pro-conservation intentions directly after watching the video manipulation, we could not observe if environmental intentions lasted longer or whether they resulted in actual pro-conservation behaviors. Finally, the motivation to maintain a positive self-concept could have impacted the participants' pro-conservation intention scores, creating a ceiling effect and influencing the final results (Bolderdijk et al., 2012). Future studies that are designed by taking our limitations into consideration, have the potential to shed further light on the relationship between values and pro-conservation behaviors and what kind of educational interventions can shape these relationships.

This study aimed to gain a better understanding of how personal values relate to pro-conservation intentions and to explore the role of environmental education in this relationship. This study is one of the relatively few experimental studies that explores the complex relationship between these variables and provides interesting insights into this relationship. It also offers directions for future research and could have important practical implications for intervention programs that aim to facilitate behavior change. Future research could consider and build upon the implications and limitations of this study. In order to do so, it is important to include behavioral measures within the design and to utilize effective manipulations that stimulate the self-identity concepts of the participants. Such research should also be able to account for the long-term effects of such manipulations and various types of behavior. This information is crucial to better understand the factors that drive behavior change, in order to increase public engagement in pro-environmental behaviors and help combat climate change.

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Appendix A

List of items used to measure pro-conservation intentions

- I would support entrance fees at this site being $10–25 higher if the extra money were used for the care and survival of this species
- I will donate up to $75 to "adopt" this animal at this site
- I will make a charitable contribution up to $150 to help purchase habitat in the wild for this species
- I will become a member of an organization committed to protecting this species, within the next 6 months
- I will volunteer at an event designed to help the conservation of this species, within the next 6 months
- Before my visit is over, I will sign up for a mailing/email to receive updates about the care and conservation of this animal
- I would write a letter/sign a petition to a government official supporting the protection of this species
- Even if I never return, I will provide ongoing financial support to this site
- If asked, I would donate as much as $50 to help protect a species I've never heard of
- I will endorse a public policy that severely restricts future growth & development in order to protect wildlife
- Elected officials' views on wildlife will be a major factor in my voting
- Even when they are more expensive or harder to find, I will buy groceries & products that support wildlife conservation

List of items used from the Environmental-Portrait Value Questionnaire (E-PVQ)

To measure biospheric values:

- It is important to this person to prevent environmental pollution.
- It is important to this person to protect the environment.
- It is important to this person to respect nature.
- It is important to this person to be in unity with nature.

To measure hedonic values:

- It is important to this person to have fun.
- It is important to this person to enjoy the life's pleasures.
- It is important to this person to do things he/she enjoys.

Appendix B

List of statements in the conservation-focused environmental education text

- Siberian tigers live in forests mostly untouched by humans. Out of all tiger species, their home has the most complete ecosystem
- In order to conserve the habitat of one tiger, approximately 10 000 hectares of forest have to be protected.
- Tigers contribute to the health of ecosystems by keeping herbivore populations under control
- After a century of decline, SIBERIAN tiger populations are stable or increasing in India, Nepal, Bhutan, Russia and China.
- This zoo donates to the International Union for Conservation of Nature tiger protection programme, which has increased tiger populations on project sites by 40%
- This zoo teaches visitors about the threats tigers face and how everyone can help
- This zoo's breeding program leads to higher birth rates, gene diversity, and cub survival

List of items in the entertainment-focused environmental education text

- Tigers have been around for a long time, about 2 million years.
- A tiger's roar can be heard about 3 kilometers away
- A tiger's urine smells like buttered popcorn
- Tigers can roar but not purr
- This zoo gives the opportunity to encounter tigers up to 10 meters close while remaining safe

- Every Wednesday, this zoo has Tiger training programs for the visitors to watch
- Twice a week, this zoo feeds the tigers by simulating a hunting act for zoo visitors to observe
- Next to the tiger exhibit, this zoo offers drinks for the visitors to enjoy while observing the tigers