Exploring the Impact of Cognitive Support on Biospheric Values: Promoting Pro-Environmental Behaviour Through Reflecting

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PSB3E-BT15: Bachelor Thesis

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January 15th, 2025

Abstract

Climate change and its adverse consequences present a need for innovative solutions to promote more environmentally-friendly behaviours. This study examined whether cognitive support for biospheric values may promote pro-environmental behaviour and whether climate anxiety moderated this relationship. The methodology from Maio and colleagues (2001) was replicated in order to test this. Participants were randomly assigned to either write down reasons for biospheric values (experimental condition) or rate their feelings towards biospheric values (control condition). The results indicated that providing cognitive support for biospheric values was not predictive of pro-environmental behaviour; climate anxiety also did not moderate this relationship. Validity and reliability issues may be accountable for these results. However, the results did indicate that the number of reasons an individual was able to articulate was positively and significantly associated with pro-environmental behaviour. Overall, despite the mixed findings, the results emphasize the potential of intensive cognitive support in promoting pro-value behaviour and stress the need for accurate and adequate measures in future research.

Keywords: biospheric values, cognitive support, pro-environmental behaviour, climate anxiety

Exploring the Impact of Cognitive Support on Biospheric Values: Promoting Pro-Environmental Behaviour Through Reflective Engagement

One of the most important challenges that faces us today is climate change. In the latest report from the Intergovernmental Panel on Climate Change (IPCC) (2023) it is highlighted that global greenhouse gas (GHG) emissions have increased over the past two centuries as a result of human activities, contributing to drastic environmental and societal consequences. These include not only the rise in extreme weather but also worldwide biodiversity losses and negative impacts on human populations, such as diminished agricultural productivity and displacement (IPCC, 2023). Despite the rise in right-wing reactionary politics and the perception that climate-friendly policies and initiatives lack public support, recent research suggests otherwise. Bouman and colleagues (2024) found that the public remains broadly willing to engage in pro-environmental behaviour and supports actions aimed at mitigating climate change. These findings underscore the importance of taking advantage of this willingness to act by implementing interventions and policies while public sentiment remains favorable.

Understanding the factors that motivate individuals to actually act on their environmental awareness is therefore crucial. In this context, exploring what values people find important might be insightful, as values are thought to be ‘guiding principles’ that assist people in decision-making (Schwartz, 1992). People may prioritize all sorts of things - some may seek achieving personal success or power, while others may instead value cooperation or social responsibility. Generally, these differences can be categorized into two orientations: self-enhancing and self-transcendent, respectively (Steg & De Groot, 2012). Within environmental psychology, the most relevant concept is related to the prosocial orientation: biospheric values. Biospheric values prioritize the quality of nature and the environment for their own sake, independent of any connection to human welfare (Steg & De Groot, 2012).

Research has demonstrated that biospheric values play an important role in promoting pro-environmental behaviour. For example, Collins and colleagues (2007) found that customers' beliefs about the importance of sustainable business performance are related to values with regards to the environment. Moreover, De Groot and Steg (2007) found that certain value orientations, such as the biospheric value, were associated with behaviour-specific beliefs such as preservation of the environment. Furthermore, Nguyen and colleagues (2016) found that biospheric values promote consumers' purchasing of energy efficient appliances. Thus, given that biospheric values influence behaviour it is essential to consider them to encourage people to behave pro-environmentally.

However, there can exist a disconnect between what a person values and their actual behaviour. This misalignment has been well-documented in various contexts, such as in instances of individual discriminatory or racist actions (Dovidio & Gaertner, 2004). These behaviours highlight a mismatch between a person's supposed values and their actual actions. Similarly, individuals that find protecting the environment important may, now and then, still indulge in ecologically irresponsible behaviour, such as taking a long shower after a tiring day.

Maio and Olson (1998) provide in their *values-as-truisms* hypothesis a potential explanation for discrepancies between values and actual behaviour. They explain that sometimes values function as truisms: values that are accepted as true without the need for evidence or further justification. Individuals hold these particular values in a superficial manner, implying that those values are rarely questioned or critically reflected upon. Without this process of cognitive support, individuals may lack a deeper understanding of why these values are important, leading to weaker connections between the values and their actions. This, in turn, may result in discrepancies between values and behaviour.

Research has demonstrated that explicitly reflecting on the reasons behind values strengthens alignment with corresponding behaviours. In their study, Maio and colleagues (2001) demonstrated that certain social values in fact function as truisms. Their experiment showed that participants who explicitly thought of the reasons underlying the values of helpfulness and equality demonstrated more helpful and egalitarian behaviours compared to the group where they had to simply rate how they feel about the values. Furthermore, Tapper and colleagues (2012) demonstrated that participants that were prompted to think of reasons for adopting a healthy lifestyle led them to report an increased frequency of exercise just one week later. Thus, these studies indicate that individuals that have thought explicitly of the reasons for a specific value enhances the likelihood that their behaviour will align with said value.

In this study we aim to examine whether these previous findings can be replicated with regards to biospheric values. **H1:** It is hypothesized that explicitly thinking of the reasons for supporting biospheric values will lead to greater pro-environmental behaviour compared to the group that simply rates how they feel about the values. Furthermore, drawing on the work from Maio and colleagues (2001), who found that individuals who provided more reasons for the value of helpfulness exhibited more helpful behaviour, we propose an additional hypothesis. **H2:** It is hypothesized that the more reasons an individual is able to give for endorsing biospheric values, the more pro-environmental behaviour they exhibit. We believe this occurs since thinking of multiple reasons enhances the cognitive engagement which in turn strengthens the connection between values and behaviour.

However, there are potential factors that may moderate the influence of cognitive support on pro-environmental behaviour. An interesting concept in the context of the personal psychological impact of climate change is *climate anxiety*. Climate anxiety, or eco-anxiety, is characterized as a persistent, constant fear of large-scale environmental destruction (Clayton

et al., 2017). This anxiety includes concerns about the well-being of future generations, threats to livelihoods, and frustration over the lack of action to tackle climate change (Soutar & Wand, 2022). Soutar and Wand (2022) further highlight that individuals experiencing climate anxiety report a range of symptoms, including feelings of helplessness and disempowerment. In some extreme cases, individuals report feelings of helplessness which can induce *eco-paralysis*. This phenomenon occurs when individuals fail to engage in pro-environmental behaviour even though they recognize the need to tackle climate change (Albrecht, 2011). Nevertheless, some studies suggest that moderate levels of climate anxiety can actually motivate individuals to engage in pro-environmental behaviour. For example, a survey by the American Psychological Association (APA, 2020) found that individuals experiencing climate anxiety were more than twice as likely to report being motivated to change their behaviour.

However, Clayton and Karazsia (2020) found no consistent positive or negative association between climate anxiety and behaviour, highlighting a potential gap between intentions and actions. This gap may be explained by the curvilinear relationship proposed by Becht and colleagues (2024), who suggest that while moderate levels of anxiety can drive action, very high levels of climate anxiety can have the opposite effect. High levels of climate anxiety may lead to feelings of helplessness and hopelessness (Becht et al., 2024). These individuals may feel that their efforts to bring about change are not meaningful or do not have an important impact. The cognitive support may not be sufficient to overcome this sense of hopelessness. Therefore, we expect that high levels of climate anxiety will diminish the effectiveness of cognitive support in promoting pro-environmental behaviour. **H3:** The higher the climate anxiety an individual experiences, the less impact cognitive support will have on pro-environmental behaviour.

Method

Participants

The sample comprised a total of 110 participants, including 35 men, 64 women, and 11 individuals who identified as "other" or preferred not to disclose their gender. Participants were recruited primarily through Whatsapp group chats and the canteen cafeteria of the Faculty of Behavioural and Social Sciences at the Rijksuniversiteit Groningen, including both undergraduate and graduate students. Additionally, students in various group chats were asked to participate, and participants were encouraged to further distribute the survey among their networks. Therefore, it is likely that the sample will consist of primarily students. Due to missing data, a total of 35 participants were assigned to the experimental condition, while 40 participants were assigned to the control condition through random assignment.

Procedure

The current study aims to replicate findings from the paper by Maio and colleagues (2001), closely following its methodological approach. All procedures were conducted through an online survey. In both the control and experimental condition participants were asked to fill out preliminary questionnaires about climate anxiety, locus of control, and agreeableness. This was followed by a filler task that lasted two minutes, whereby the participants highlighted all adjectives of a neutral reading passage.

Then, for the *experimental condition*, the participants were expected to write reasons for why they found certain values important or unimportant; participants had unlimited time to write down as many reasons as possible. The first value was about tradition (filler value). After completing this task, the participants could proceed to the next value. Now, participants had to generate as many reasons as they could for or against biospheric values (see Appendix A). When this task was completed the participant was shown a screen with the following words: “Finally, in collaboration with the university Green Office, we would like to bring

your attention to the following event". Participants were shown a poster for a litter-pick initiative and were asked if they were interested to participate. They could either choose to not participate or help volunteer for 10 minutes, 30 minutes, 1 hour or 2 hours. After indicating their preference, participants were asked questions about whether they liked or supported the idea of the litter-pick event. After this, the participants were debriefed.

In the *control condition*, participants were asked to rate their feelings about the two values instead of writing reasons. This occurred after completing the filler task (highlighting adjectives). The participants had to rate several statements on a 7-point semantic differential scale (-3 to +3). The scale used bipolar adjectives such as 'Happy - Sad' or 'Pleasant - Unpleasant' (see Appendix B). For each value, participants were given an unlimited amount of time to rate their feelings with regards to each value. The traditions rating was presented first, then the biospheric value. After the participants had rated their feelings, they were presented with the message about the Green Office. The subsequent steps mirrored those followed by the experimental group.

The study was submitted to the ethics board using the fast-track procedure and was therefore exempt from formal review. All relevant research documents, including the research plan, data management plan, participant information form, and consent form, were registered prior to the start of the study but were not formally reviewed. The principal investigator confirmed that the study met the guidelines for conducting a low-risk study and made sure that all procedures adhered to the relevant ethical codes.

Materials

Climate Change Anxiety Scale

The Climate Change Anxiety Scale (Clayton & Karazsia, 2020) assesses the emotional and functional impact of climate change anxiety. The scale includes items such as *"I have*

nightmares about climate change" rated on a 5-point Likert scale (1 = Never to 5 = Almost Always). In the current study, the scale showed high reliability, with a Cronbach's alpha of .83. The mean score was notably low with a score of 1.45 and the standard deviation was .44. The low score indicates that our sample did not experience high or moderate levels of climate anxiety.

Results

To analyze the data SPSS was used. The reasons that were listed by participants in the experimental condition were content analyzed by two independent raters. As in the paper by Maio and colleagues (2001), we coded statements by participants as (a) reasons supporting biospheric values, (b) reasons opposing biospheric values, or (c) nonreasons. The independent raters agreed on 94% of their codings. Any discrepancies were discussed and eventually the final count was decided on by consensus.

We performed an independent samples *t* test to examine whether the experimental and control condition affected the amount of time participants (N = 75) were willing to volunteer to go litter picking. It must be noted, however, that certain assumptions for the tests discussed were violated. The data did not consist of a simple random sample since participants performing the study were asked to identify other potential participants. Moreover, the dependent variable was positively skewed (*skewness* = .96, *SE* = .28) implying that the distribution violates the normality assumption. Levene's test showed that the assumption of equal variances was not violated, $F(1, 73) = 1.34$, $p = .25$

Interestingly, participants in the value-salient condition volunteered slightly more time ($M = 40.75$) compared to those in the control condition ($M = 30.00$). However, this difference was not statistically significant ($p = 0.18$). Additionally, the effect size for this difference, as measured by Cohen's d, was small ($d = 0.32$; Cohen, 1988), suggesting that the observed trend

may not reflect a meaningful effect. These findings are not in line with the results by Maio and colleagues (2001) who found that participants that thought explicitly of reasons volunteered more time than the control condition.

Moreover, in order to test our second hypothesis, the amount of concrete reasons for supporting biospheric values were summed (M = .89, SE = .86) for each of the participants in the experimental condition. Pearson correlation analysis showed a significant positive correlation between the number of reasons a participant gave and the total time they volunteered, $r(28) = .43$ $p = .023$. The assumption of linearity was tested using an F-test. There was no significant deviation from linearity, $F(2, 27) = 2.85$, $p = .078$.

Furthermore, a moderated regression analysis was conducted to examine the role of climate anxiety in moderating the effect of cognitive support on pro-environmental behaviour. The main effects model did not explain a significant proportion of variance in pro-environmental behaviour, $R^2 = .025$, $p = .41$. Specifically, climate anxiety was not a significant predictor ($\beta = 8.96$, $p = .992$), and cognitive support also did not significantly predict pro-environmental behaviour ($\beta = 8.045$, $p = .185$). When the interaction term was added to the model, there was still no significant improvement in the explained variance, $\Delta R^2 = 0.025$, with the change in F not reaching significance, $F_{change}(1, 71) = 1.92$, $p = .176$. The interaction term itself was not significant ($\beta = 18.49$, $p = .176$). These results suggest that climate anxiety does not affect pro-environmental behaviour directly and does not moderate the effect of cognitive support on pro-environmental behaviour .

Discussion

The focus of this study was to explore the role of biospheric values, related to environmental protection, in promoting pro-environmental behaviour. Building on the findings of Maio and colleagues (2001), who demonstrated that reflecting explicitly on the

reasons for a particular value increases the likelihood of pro-value behaviour, this study examined whether biospheric values function as truisms and whether having individuals think explicitly of reasons supporting biospheric values would encourage pro-environmental behaviour. In this study, pro-environmental behaviour was operationalized as volunteering for a litter-picking initiative.

The results indicated that, contrary to expectations, participants in the value-salient condition volunteered slightly more time for the litter-picking initiative compared to participants in the control condition; however, this difference was not statistically significant. Additionally, a significant positive association was found between the number of reasons participants generated for supporting biospheric values and the amount of time they volunteered. Furthermore, climate anxiety did not moderate the relationship between cognitive support and pro-environmental behaviour, as the interaction effect was not significant.

As previously noted, the first hypothesis is not supported by the results of our study. Specifically, individuals in the control condition, who were asked to simply rate their feelings towards biospheric values, exhibited a greater willingness to engage in pro-environmental behaviour compared to those in the experimental condition. No significant result was found, however. A potential explanation for this unexpected result may lie in the method used to solicit the dependent variable. Because the study used an online questionnaire, participants were asked virtually, rather than in person, to volunteer for the litter-picking initiative. This lack of personal interaction may have diminished the perceived immediacy of the request, reducing the extent to which the scenario felt realistic to participants. Consequently, participants may not have taken the request very seriously, possibly seeing it as something hypothetical instead of a real opportunity to volunteer. This may have led to the dependent variable being more reflective of an intention than actual behaviour.

The second hypothesis was supported by the results of our study. Specifically, the number of reasons an individual was able to generate and articulate was significantly and positively associated with the amount of time they volunteered. This finding is consistent with the work of Maio and colleagues (2001), who identified a similar relationship. By explicitly reflecting on reasons for supporting biospheric values, participants had developed a more clear understanding of why they should engage in pro-environmental behaviours. This, in turn, may have led to a greater inclination to act in a manner which is consistent with the reasons they had just generated. A potential explanation for this outcome is that individuals may experience cognitive dissonance when they do not volunteer time to go litter-picking after having considered the reasons for behaving pro-environmentally. Another explanation aligns with the behavioural reasoning theory (BRT), which suggests that when individuals are able to generate multiple reasons to support their attitudes or behaviours, the alignment between their values and actual behaviour is strengthened (Sahu et al., 2020). Ultimately, these results suggest that the greater the intensity of an individual's reasoning for a particular value, the more likely they are to act in accordance with that value.

The third hypothesis was not supported by the findings. Climate anxiety did not seem to be significantly associated with pro-environmental behaviour. Furthermore, the interaction term, for which we expected that climate anxiety would diminish the positive effect of cognitive support on pro-environmental behaviour, was not significant. One potential explanation for this result lies in the notably low levels of climate anxiety reported by participants in our sample. We believe that people experiencing these low levels of climate anxiety may not feel a sense of urgency to engage in behaviours that tackle climate change. This is not necessarily the case for moderate or higher levels of climate anxiety. For example, Coates and colleagues (2024) did find that moderate levels of climate anxiety were optimal for behaving pro-environmentally. It is therefore possible that low variability of climate

anxiety levels in our sample may have limited the ability to detect the hypothesized effects. These insights may be valuable for future research as it helps to understand under what conditions climate anxiety is most predictive of pro-environmental behaviour.

The findings of this study carry some important theoretical implications. The first hypothesis was not supported as no significant difference was found between the effects of the reason salient condition and the control condition on time volunteered to go litter-picking. Our results were not in line with the values-as-truisms theory (Maio et al., 2001). Rather, we believe the findings of our study reflect a larger issue within psychological research, namely the intention-behaviour gap (Sheeran & Webb, 2016). As the online survey created interpersonal distance between the experimenter and participant, this may have weakened the ecological validity. A key theoretical takeaway is, when testing these theories, to consider situational characteristics, such as the unrealistic scenario in which participants were asked to sign up for volunteering.

Furthermore, the results did highlight that participants who were able to articulate more reasons to behave pro-environmentally did offer significantly more time to volunteer than participants who articulated less reasons. The findings lend support to the idea that cognitive elaboration is useful in implementing behavioural change (Barone & Hutchings, 1993). Furthermore, the values-as-truisms hypothesis posited by Maio and Olson (1998) is further supported. Moreover, it lends further support to behavioural reasoning theory which posits that people who are able to articulate reasons for their opinion will be more likely to act in line with that opinion (Sahu et al., 2020).

The practical implications are of interest as well. The insights mentioned above offer valuable insight into the potential of intensive explicit reasoning (i.e. generating many reasons) to ensure individuals behave in a certain way. This cognitive elaboration process could be integrated into public awareness campaigns, for example, by making individuals

actively consider the importance of environmental protection and how their actions contribute to it. This approach has been proven successful and is recognized as an important component in psychological therapy where it is used to change maladaptive behaviours (Barone & Hutchings, 1993). By implementing this approach in the environmental domain it may be possible to encourage behavioural change, which is essential for addressing the challenges posed by climate change.

It is important to note that the sample may not be representative of the general population and is disproportionately composed of individuals with higher levels of education. Most of the participants were recruited from university canteens and through group chats involving mostly university students. Since higher education has been associated with greater environmental concern and pro-environmental behaviour (Meyer, 2015), this may have biased the data, limiting the external validity of the study.

Furthermore, feedback from some participants revealed that they found the survey to be fatiguing. This sentiment was confirmed by data from Qualtrics, which revealed that a large number of participants who had to write reasons either skipped the questions or spent significantly less time on the task than was instructed. These observations suggest that some participants may not have engaged actively. As a result, it is reasonable to question the reliability of the data, given that a part of the sample may not have engaged in the intended cognitive elaboration. This also raises concerns about the validity of the findings.

Future research should prioritize obtaining direct measures of pro-environmental behaviour to address the limitations posed by the use of an online survey in our study. The online format raises questions about whether actual behaviour was adequately measured. Conducting studies in an in-person setting may enhance participant engagement and provide a more reliable assessment of behaviour. Replicating procedures similar to those outlined by Maio and colleagues (2001) in a controlled, face-to-face environment could offer more

reliable findings that would help clarify the relationship between cognitive support for values and subsequent behaviour.

In summary, the findings showed that cognitive support for biospheric values were not predictive of pro-environmental behaviour compared to only making the values salient. However, the results partially align with Maio and colleagues (2001), as individuals who were able to generate more reasons supporting biospheric values were more likely to act in line with those reasons. Climate anxiety did not moderate the relationship between cognitive support and pro-environmental behaviour, which may be due to the relatively low scores on the climate anxiety scale. Given the limitations of the current study, particularly regarding the validity and reliability of the data, future research should collect more robust data and investigate the long-term effects of cognitive support of biospheric values on behaviours. Considering that climate change is here to stay, exploring questions about the alignment between values and behaviour still remains an essential research direction.

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Appendix A

Writing reasons paper sheet (experimental condition)

"Please use the textbox below to explain why you consider preventing environmental pollution, protecting the environment, respecting nature, and being in unity with nature either important or unimportant as guiding principles in your life. Be as detailed and specific as possible and provide as many reasons as you can."

Appendix B

Value salient condition

Affective rating scale (biospheric values)

"Please read the following statements/words. Rate how you feel towards the statements along three different scales: Unpleasant - Pleasant; Bad - Good, Negative - Positive"

1. Devotion
2. Modesty
3. Preventing Environmental pollution
4. Protecting the environment
5. Respecting nature
6. Being in unity with nature