# Do Students Contribute to a More Sustainable World? A Cross-Sectional Study on the Influence of Climate Anxiety and Climate Concern on Pro-Environmental Behaviour.

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**Abstract**

A rising number of people are feeling distressed because of the climate crisis. This study investigated whether the emotions climate anxiety and climate concern mediated the relationship of the variables information-seeking, generalised anxiety, nature relatedness, mindfulness, and self-efficacy on pro-environmental behaviour (PEB). A digitalised, standardised, cross-sectional research design was used. In total 114 participants took part in the study of which 84 participants were included in the analysis. Information seeking, generalised anxiety and nature relatedness were found to positively predict both climate anxiety and climate concern. Climate anxiety, climate concern, information seeking and nature relatedness positively predicted PEB. The mediation analysis revealed that on the one hand, climate anxiety was a significant mediator of the relationship between nature relatedness and generalised anxiety with PEB and on the other hand, climate concern was a significant mediator of the relationship between information seeking, nature relatedness and generalised anxiety with PEB. Hence this study showed that both climate anxiety and climate concern are constructive emotions that are behaviour-facilitating. Future interventions aimed at increasing PEB should focus on nature relatedness, information seeking, and generalised anxiety and the mediating role of emotions related to climate change.

**Keywords:** Information Seeking; Generalised Anxiety; Nature Relatedness; Mindfulness; Self-Efficacy; Climate Anxiety; Climate Concern; Pro-Environmental Behaviour

## Introduction

Anthropogenic climate change is a major threat to the well-being and survival of human society (Cunsolo et al., 2020; Watts et al., 2019; Whitmarsh et al., 2022). The reports by the International Panel on Climate Change (IPCC) illustrate the catastrophic consequences if no radical measures are taken (Masson-Delmotte et al., 2018; Pörtner et al., 2019; Shukla et al., 2019). Individual behaviours enacted on a global scale such as eating meat, flying, or using plastic bags play a significant role in the progress of the climate crisis (Grilli & Curtis, 2021; Ivanova et al., 2015; Molonexny et al., 2010; Persson et al., 2021). The Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC, 2015) further add to this by stating that behaviour changes of individuals play an imperative role in detaining a climate catastrophe. In addition, there has also been a significant increase in the number of individuals experiencing anxiety and concern because of climate change, influencing their ability to engage in pro-environmental behaviours (Helferich et al., 2019; Ogunbode et al., 2022; Ojala et al., 2021).

In the past, both international climate policy and empirical research have often neglected and underestimated the power of individual behaviours. Instead, a strong focus has been put on institutional actors like the government or the industry (Clayton et al., 2015; Dubois et al., 2019). In line with this, empirical literature deems the current behavioural changes of citizens, in response to the growing climate crisis as insufficient and are calling for further research to find ways to increase citizen involvement (Hegger et al., 2017; Kapeller et al., 2021; Klein et al., 2018; Van Kasteren, 2014; Wamsler, 2016). Therefore, one of the focuses of this study is the pro-environmental behaviour (PEB) of individuals, which is defined as any behaviour aiming to prolong environmental sustainability and limit the precarious impact of climate change (Lee & Khan, 2020).

More and more evidence has shown that whether individuals engage in PEB may depend on their climate anxiety or climate concern (Helferich et al., 2019; Mouguiama-Daouda et al., 2022; Ogunbode et al., 2022). Currently, empirical literature does not clearly distinguish between the two emotions and uses the terms interchangeably (Clayton & Karazsia, 2020). This is heavily criticised by researchers such as Clayton and Karazsia (2020), Verplanken et al. (2020) and Whitmarsh et al. (2022). They stress that climate anxiety and climate concern are two different emotions that can have converse effects on an individual's well-being and engagement in PEB. They argue that most studies on climate anxiety actually measure climate concern (Clayton & Karazsia, 2020; Pihkala, 2020; Whitmarsh et al., 2022). According to them, climate anxiety refers to the extreme form of worry about the climate crisis that

negatively affects an individual's well-being and ability to function normally, paralysing their ability to engage in PEB (Clayton & Karazsia, 2020; Verplanken et al., 2020; Verplanken & Roy, 2013; Pihkala, 2020). Climate concern, on the other hand, is a milder form of worry about the climate crisis that does not endanger the well-being of an individual and motivates them to take action (Verplanken et al., 2020). Consequently, in this study, climate anxiety is defined as excessive worry about the climate crisis that is maladaptive and behaviour-inhibiting (Clayton & Karazsia, 2020). Climate concern is defined as rational and constructive worry alerting the individual to the potentially catastrophic consequences of the climate crisis, motivating them to engage in PEB (Mansoor & Wijaksana, 2022).

Furthermore, survey results show that younger people suffer from more climate anxiety and climate concern than older people (Hickman et al., 2021; Searle & Gow, 2010; Triodos Bank, 2019; Washington Post, 2019; Whitmarsh et al., 2022). For example, in the global survey conducted by Hickman et al. (2021) on the climate anxiety of children and young adults, 45 per cent of participants worldwide indicated that their climate anxiety was so high that it impacted their ability to function normally. Further, the American Psychological Association (2018) survey has also found that young adults were more concerned about climate change than older adults. The dire prognoses for the climate crisis that are illustrated in reports such as the recent UN environmental program report (2022) have led more and more young people to demand action and openly voice their anxieties and concerns about the climate crisis. This is done through means like the Fridays for Future protests or the demonstration against government policies like the expansion of the coal mine in Lüzerath, Germany (Alle Dörfer Bleiben, 2023; Fridays for Future, 2023). Nevertheless, even though younger people are much more affected by the climate crisis and are also the ones who will have to live with the consequences, past research on climate anxiety and PEB has overwhelmingly focused on participants of all ages and has rarely specifically targeted young people. Thus, this study will focus on the climate anxiety and climate concern of university students.

Moreover, as climate anxiety and climate concern play an important role in influencing the PEB of students, it is important to know which factors predict the two emotions. In general, empirical research on the predictors of climate anxiety is limited. The only existing study that has explored the predictors of climate anxiety as defined in this study is the study conducted by Whitmarsh et al. (2022). They investigated the prevalence and most important predictors of climate anxiety amongst adults in the UK. In their study, the strongest predictors were climate concern, generalised anxiety, mindfulness, nature relatedness, and information seeking.

This study aims to address this gap, by examining the predictors of climate anxiety as identified by Whitmarsh et al. (2022); information seeking, generalised anxiety, nature relatedness and mindfulness. The present study will extend the model of Whitmarsh et al. (2022) by also investigating the additional predictor self-efficacy, as self-efficacy has been deemed as one of the most important determinants of behaviour change (Lauren et al., 2016). Besides climate anxiety, this study will also include climate concern. Moreover, this research intends to differentiate and compare climate anxiety and climate concern as mediators to determine if they share the same predictors and to examine their impact on PEB. The focus of this study is to ascertain if the predictors and mediators identified in previous studies using older populations, can be observed in a sample of young adults as well. Consequently, the following research question will be addressed: "Do climate anxiety and climate concern individually contribute to explaining pro-environmental behaviour and what are their determinants?"

## Theoretical Framework

### *Climate Anxiety and Climate Concern*

Emotions play a vital role in shaping behaviour (Ogunbode et al., 2022). Thus, whether individuals engage in PEB may depend on their level of climate anxiety or climate concern. As most of the empirical research has operationalised climate anxiety differently, results are hard to generalise. Studies that measured mild forms of climate anxiety found climate anxiety to predict a higher frequency of PEB (Hoff et al., 2021; Mouguiama-Daouda et al., 2022; Ogunbode et al., 2022; Whitmarsh et al., 2022; Wullemkord et al., 2021). Studies that used a different measure, that also focuses on pathological climate anxiety and is more in line with the definition of the present study, have found that individuals with climate anxiety were paralysed in their behaviour, deeming climate anxiety as unconstructive and behaviour-inhibiting (Clayton & Karazsia, 2020; Verplanken et al., 2020; Verplanken & Roy, 2013; Pihkala, 2020; Whitmarsh et al., 2022). As research has also repeatedly shown that young adults experience higher levels of climate anxiety than the general population (Hickman et al., 2021; Searle & Gow, 2010; Triodos Bank, 2019; Washington Post, 2019; Whitmarsh et al., 2022), it is to be expected, that pathological forms of climate anxiety with a behaviour-inhibiting effect will exist in the present study's sample of university students as well. Consequently, this study aims to expand knowledge on climate anxiety in young adults.

Further, this study will also focus on climate concern. In current empirical research, climate concern is seen as a constructive form of worry and an important determinant of PEB,

having been repeatedly connected to increased PEB (Mansoor & Wijaksana, 2022; Rhead et al., 2015; Whitmarsh et al., 2022; Wu et al., 2019; Yue et al., 2020). Studies with diverging findings are over 20 years old and may thus be outdated (e.g., Blake, 1999; Finger, 1994; Gifford, 2011; Kollmuss & Agyeman, 2002). Climate concern has a prevalent role in the current society. For example, the majority of the global population considered environmental protection as crucial in the World Values Survey in 2016 (Milfont & Schultz, 2016; Rodríguez-Casallas et al., 2020). Therefore, this study investigates whether the climate concern of students can predict their PEB.

***Predictors of Climate Anxiety, Climate Concern and PEB***

Based on past empirical research, this study will investigate the antecedents of climate anxiety, climate concern and PEB; information seeking, generalised anxiety, nature relatedness, mindfulness, and self-efficacy. In this study, information seeking refers to the purposeful act of searching for, obtaining, evaluating, and using the information to fulfil a particular need or objective related to climate change knowledge (Wilson, 2000). Past empirical research suggests that information seeking is an important predictor of climate anxiety, climate concern and PEB. Whitmarsh et al. (2022) is the first study to explore the relationship between information-seeking and climate anxiety. In their study, information seeking was the strongest predictor of climate anxiety, suggesting that it may play a crucial role in determining climate anxiety. Further, prior research has also indicated a positive correlation between information seeking and generalised anxiety (e.g. Cunsolo et al., 2020 or Hmielowski et al., 2019). Moreover, several studies found that participants who actively sought information about climate change also had higher levels of climate concern (Gatersleben et al., 2014; Hornsey et al., 2016; Kellstedt et al., 2008; O'Neill & Nicholson-Cole, 2009; Stedman, 2002). The relationship between information seeking and PEB has been explored by Huang (2016), Pegan et al. (2023) and Whitmarsh et al. (2022) who have found information seeking to be an important predictor of PEB. However, these studies focused on a broad population and not young people. Thus, the present study will further explore the relationship between information seeking and climate anxiety and climate concern of young people, as it is very likely that these effects also play a role for them. In the present study, information seeking will be expected to be positively associated with climate anxiety, climate concern and PEB.

The second antecedent is generalised anxiety. Generalised anxiety is characterised as the excessive and persistent worry about various occasions, activities or topics that significantly impact the individual's relationships and ability to function (Borza, 2022).

Empirical research shows that a high number of university students suffer from high levels of generalised anxiety (Cao et al., 2020; Sallam et al., 2020; Savitsky et al., 2020; Solomou & Constantinidou, 2020; Zhang et al., 2020). For example, 15 per cent of students attending a Swiss university and 65 per cent attending a Polish university suffered from generalised anxiety (Amendola et al. 2020; Rogowska et al., 2020). Hence, it is important to investigate the relationship of generalised anxiety with climate anxiety, climate concern and PEB. Several past studies have found a significant association between generalised anxiety and climate anxiety (Clayton & Karazsia, 2020; Stanley et al., 2021; Whitmarsh et al., 2022; Wullenkord et al., 2021). Studies about the relationship between generalised anxiety and climate anxiety among students have also found a positive association (Reyes et al., 2021; Schwartz et al., 2022). However, research about generalised anxiety and climate concern is sparse. The study conducted by Searle and Gow (2010) focusing on all ages, found a positive association between generalised anxiety and climate concern. Similarly, Sciberras & Fernando (2021) also found a positive correlation between generalised anxiety and the climate concern of university students. Thus, generalised anxiety has been proven to predict increased climate anxiety and climate concern. Further, generalised anxiety has also been connected to functional impairment (Spitzer et al., 2006) and behavioural inhibition, suggesting that generalised anxiety may also inhibit PEB (Muris et al., 2001; Svihra & Katzman, 2004; Zeytinoglu et al., 2021). In line with this, multiple studies have found a negative correlation between climate anxiety and PEB (see above), further suggesting that generalised anxiety may have the same effect as climate anxiety. However, the study conducted by Whitmarsh et al. (2022) is the only study that has investigated the relationship between generalised anxiety and PEB and did not find a significant correlation. Nevertheless, as their study did not focus on young adults, it is still important to conduct further research on the relationship between generalised anxiety and PEB in young adults as well as it is to be expected that these effects play a role for young adults. Thus, this study aims to expand the knowledge of the relationship between generalised anxiety and climate anxiety, climate concern, and PEB. To conclude, generalised anxiety is expected to predict climate anxiety and climate concern positively and negatively predict PEB.

The third antecedent is nature relatedness. Nature relatedness is an individual's subjective perception of their connection to nature (Nisbet et al., 2009). The studies that have investigated the connection between nature relatedness and climate anxiety have found nature relatedness and climate anxiety to be positively related (Clayton & Karazsia, 2020; Capstick et al., 2015; Clayton et al., 2021; Whitmarsh et al., 2022). Further, studies have also found nature relatedness to predict increased levels of climate concern (Curll et al., 2022; Dutcher et al.,

2007; Helm et al., 2018; Martin & Czellar, 2017; Mayer & Frantz, 2004; Nisbet et al., 2009). However, one must note that none of the studies focused specifically on young adults, but it is to be expected that these effects also play an important role for them. Further, past research has also overwhelmingly found a positive association between nature relatedness and PEB (Mackay & Schmitt, 2019; Martin et al., 2020; Whitburn et al., 2019; Whitmarsh et al., 2022). Positive associations were additionally found between university students' nature connectedness and PEB (Ibáñez-Rueda et al., 2020; Nisbet et al., 2009; Rosa et al., 2020). Thus, in the present study, nature relatedness is expected to have a positive relationship with climate concern, climate anxiety and PEB.

Mindfulness is the fourth antecedent and is the cognitive process characterised by an enhanced focus and awareness of the current moment in a non-judgemental and accepting manner. In Western academics, mindfulness is typically studied independently from its Buddhist origins and spirituality (Asthana, 2022). The empirical literature suggests that having a high level of mindfulness may aid individuals in coping with the uncertainty surrounding climate change (Carpenter et al., 2019). However, the connection between mindfulness and climate anxiety has only been researched in the study conducted by Whitmarsh et al. (2022), who found that mindfulness negatively predicted climate anxiety. This finding is in line with past research, that has consistently shown that mindfulness was associated with decreased symptoms of anxiety (e.g. Hofmann et al., 2010; Roemer et al., 2014; Van Dam et al., 2014). Further, the relationship between mindfulness and climate concern has also only been examined by the study conducted by Asthana (2022) who found a positive association. Further, the relationship between mindfulness and PEB has been explored numerous times in empirical research. The overwhelming majority of studies have found a positive association (Amel et al., 2009; Barbaro & Pickett, 2016; Barber & Deale, 2014; Colombo et al., 2023; Kumar et al., 2021 Patel & Holm, 2018). Although it is important to mention that none of them focused on young adults specifically. However, very likely, these effects also play a role for young people as well. This leads to the conclusion that mindfulness can be expected to predict lower climate anxiety levels and higher climate concern and PEB.

The last antecedent is self-efficacy which can be defined as people’s belief that they themselves have the strength and capability to take climate change mitigating actions (Jugert et al., 2016). Empirical research about the relationship between self-efficacy and climate anxiety or climate concern is sparse. The study conducted by Innocenti et al. (2023) is the only study that has focused on the association between climate anxiety and self-efficacy. In their study, self-efficacy and climate anxiety were negatively correlated. Further, past studies have

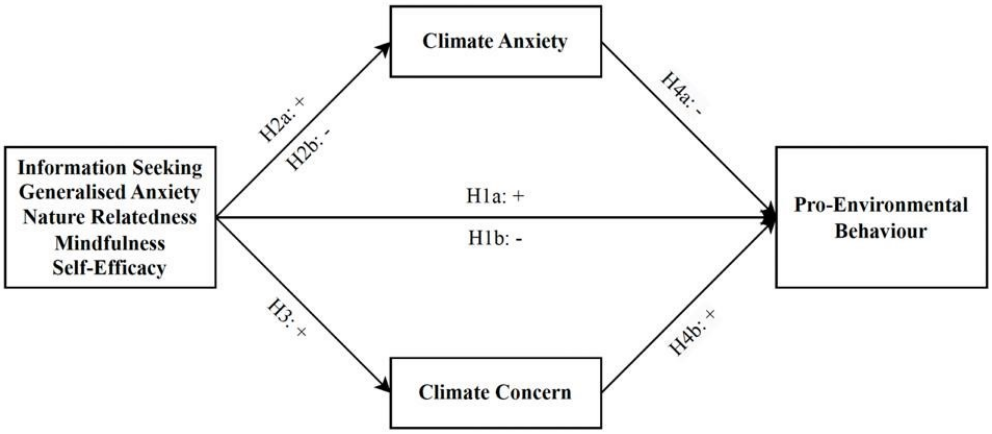
shown that participants with low self-efficacy also had higher levels of generalised anxiety (Bandura, 1982; Muris, 2002; Sawitri et al., 2015; Tahmassian & Moghadam, 2011). This suggests that individuals with low self-efficacy may additionally suffer from higher climate anxiety. The study conducted by Kerpelman & Mosher (2004) is the only study that researched the relationship between self-efficacy and climate concern. They found self-efficacy to have the opposite effect; participants with high self-efficacy levels also had higher climate concern levels. This could be because individuals with high self-efficacy may have felt more responsible for the climate crisis, making them more concerned (Kerpelman & Mosher, 2004). It is important to mention, however, that the study by Kerpelman & Mosher (2004) focused on general self-efficacy and not specifically self-efficacy about climate change as the present study does. Further, Bandura (1999) deemed self-efficacy to be one of the key factors influencing intention, which further influences behaviour. The empirical literature is in line with this and has consistently found self-efficacy to predict PEB (Huang, 2016; Lee et al., 2014; Loy et al., 2020; Vicente-Molina et al., 2013). To conclude, only a few studies have focused on the relationship between self-efficacy and climate anxiety and climate concern and none of them focused specifically on young adults. However, their results still suggest that very likely, these effects also play a role for young people. Consequently, it is important to further investigate the possible opposite effect of self-efficacy on the climate anxiety and climate concern of students. To summarise, it is predicted that self-efficacy will have a positive effect on climate concern and PEB and a negative effect on climate anxiety.

## The Present Study

This study examines the mediating effect of climate anxiety and climate concern and investigates whether information seeking, generalised anxiety, nature relatedness, mindfulness and self-efficacy are predictors of climate anxiety and climate concern and in turn of PEB in young adults. This leads to the conceptual framework visualised in Figure 1.

**Figure 1**

*Conceptual Framework*




## Hypotheses

Based on prior research the hypotheses are as follows:

- H1a Information seeking, nature relatedness, mindfulness and self-efficacy positively predict PEB
- H1b Generalised anxiety negatively predicts PEB
- H2a Information seeking, generalised anxiety and nature relatedness positively predict climate anxiety
- H2b Mindfulness and self-efficacy negatively predict climate anxiety
- H3 Information seeking, generalised anxiety, mindfulness and nature relatedness and self-efficacy positively predict climate concern
- H4a Climate anxiety negatively affects PEB
- H4b Climate concern positively affects PEB
- H5a Climate anxiety mediates the effect of information seeking, generalised anxiety, nature relatedness, mindfulness, and self-efficacy on PEB
- H5b Climate concern mediates the effect of information seeking, generalised anxiety, nature relatedness, mindfulness, and self-efficacy on PEB

# Methods

## Study Design

A digitalised, standardised, and cross-sectional study design was chosen to answer the quantitative research questions. This design was selected due to its ability to efficiently collect data while simultaneously assessing and analysing multiple variables. A questionnaire was developed measuring the variables climate anxiety, climate concern, information seeking, generalised anxiety, nature relatedness and mindfulness as well as other variables that were used for parallel research at the university but were excluded from this study.

## Participants

The sample of this study consisted of students at the University of Twente. Participants were recruited in three different ways: through the Sona system, a test subject pool from the University of Twente, convenience sampling which involved asking people from the researcher's social environment to participate through social media and by going to the university campus to distribute the questionnaire. Participation in the study was voluntary, and participants were not compensated. Students who participated through Sona Systems received 0.25 credits. The inclusion criteria were that participants must be enrolled at the University of Twente, agreed to informed consent and were able to access the Internet. In total 114 participants took part, of which 31 were excluded from the analysis. Of the excluded participants, six were excluded because they were not students at the University of Twente, one participant answered the questions unserious (gave an unrealistic answer of being 98 years old), five were excluded because they did not believe in anthropogenic climate change or where unsure whether they believed in it and a further 18 were removed because they did not finish the survey. The climate change deniers were filtered out as their climate concern and anxiety most likely had a different cause than those of the other participants and this could have led to a possible bias in results (Stanley et al., 2021). For example, climate change deniers might have been concerned that climate change received a lot of attention in society even though it doesn't exist, compared to climate change believers who might have been anxious about the lack of action (Stanley et al., 2021). The resulting subject pool consisted of 84 participants with a mean age of 22.74. This study did not check for gender differences, as there were too few male participants to be able to run two separate analyses with female and male participants to find out whether differences might have existed.

**Table 1**

*Sociodemographic Characteristics of Participants*

| Baseline characteristic | | n | % |
|---|---|---|---|
| Gender | Female | 59 | 70.24 |
| | Male | 23 | 27.38 |
| | Non-binary/third gender | 1 | .01 |
| Baseline characteristic | | n | % |
| | Prefer not to say | 1 | .01 |
| Nationality | German | 52 | 60.71 |
| | Dutch | 14 | 16.67 |
| | European | 13 | 16.67 |
| | Non-European | 5 | 5.95 |
| Age | 18-19 | 11 | 13.10 |
| | 20-21 | 18 | 21.43 |
| | 22-23 | 30 | 35.71 |
| | 24-25 | 15 | 17.86 |
| | >25 | 10 | 11.90 |
| Study Field | Engineering technology | 6 | 7.14 |
| | Electrical Engineering, Mathematics and Computer Science | 6 | 7.14 |
| | Science and Technology | 5 | 5.95 |
| | Geo-Information Science and Earth Observation | 1 | 1.19 |
| | Behavioural, Management & Social Sciences (BMS) | 66 | 78.57 |
| BMS Programme | Communication Science | 16 | 19.05 |
| | Industrial Engineering and Management | - | - |
| | International Business Administration | 2 | 2.38 |
| | Management, Society & Technology | 2 | 2.38 |
| | Psychology | 46 | 54.76 |
| | Not BMS | 18 | 21.43 |
| Educational Degree | Undergraduate (Bachelor) | 65 | 77.38 |
| | Master's Degree | 15 | 17.86 |
| | PhD | 2 | 2.38 |
| | Currently not pursuing a degree | 2 | 2.38 |

## Measures

### *Climate Change Deniers*

Climate change deniers were filtered out using the two items "I believe that climate change is real" and "human activities are a major cause of climate change" adapted from Van Valkengoed et al.'s (2021) Climate Change Perception Scale (see Appendix A).

### *Pro-Environmental Behaviour*

The variable PEB was measured with eight items adapted from Ogunbode et al. (2022) e.g. "cycle or walk instead of driving" and six self-developed items about students' engagement in climate change organisations and demonstrations e.g. "take part in a protest related to protecting the environment" (see Appendix A). The internal relatability of the scale was good ($\alpha = .88$).

### *Climate Anxiety*

The extent of participants' climate anxiety was assessed using Clayton & Karazsia's (2020) Climate Change Anxiety Scale (CCAS) consisting of 13 items. The first eight factors of the CCAS measured the participant's cognitive-emotional impairment, like "I find myself crying because of climate change" and the last five items the functional impairment, like "my friends say I think about climate change too much" (see Appendix A). The reliability of this scale was excellent ($\alpha = .93$).

### *Climate Concern*

Participants' level of climate concern was measured with the Climate Change Worry Scale from Stewart (2021) consisting of seven items. Participants were asked to rate their worry about climate change and its potential impact on the future and the people they care about, e.g. "I worry about how climate change may affect the people I care about". The item "I tend to seek out information about climate change in the media (e.g. TV, newspapers, Internet)" was removed as this question was too similar to the question that measured the variable information seeking (see Appendix A). The scale had good internal reliability ($\alpha = .89$).

### *Information Seeking*

The variable information seeking was measured with Whitmarsh et al.'s (2022) item: "How often, in a typical week, do you intentionally seek out information about climate change?" (see Appendix A).

### *Generalised Anxiety*

The variable generalised anxiety was assessed with the seven items of the GAD-7 developed by Spitzer et al., 2006 (see Appendix A). The GAD-7 consists of seven statements

about the participant's perceived symptoms of generalised anxiety like "worrying too much about different things". A factor analysis on the items of the scale revealed that the scale was not a valid measurement, as the explained variance was only .48. To improve the validity of the scale, item 6 ("becoming easily annoyed or irritable") was removed as it showed a high level of uniqueness (.80) suggesting that it might not be strongly related to the other items in the factor. After running the analysis again without item 6, the explained variance increased to 53 per cent, making the scale a valid measurement. Further, the scale also possessed good reliability (α = .86). To get more insight into what caused the anxiety of the participants and to what extent climate change is mentioned without being prompted, the additional open question: "If you indicated to feel to some extent anxious in the question above, can you say in a few words what makes you most anxious?" was added (see Appendix A).

***Nature Relatedness***

Participants' level of nature relatedness was measured with the NR-6 from Nisbet & Zelensky (2013). The scale consists of six statements like "I take notice of wildlife wherever I am" that assess participants' connection and appreciation of nature (see Appendix A). Before publishing the survey, the Likert scale of this questionnaire was changed from "Never" to "Always", into "Strongly Agree" to "Strongly Disagree" because a test participant gave feedback that this would make the questions easier to answer. The reliability of this scale was good (α = .84).

***Mindfulness***

The variable mindfulness was measured using Medvedev et al.'s (2018) adapted scale FFMQ-18 (see Appendix A). The scale comprised 18 items that measured the five different dimensions of mindfulness (observing, acting with awareness, nonjudging, describing and nonreactivity). Observing (e.g. "I notice the smells and aromas of things") was measured with items 1-3, acting with awareness (e.g. "I rush through activities without being really attentive to them") with items 4-6, nonjudge with items 7-9 (e.g. "I make judgments about whether my thoughts are good or bad"), describe with items 10-14 (e.g. "I'm good at finding words to describe my feelings") and nonreact with items 15-18 (e.g. "I watch my feelings without getting carried away by them"). The scale had good reliability (α = .81).

***Self-Efficacy***

The variable self-efficacy was assessed with the scale from Van Zomeren et al. (2010). The scale consists of five items about the participant's perceived ability to reduce the negative

consequences of the climate change crisis like "I can change my daily routines to combat the climate crisis" (see Appendix A). The reliability of this scale was excellent (α = .91).

**Procedure**

This study was approved by the University of Twente BMS Ethics Committee (request number: 230292, date: 30.03.2023). The data collection took part from the 28th of March 2023 until the 23rd of April 2023. The data was collected with the online survey tool Qualtrics. Participants were asked to indicate their answers on a 5-point Likert scale that ranged from "Never" to "Always" or "Strongly Disagree" to "Strongly Agree" (see Appendix A). After receiving a link or QR code to the questionnaire, participants had to agree or disagree with informed consent (see Appendix B). Then, the characteristics of participants were asked (gender identity, age, nationality, study field and educational degree they were pursuing). After that, participants answered the items of the constructs not involving climate change, generalised anxiety, mindfulness, and nature-relatedness. These constructs were asked first to avoid possible bias e.g. asking participants about their feelings about climate change at the beginning might increase their generalised anxiety which could lead to different results (Stanley et al., 2021). Next, two questions aimed at filtering out participants who did not believe in anthropogenic climate change were asked (see Appendix A). This was followed by the items measuring the constructs involving climate change; climate anxiety, climate concern, information seeking and self-efficacy (Appendix A). The questionnaire ended with a page thanking participants and providing contact information of the two researchers, the ethics committee, climate activist groups and information about whom they could contact if the survey triggered them in any way (Appendix C).

## Results

**Assumptions**

Before proceeding with the analysis, the data were tested for violations of the four parametric assumptions (linearity, normality, equality of variances and multicollinearity). Firstly, the assumption of linearity was tested by plotting residuals against predicted values for each dependent and independent variable. All values were linear (see Appendix E). Secondly, a Shapiro-Wilk test was performed to assess the assumption of normality. The outcome showed that mindfulness ($W = .97$, $p = .091$), generalised anxiety ($W = .98$, $p = .188$) and PEB ($W = .98$, $p = 0.297$) were normally distributed ($p > .05$). Secondly, the assumption of normality was tested by plotting histograms (see Appendix F) and calculating the skewness and kurtosis values. Brown (2015), states that skewness values between -3 and 3 and kurtosis values

between -10 and 10 meet the assumption of normality. Thus, skewness values (-0.67 to 1.50) and kurtosis values (2.51 to 3.27) were within the acceptable range. However, the variables climate anxiety was right-skewed and leptokurtic, information seeking was right-skewed, climate concern was left-skewed and leptokurtic and self-efficacy was left-skewed. To increase validity, these variables were log-transformed for a more normal distribution closer to the normal distributions of the other variables. As observed in Table 2, the log transformation improved the normality for all variables. The histograms were also closer to a normal distribution (see Appendix G). Thirdly, the Flinger Filleen test was chosen to test for the assumption of homoscedasticity as the data was normally distributed. The assumption of homoscedasticity was met by all variables ($p > .05$). Lastly, the assumption of no multicollinearity was tested with a VIF test. The cut-off value of VIF was set to 5 (Vittinghoff et al., 2006). All values were below 5 ($VIF \leq 1.35$) so the assumption of no multicollinearity was met. Thus, all assumptions were met, which led to the decision to conduct the analyses with parametric tests. Additionally, the analyses were run with the untransformed data to see how much the log transformation changed the results. The same significant results were found with the untransformed data, with only very minor differences (see Appendix D).

**Table 2**

*Descriptive Statistics of Skewness and Kurtosis Values Before and After the Log-Transformation*

| | Skewness (Original) | Kurtosis (Original) | Skewness (Transformed) | Kurtosis (Transformed) |
|---|---|---|---|---|
| Climate Anxiety | 1.50 | 4.94 | 0.82 | 2.83 |
| Information Seeking | 0.63 | 2.99 | -0.32 | 2.60 |
| Climate Concern | -0.64 | 3.27 | 0.25 | 2.76 |
| Self-Efficacy | -0.67 | 2.94 | 0.28 | 2.72 |

**Descriptives**

The means and standard deviations of the variables were examined (see Table 3). Additionally, the prevalence rates of the variables were calculated. The prevalence was determined by categorising participant's responses into the three categories used in the study conducted by Whitmarsh et al. (2022) "mild" ($1.00 \leq M \geq 2.33$), "moderate" ($2.34 \leq M \geq 3.66$), and "high" ($3.67 \leq M \geq 5.00$) levels and calculating the percentages for

each category. Climate concern levels were quite high in this sample: 9.64 per cent had mild climate concern, 40.96 moderate and 49.40 per cent high. Climate anxiety levels were much lower: 87.14 per cent suffered from mild anxiety, 11.43 per cent from moderate and only 1.43 per cent from high climate anxiety. In comparison to the study conducted by Whitmarsh et al. (2022) that focused on the general population of the UK, the climate anxiety levels of the current study were slightly higher. In their study, 90.90 per cent of their participants under 30 suffered from mild climate anxiety, 9.1 per cent from moderate and no one from severe climate anxiety. Information seeking was relatively low, 67.65 per cent had low, 20.59 moderate and 11.76 high levels of information seeking. Generalised anxiety levels were much higher, only 7.56 had low generalised anxiety, 47.56 moderate and 4.88 high. 10.71 per cent had mild nature relatedness, 52.38 moderate and 36.90 high. Surprisingly, all participants had moderate levels of mindfulness. Self-efficacy was also quite high in this sample, only 13.25 per cent had mild, 38.55 moderate and 48.19 a high level of self-efficacy.

Further, a Pearson's correlation matrix of the variables showed that several variables were significantly correlated (see Table 3). Nature relatedness was positively correlated with information seeking, mindfulness and self-efficacy. Further, the two emotional variables climate anxiety and climate concern were positively correlated. Climate anxiety and climate concern were both positively correlated with information seeking, generalised anxiety and nature relatedness. PEB was positively correlated with information seeking, nature relatedness, self-efficacy, climate anxiety and climate concern (see Table 3).

Additionally, the open question "If you indicated to feel to some extent anxious in the question above, can you say in a few words what makes you most anxious?" was further analysed. Most participants who felt anxious were most anxious about things related to university (17 participants), the future (13 participants) and/or climate change (5 participants).

**Table 3**

*Correlation Matrix of the Variables*

| Variable | | | Correlations | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | M | SD | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
| 1.Information Seeking[a] | 2.17 | .85 | - | | | | | | | |
| 2.Generalised Anxiety | 2.37 | .71 | .05 | - | | | | | | |
| 3. Nature Relatedness | 3.21 | .90 | .34* | -.02 | - | | | | | |
| 4. Mindfulness | 3.05 | .20 | .17 | -.18 | .24* | - | | | | |
| 5. Self-Efficacy[a] | 3.50 | .99 | .08 | -.15 | .33* | .18 | - | | | |
| 6. Climate Anxiety[a] | 1.57 | .62 | .44** | .36** | .39** | .10 | .17 | - | | |
| 7. Climate Concern[a] | 3.49 | .86 | .36** | .31* | .42** | .05 | .14 | .55** | - | |
| 8. PEB | 2.82 | .74 | .51** | .02 | .57** | .13 | .25* | .48** | .49** | - |

*Note.* Measured on a 5-point Likert Scale. The variables information seeking, nature relatedness, climate anxiety and climate concern were log-transformed

[a] Variables are log-transformed

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

## Regression Analyses

### *Multivariate Regression Analysis: Predicting Emotions*

A multivariate regression analysis was chosen to test the relationship between the independent variables information seeking, generalised anxiety, nature relatedness, mindfulness, and self-efficacy and the dependent variables climate anxiety and climate concern (see Table 4). In line with expectations, the results showed that information seeking, generalised anxiety and nature relatedness significantly positively predicted climate anxiety, providing support for H2a. Different from expectations, mindfulness and self-efficacy did not have a significant effect on climate anxiety and thus H2b was rejected. Unexpectedly, only information seeking, generalised anxiety and nature relatedness significantly positively affected climate concern. Mindfulness and self-efficacy did not have a significant effect, hence, H3 was only partly accepted.

**Table 4**

*Results of Multivariate Regression Analysis with Independent Variables Information Seeking, Generalised Anxiety, Nature Relatedness, Mindfulness, and Self-Efficacy and Dependent Variables Climate Anxiety and Climate Concern*

| Parameter | B[a] | SE | t | *p* | 95% CI |
|---|---|---|---|---|---|
| Climate Anxiety | | | | | |
| Intercept | -0.63 | 0.52 | -1.22 | .226 | [-1.67, 0.40] |
| Information Seeking[b] | 0.27 | 0.08 | 3.44 | <.001** | [0.11, 0.43] |
| Generalised Anxiety | 0.18 | 0.04 | 4.035 | <.001** | [0.09, 0.26] |
| Nature Relatedness | 0.09 | 0.04 | 2.42 | .018* | [0.02, 0.17] |
| Mindfulness | 0.06 | 0.16 | 0.39 | .696 | [-0.26, 0.38] |
| Self-Efficacy[b] | 0.21 | 0.18 | 1.16 | .251 | [-0.15, 0.57] |
| Climate Concern | | | | | |
| Intercept | -0.70 | 0.24 | -2.88 | .005* | [-1.19, -0.22] |
| Information Seeking[b] | 0.08 | 0.04 | 2.24 | .003* | [0.01, 0.16] |
| Generalised Anxiety | 0.06 | 0.02 | 3.18 | .002* | [0.02, 0.11] |
| Nature Relatedness | 0.56 | 0.18 | 3.10 | .003* | [0.02, 0.09] |
| Mindfulness | -0.01 | 0.07 | -0.18 | .859 | [-0.16, 0.14] |
| Self-Efficacy[b] | 0.06 | 0.09 | 0.64 | .521 | [-0.12, 0.23] |

*Note.* Climate Anxiety: *R2 = .41* (*Adjusted R2 = .37), F*(5, 78) = 10.66, *p* <.001 and Climate Concern: *R2 = .30* (*Adjusted R2 = .26), F*(5, 78) = 6.78, *p* <.001

[a] The unstandardised regression coefficient

[b] Variables are log-transformed

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

***Multiple Regression Analysis: Predicting Pro-Environmental Behaviour***

Multiple regression analyses were chosen to test whether information seeking, generalised anxiety, nature relatedness, mindfulness, self-efficacy, climate anxiety and climate concern predicted PEB. The first multiple linear regression was run with climate anxiety and climate concern as the independent variables and PEB as the dependent variable (see Table 5). Contrary to expectations, climate anxiety had a significant positive effect on PEB, hence the opposite of H4a was accepted. Climate concern also had a significant positive effect on PEB, providing support for H4b. The second multiple linear regression was run with information

seeking, generalised anxiety, nature relatedness, mindfulness, and self-efficacy as independent variables and PEB as the dependent variable (see Table 6). Hereby, only information seeking, and nature relatedness had a significant positive effect on PEB (see Table 6). Consequently, H1a was partly accepted and H1b was rejected.

**Table 5**

*Results of a Multiple Linear Regression Analysis with Independent Variables Climate Anxiety and Climate Concern and the Dependent Variable PEB*

| Parameter | B[a] | SE | t | *p* | 95% CI |
|---|---|---|---|---|---|
| Intercept | 3.15 | 0.27 | 11.50 | < .001** | [2.60, 3.69] |
| Climate Anxiety[b] | 0.66 | 0.24 | 2.73 | .008* | [0.18, 1.13] |
| Climate Concern[b] | 1.55 | 0.54 | 2.87 | .005* | [0.48, 2.63] |

*Note. R2 = .30* (*Adjusted R2 = .28), F*(2, 81) = 17.48, *p* <.001

[a] Unstandardised regression coefficient

[b] Variables are log-transformed

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

**Table 6**

*Results of a Multiple Linear Regression Analysis with the Independent Variables Information Seeking, Generalised Anxiety, Nature Relatedness, Mindfulness, and Self-Efficacy and the Dependent Variable PEB*

| Parameter | B[a] | SE | t | *p* | 95% CI |
|---|---|---|---|---|---|
| Intercept | 1.93 | 1.07 | 1.81 | .074 | [-0.19, 4.06] |
| Information Seeking[b] | 0.67 | 0.16 | 4.10 | <.001** | [0.34, 1.00] |
| Generalised Anxiety | 0.01 | 0.09 | 0.09 | .925 | [-0.17, 0.19] |
| Nature Relatedness | 0.35 | 0.08 | 4.49 | <.001** | [0.20, 0.51] |
| Mindfulness | -0.19 | 0.33 | -0.59 | .559 | [-0.85, 0.46] |
| Self-Efficacy[b] | 0.38 | 0.37 | -1.02 | .311 | [-0.36, 1.13] |

*Note. R2 = .45* (*Adjusted R2 = .42), F*(5, 78) = 12.86, *p* <.001

[a] Unstandardised regression coefficient

[b] Variables are log-transformed

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

## Mediation Analysis

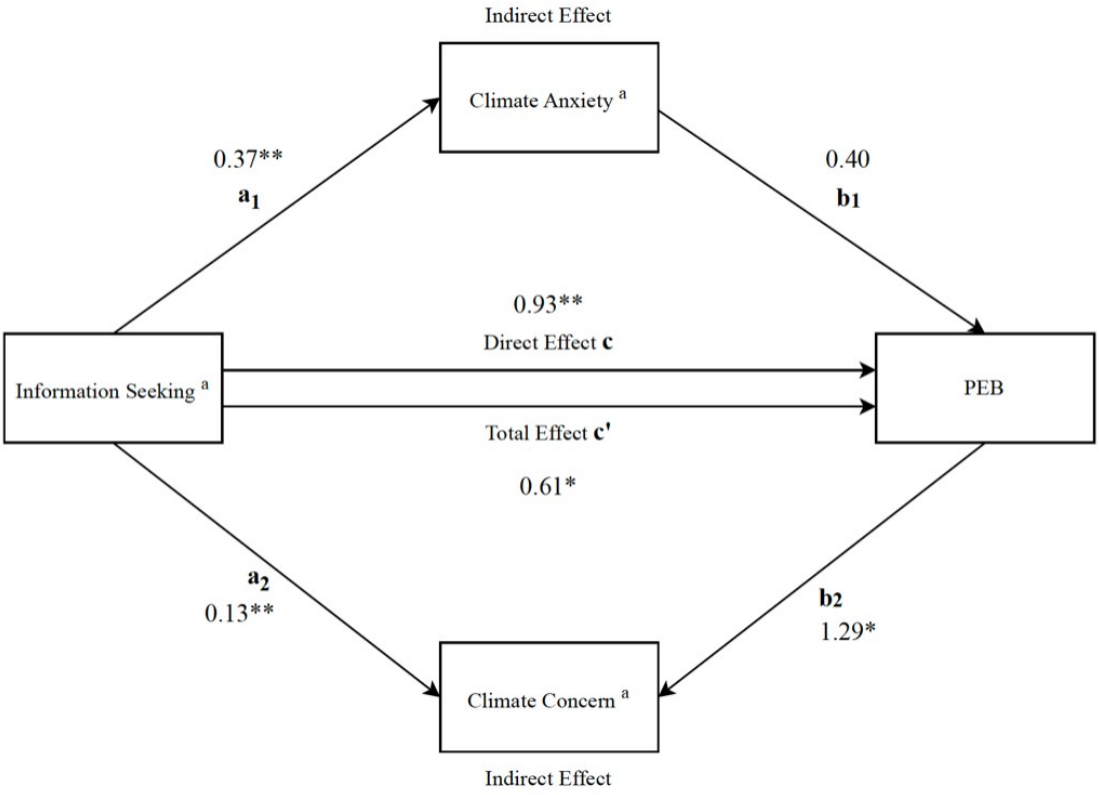
As observed in Table 3, nature relatedness, generalised anxiety and information seeking were the only variables that were significantly correlated with PEB, and nature relatedness and information seeking were also correlated with climate anxiety and climate concern. Thus, nature relatedness, generalised anxiety and information seeking qualified for a mediation analysis. Parallel mediation analyses were conducted with climate anxiety and climate concern as mediators as both were highly correlated (see Table 3). The mediation analyses were conducted with the PROCESS macro, developed by Hayes (2013) using bootstrapping procedures with 5000 simulations. The significance of the mediation effect, or the indirect effect (a*b), was determined by examining the bootstrapped confidence intervals. If the confidence intervals did not include zero, the mediation effect was considered significant. According to Hayes (2013), a mediation is significant when an overall significant indirect effect is found, the direct path (path c) does not have to be significant.

### *Information Seeking*

The first mediation analysis was run with information seeking as the independent variable, climate anxiety and climate concern as the mediator variables and PEB as the dependent variable. First, the direct effect (path c) was calculated by running a separate linear model to test whether information seeking significantly predicted PEB. Next, the mediation analysis was conducted (see Figure 2). Results showed that information seeking had a significant positive effect on both climate anxiety (path a1) and climate concern (path a2). Climate anxiety did not significantly affect PEB (path b1), but climate concern had a significant positive effect on PEB (path b2). Further, the effect of information seeking on PEB was reduced to 0.61 when climate anxiety and climate concern were controlled for but remained significant (path c'). As observed in Table 7 and Table 8, the indirect effect of information seeking on PEB was not significant for climate anxiety and significant for climate concern, indicating that information seeking had a significant overall indirect effect on PEB through climate concern. Thus, results were consistent with a partial mediation via climate concern and no mediation via climate anxiety.

**Figure 2**

*Path Model Diagram with the Results of a Parallel Mediation Analysis with Information Seeking as the Independent Variable, Climate Anxiety and Climate Concern as Mediator Variables and PEB as the Dependent Variable PEB*




[a] Variables are log-transformed

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

**Table 7**

*Unstandardised Results of a Mediation Analysis with Information Seeking as the Independent Variable, Climate Anxiety and Climate Concern as the Mediator Variables and PEB as the Dependent Variable*

| | Effect | Boot SE | Boot 95% CI | Significant Mediation |
|---|---|---|---|---|
| Total | .32 | .13 | [0.10, 0.61] | Yes |
| Climate Anxiety[a] | .15 | .10 | [-0.03, 0.38] | No |
| Climate Concern[a] | .17 | .08 | [0.03, 0.36] | Yes |
| Difference in Mediation Effects | -.02 | .14 | [-0.30, 0.26] | No |

*Note.* A significant effect is determined when the CI does not include zero.

[a] Variables are log-transformed

**Table 8**

*Standardised Results of a Mediation Analysis with Information Seeking as the Independent Variable, Climate Anxiety and Climate Concern as the Mediator Variables and PEB as the Dependent Variable*

| | Effect | Boot SE | Boot 95% CI | Significant Mediation |
|---|---|---|---|---|
| Total | .18 | .06 | [0.06, 0.31] | Yes |
| Climate Anxiety[a] | .08 | .05 | [-0.02, 0.20] | No |
| Climate Concern[a] | .09 | .04 | [0.02, 0.18] | Yes |
| Difference in Mediation Effects | -.01 | .08 | [-0.16, 0.14] | No |

*Note.* A significant effect is determined when the CI does not include zero.

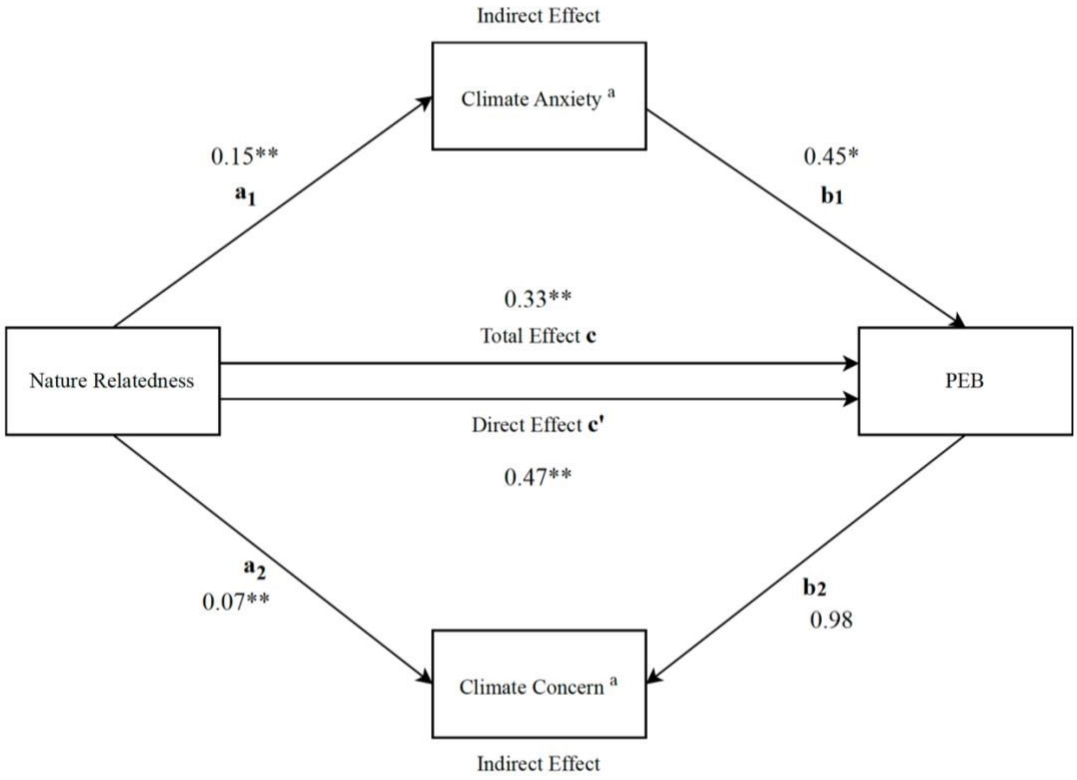
[a] Variables are log-transformed

***Nature Relatedness***

The second mediation analysis was run with nature relatedness as the independent variable, climate anxiety and climate concern as the mediator variables and PEB as the dependent variable. First, the direct effect (path c) was calculated by running a separate linear model to test whether nature relatedness significantly predicted PEB. Next, the mediation analysis was conducted (see Figure 3). Results showed that nature relatedness had a significant positive effect on both climate anxiety (path a1) and climate concern (path a2). Climate anxiety had a significant positive effect on PEB (path b1), but climate concern did not significantly affect PEB (path b2). Further, the effect of nature relatedness on PEB was reduced to 0.33 when climate anxiety and climate concern were controlled for but remained significant (path c'). As observed in Table 9 and Table 10, the indirect effect of nature relatedness on PEB was marginally significant for both climate anxiety and climate concern, indicating that nature relatedness had a small significant overall indirect effect on PEB through both mediators. Hence, results are consistent with partial (marginal) mediations vial both climate anxiety and climate concern.

**Figure 3**

*Path Model Diagram with the Results of a Parallel Mediation Analysis with Nature Relatedness as the Independent Variable, Climate Anxiety and Climate Concern as Mediator Variables and PEB as the Dependent Variable PEB*




[a] Variables are log-transformed

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

**Table 9**

*Unstandardised Results of a Mediation Analysis with Nature Relatedness as the Independent Variable, Climate Anxiety and Climate Concern as the Mediator Variables and PEB as the Dependent Variable*

| | Effect | Boot SE | Boot 95% CI | Significant Mediation |
|---|---|---|---|---|
| Total | .14 | .05 | [0.04, 0.25] | Yes |
| Climate Anxiety[a] | .07 | .04 | [0.00, 0.16] | Marginally |
| Climate Concern[a] | .07 | .04 | [0.00, 0.16] | Marginally |
| Difference in Mediation Effects | .00 | .06 | [-0.12, 0.12] | No |

*Note.* A significant effect is determined when the CI does not include zero.

[a] Variables are log-transformed

**Table 10**

*Standardised Results of a Mediation Analysis with Nature Relatedness as the Independent Variable, Climate Anxiety and Climate Concern as the Mediator Variables and PEB as the Dependent Variable*

| | Effect | Boot SE | Boot 95% CI | Significant Mediation |
|---|---|---|---|---|
| Total | .17 | .06 | [0.06, 0.30] | Yes |
| Climate Anxiety[a] | .08 | .05 | [0.00, 0.19] | Marginally |
| Climate Concern[a] | .08 | .05 | [0.00, 0.18] | Marginally |
| Difference in Mediation Effects | .00 | .07 | [-0.14, 0.15] | No |

*Note.* A significant effect is determined when the CI does not include zero.

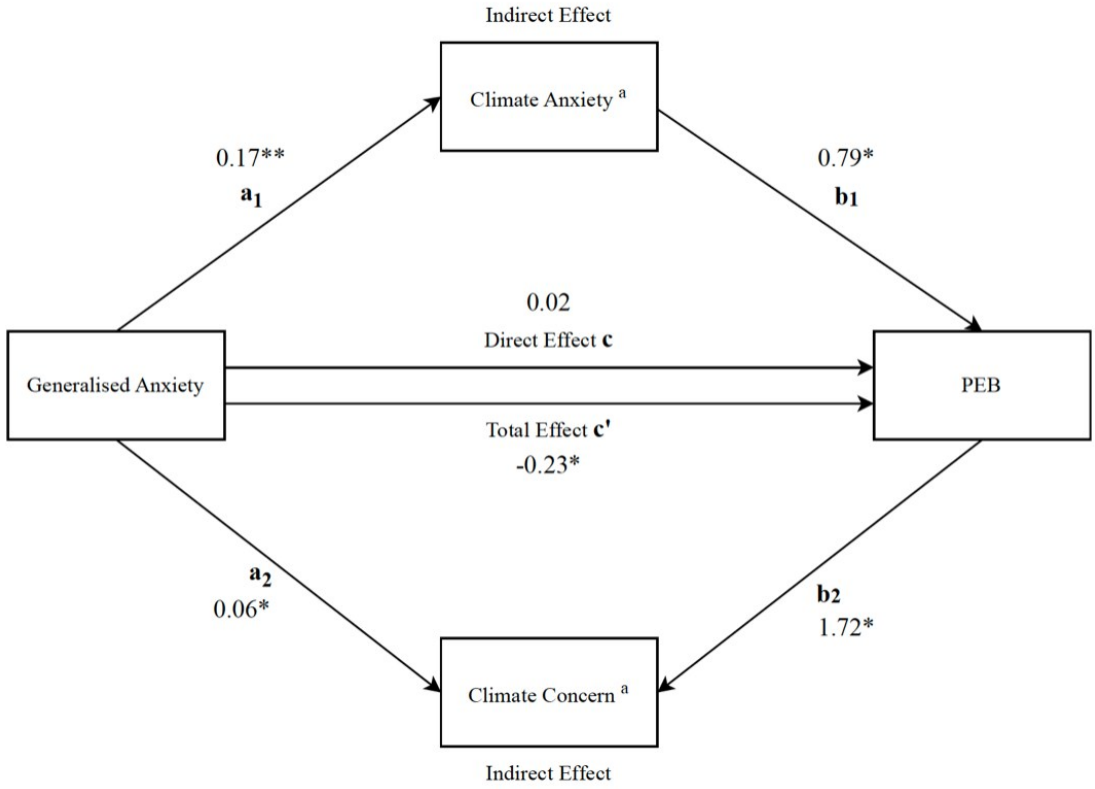
[a] Variables are log-transformed

***Generalised Anxiety***

The third mediation analysis was run with generalised anxiety as the independent variable, climate anxiety and climate concern as the mediator variables and PEB as the dependent variable. First, the direct effect (path c) was calculated by running a separate linear model to test whether generalised anxiety significantly predicted PEB. Next, the mediation analysis was conducted (see Figure 4). Results showed that generalised anxiety had a significant positive effect on both climate anxiety (path a1) and climate concern (path a2). Further, the effect of generalised anxiety on PEB became significant and positive when the mediators were controlled for (path c'). As observed in Table 11 and Table 12, the indirect effect of generalised anxiety on PEB was significant. Thus, the direct effect of generalised anxiety on PEB (path c) was not significant but the remaining direct effect (path c') was significant and had the opposite effect of the mediated effect, leading together to a significant total effect (see Figure 4). Hence, results are consistent with partial mediations via both climate anxiety and climate concern.

**Figure 4**

*Path Model Diagram with the Results of a Parallel Mediation Analysis with Generalised Anxiety as the Independent Variable, Climate Anxiety and Climate Concern as Mediator Variables and PEB as the Dependent Variable PEB*




[a] Variables are log-transformed

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

**Table 11**

*Unstandardised Results of a Mediation Analysis with Generalised Anxiety as the Independent Variable, Climate Anxiety and Climate Concern as the Mediator Variables and PEB as the Dependent Variable*

| | Effect | Boot SE | Boot 95% CI | Significant Mediation |
|---|---|---|---|---|
| Total | .25 | .08 | [0.10, 0.40] | Yes |
| Climate Anxiety[a] | .13 | .05 | [0.04, 0.25] | Yes |
| Climate Concern[a] | .11 | .05 | [0.02, 0.22] | Yes |
| Difference in Mediation Effects | .02 | .07 | [-0.11, 0.16] | No |

*Note.* A significant effect is determined when the CI does not include zero.

[a] Variables are log-transformed

**Table 12**

*Standardised Results of a Mediation Analysis with Generalised Anxiety as the Independent Variable, Climate Anxiety and Climate Concern as the Mediator Variables and PEB as the Dependent Variable*

| | Effect | Boot SE | Boot 95% CI | Significant Mediation |
|---|---|---|---|---|
| Total | .24 | .07 | [0.10, 0.39] | Yes |
| Climate Anxiety[a] | .13 | .05 | [0.04, 0.24] | Yes |
| Climate Concern[a] | .11 | .05 | [0.02, 0.21] | Yes |
| Difference in Mediation Effects | .02 | .06 | [-0.11, 0.15] | No |

*Note.* A significant effect is determined when the CI does not include zero.

[a] Variables are log-transformed

**Overview of Results**

Table 13 presents a summary of the findings from the examined hypotheses. Additionally, modifications were made to the research model as depicted in Figure 5.

**Table 13**

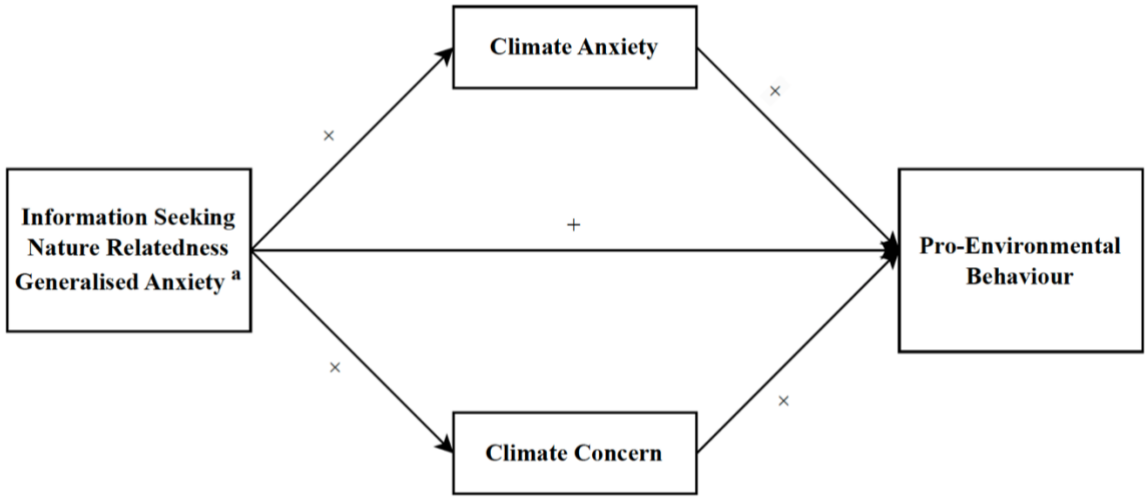
*Overview of the Findings*

| No | Hypothesis |
|---|---|
| H1a | Information seeking and nature relatedness, positively predict PEB |
| H2a | Information seeking, generalised anxiety and nature relatedness positively predict climate anxiety |
| H3 | Information seeking, generalised anxiety and nature relatedness positively predict climate concern |
| H4a | Climate anxiety positively affects PEB |
| H4b | Climate concern positively affects PEB |
| H5a | Climate anxiety mediates the effect of generalised anxiety and nature relatedness on PEB |
| H5b | Climate concern mediates the effect of information seeking, generalised anxiety, and nature relatedness on PEB |

*Note.* The other variables that were included in the analysis, mindfulness and self-efficacy did not have a significant effect on climate anxiety, climate concern or PEB

**Figure 5**

*Updated Conceptual Framework*




*Note.* Information seeking and nature relatedness had a significant positive effect on PEB. Climate anxiety significantly partially mediated the relationship between nature relatedness and generalised anxiety with PEB and climate concern significantly partially mediated the relationship between information seeking, nature relatedness and generalised anxiety with PEB. The other variables that were included in the analysis, mindfulness, and self-efficacy, did not have a significant effect on climate anxiety, climate concern or PEB.

[a] Generalised anxiety did not have a significant total effect on PEB, only a remaining positive direct effect.

## Discussion

This study aimed to investigate whether students' climate anxiety and climate concern mediated the relationship of information seeking, generalised anxiety, nature relatedness, mindfulness, and self-efficacy with PEB.

### Comparison of Results to Literature

#### *Climate Anxiety and Climate Concern*

Climate anxiety had a significant positive effect on the PEB of students, opposite of what was hypothesised. However, one must note that the levels of climate anxiety in the present study's sample were very low (only 1 per cent suffered from high climate anxiety). This might be partly explained because the majority of this study's participants were Western. The study conducted by Hickman et al. (2021) on the climate anxiety of children and young adults found that non-Western participants were affected the most. In their study, 50-70 per cent of non-

Western participants indicated high levels of climate anxiety, compared to only 26-37 per cent of the Western participants. Further, even though the finding of the present study was opposite to what was hypothesised, the finding is still in line with previous research that has found that low and mild forms of climate anxiety predicted a higher frequency of PEB (e.g. Mouguiama-Daouda et al., 2022) and only high levels of climate anxiety predicted lower levels of PEB (e.g. Clayton & Karazsia, 2020). In line with expectations, climate concern also significantly positively affected the PEB of students. This confirms previous research that has consistently found a positive association between climate concern and PEB (Mansoor & Wijaksana, 2022; Rhead et al., 2015; Whitmarsh et al., 2022; Wu et al., 2019; Yue et al., 2020). These findings illustrate that emotions related to climate change play an imperative role in predicting and motivating students' engagement in PEB. This may be because students with climate anxiety and climate concerns likely recognised the urgency of taking action to mitigate the effect of the climate crisis. This could have led to a greater willingness to engage in PEB explaining why these positive associations were found.

The importance of emotions is further underlined by the mediating effect of climate anxiety and climate concern on the relationship between information seeking, generalised anxiety and nature relatedness with PEB. The results showed that climate anxiety significantly partially mediated the relationship between nature relatedness and generalised anxiety with PEB. Further, the findings revealed that climate concern significantly partially mediated the relationship between information seeking, nature relatedness and generalised anxiety with PEB. Thus, emotions also play an important role in influencing PEB as mediating forces.

***Predictors of Climate Anxiety, Climate Concern and PEB***

It was hypothesised that information seeking, nature relatedness, mindfulness, and self-efficacy positively predict PEB, and generalised anxiety negatively predicts PEB. It was also hypothesised that information seeking, generalised anxiety and nature relatedness positively predict climate anxiety and mindfulness and self-efficacy negatively predict climate anxiety. Further, information seeking, generalised anxiety, mindfulness and nature relatedness and self-efficacy were hypothesised to positively predict climate concern.

First, the relationship between information seeking and climate anxiety, climate concern and PEB of students will be further explored. In accordance with what was hypothesised, and the study conducted by Whitmarsh et al. (2022), the present study found information seeking positively predicted the climate anxiety of students. The vital role of information seeking in predicting PEB is further underlined by the fact that it was the strongest

predictor in both the present study and the study conducted by Whitmarsh et al. (2022). Also in line with expectations, this study found information seeking to have a significant positive effect on climate concern, in line with past research with participants of all ages (Gatersleben et al., 2014; Hornsey et al., 2016; Kellstedt et al., 2008; O'Neill & Nicholson-Cole, 2009; Stedman, 2002). This study followed the causal order as proposed by Whitmarsh et al. (2022) but empirical literature suggests that the causal effect should be the other way around. The empirical literature suggests that the positive effect of information seeking on both climate anxiety and climate concern may also be attributed to the fact that information seeking is a common consequence of anxiety and concerns (Cunsolo et al., 2020). The anxieties and concerns of the students and their information seeking behaviours might have mutually reinforced each other, explaining why participants who engaged in more information seeking suffered from higher levels of climate anxiety and climate concern. Further, this is the first study that has explored the relationship between information seeking and PEB among students and has found a positive relationship. The present study's findings are consistent with previous research that focused on participants of all ages (Huang, 2016; Pegan et al., 2023; Whitmarsh et al., 2022). Hence, this study confirms that information seeking also predicts more PEB among students. This may be because individuals who seek information may be more aware of the consequences of their behaviour and what good PEB can do for the climate crisis (Amoah & Addoah, 2020). This in turn might have motivated them to actively engage in PEB.

Second, the relationship between generalised anxiety and climate anxiety, climate concern and PEB will be further inspected. Consistently with anticipated outcomes, generalised anxiety positively predicted the climate anxiety of students. Thus, this study confirms past research that also found a positive relationship between students' generalised anxiety and climate anxiety (Reyes et al., 2021; Schwartz et al., 2022). Furthermore, generalised anxiety also positively predicted climate concern. So far, only the studies conducted by Searle & Gow (2010) focusing on the broad public and the study focusing specifically on students conducted by Sciberras & Fernando (2021) have investigated this relationship further. In line with the present study's findings, both found a significant positive relationship. Thus, this study confirms the important role of generalised anxiety in predicting the climate concern of students. The positive relationship between generalised anxiety and climate anxiety and climate concern might have been found because individuals with generalised anxiety frequently experience a broad spectrum of anxieties and concerns which might include the climate crisis (Lawrance et al., 2022). Consequently, their generalised anxiety may spill over into increased anxiety and concern specifically about climate change, leading to a positive predictive relationship between

them. Further, generalised anxiety did not have a significant total effect on PEB, only a significant partially mediating effect and a remaining direct effect in the opposite direction when the two mediators were controlled for. Thus, the effect between the variables is rather complex and suggests that there might be other possible mediating variables explaining the significant remaining direct effect. Future studies should investigate these possible other mediating variables like positive emotions related to climate change like hope or demographic characteristics like gender. This should also be kept in mind by interventions focusing on increasing PEB. Further, this study was also only the second study that has investigated the relationship between generalised anxiety and PEB and confirms the study conducted by Whitmarsh et al. (2022) that generalised anxiety does not have a significant total effect on PEB. As the level of generalised anxiety was quite high in this sample (over half of the participants suffered from either medium or high generalised anxiety), students might have been so focused on dealing with their generalised anxiety that they could not also deal with and engage in PEB. This is also consistent with the findings of the open question in which participants were most anxious about things unrelated to climate change. The most common answers to what made them most anxious were things related to university (17) and worries about the future (13). Only five participants indicated that they were most anxious about climate change. This leads to the conclusion that the relationship between generalised anxiety and PEB is rather abstruse.

Third, the relationship between nature relatedness and climate anxiety, climate concern and PEB will be further looked at. Nature relatedness had a significant positive effect on climate anxiety among this study's sample of students. This is in line with past research with participants of all ages (Clayton & Karazsia, 2020; Capstick et al., 2015; Clayton et al., 2021; Whitmarsh et al., 2022). Nature relatedness also had a significant positive effect on climate concern, in line with the findings of past research consisting of participants of all ages (Curll et al., 2022; Dutcher et al., 2007; Helm et al., 2018; Martin & Czellar, 2017; Mayer & Frantz, 2004; Nisbet et al., 2009). Hence, this study is the first to confirm that nature relatedness has a significant effect on the climate anxiety and climate concern of students. This may be because people who feel connected to nature often also perceive themselves as part of nature (Nisbet et al., 2009). This might have led participants to acknowledge their dependence on nature and the catastrophic consequences of the climate crisis, leading to an augmentation in their climate anxiety and climate concern. Further, nature relatedness also had a significant positive effect on PEB. This is in accordance with what was hypothesised and the findings of previous empirical research with samples consisting of participants of all ages (Mackay & Schmitt, 2019; Martin et al., 2020; Whitburn et al., 2019; Whitmarsh et al., 2022) and samples consisting

solely of university students (Ibáñez-Rueda et al., 2020; Nisbet et al., 2009; Rosa et al., 2020). The nature relatedness of students might have made them feel responsible for the climate crisis which might in turn have motivated them to engage in PEB.

Fourth, the relationship between mindfulness and climate anxiety, climate concern and PEB will be further explored. Against expectations, mindfulness did not have a significant effect on climate anxiety, climate concern and PEB and thus did not confirm the findings of previous research (Amel et al., 2009; Asthana 2022; Barbaro & Pickett, 2016; Barber & Deale, 2014; Colombo et al., 2023; Kumar et al., 2021 Patel & Holm, 2018; Whitmarsh et al., 2022). This could be because the mindfulness practices of the individuals in the present study might not have been targeted at their climate anxiety or climate concern, accounting for its limited influence on these emotions. However, this study is the first study to focus on students and thus this might be an important implication that mindfulness has a different impact on climate anxiety, climate concern and PEB of students compared to the general population.

Lastly, the relationship between self-efficacy and climate anxiety, climate concern and PEB was not significant as well, even though self-efficacy levels were quite high (around 40 per cent moderate and 50 per cent high level). Thus, the findings of the present study do not confirm previous research (Huang, 2016; Innocenti et al., 2023; Kerpelman & Mosher, 2004; Lee et al., 2014; Loy et al., 2020; Vicente-Molina et al., 2013). However, it is important to note that the present study is the first to have focused specifically on students. This could mean that self-efficacy may not be an important determinant for students. The lack of a significant effect could have been because the student's climate anxiety and climate concerns might have been more related to large-scale systemic issues and their perceived lack of control over them, rather than their personal responsibility for the climate crisis. This might have led them to place less emphasis on their self-efficacy which in turn diminished the effect of their self-efficacy on climate anxiety and climate concern. Further, the insignificant outcome of self-efficacy on PEB can be explained by the intention-behaviour gap from the theory of planned behaviour by Bandura (Wang & Mangmeechai, 2021). The attention-behaviour gap postulates that while self-efficacy can enhance the motivation and intention to engage in PEB, it does not necessarily translate into active engagement in PEB, which might have been the case in this study's sample.

**Limitations and Recommendations for Future Research**

The first limitation of the current study is that it used convenience sampling and recruited some of the participants from groups like the vegan student association. This could have biased results as it is to be expected that environmentally conscious students suffer from low and mild levels of climate anxiety and higher levels of climate concern and engage in more

PEB. The second limitation is that 70 per cent of participants were female. The findings of this study thus do not represent men and other genders well and further research should examine gender differences. Further, the sample size was very small as only 84 participants were included in the analysis. A bigger sample would have given more statistical power, possibly leading to different results. For example, self-efficacy and PEB were significantly correlated in the Pearson correlation, but self-efficacy did not have a significant effect on PEB in the regression analysis. However, the effect of self-efficacy on PEB was still quite big (0.38) and might thus have been significant in a considerably larger sample with more statistical power. Further, as the current sample only included students from one university in the Netherlands, its generalisability to broader populations is limited. Moreover, due to the absence of participants experiencing high climate anxiety, it is impossible to draw any valid conclusions about individuals suffering from high climate anxiety which further restricts the generalisability of the findings and the ability to comprehensively understand and address this subgroup. This highlights the importance of future research to also include participants suffering from high levels of climate anxiety. The last limitation is the non-normal distribution of the data and the consequent log transformation aimed at making the distribution of the variables closer to normal. Even though the log transformation made the variables less skewed and closer to normal and did not change the results significantly, Feng et al. (2014) still note that it is still important to consider the impact of the transformation in the interpretation of this study's results. They argue that log transformations change the original data. This underscores the need for cautious interpretation and further research with more normal-distributed data. Lastly, it is recommended that future research further explores other emotional mediators related to climate change like hope or anger to gain a deeper understanding of the important role of emotions related to climate change and how they may predict and mediate PEB.

**Strengths, Implications and Practical Recommendations**

Despite its limitations, the present study adds to the literature as one of the first studies to focus on and compare climate anxiety and climate concern and clearly distinguish them from one another. Further, it is one of the only studies focusing specifically on students. Moreover, the present study is the first study that has researched the mediating roles of climate anxiety and climate concern on PEB. Findings of the present study have shown that different emotional responses related to climate change strengthen the PEB of individuals and positively mediate the relationship between generalised anxiety, nature relatedness and information seeking with PEB. Hence, the results of this study provide valuable information about the vital role of emotions in increasing PEB, confirming that climate concern and low levels of climate anxiety

are behaviour-facilitating and constructive. This leads to the practical recommendations that interventions aimed at increasing the PEB of students should focus on finding ways to increase individuals' nature relatedness, information seeking behaviours and climate concern and to an extent their climate anxiety.

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# Appendix A

## Survey Scales

**Table A1**

*Screening Questions Climate Change Deniers*

| For each of the following, please rate the extent to which these statements apply to you, using the scale as shown below. Please, respond as you really feel, rather than how you think most people feel. |
|---|
| 1. I believe that climate change is real. |
| 2. Human activities are a major cause of climate change. |

*Note.* Items were answered on a 5-point Likert scale with answer options 'Strongly disagree', 'Somewhat agree', 'Neither agree nor disagree', 'Somewhat agree' and 'Strongly agree'

**Table A2**

*Items Measuring PEB (Items 1-8 Adapted from Ogunbode et al. (2022) and Items 9-14 Self-Developed)*

| For each of the following, please rate the extent to which these statements apply to you, using the scale as shown below. Please, respond as you really feel, rather than how you think most people feel. |
|---|
| 1. Cycle or walk instead of driving, |
| 2. Restrain oneself from buying unneeded new clothes. |
| 3. Choose not to fly. |
| 4. Try to influence family and friends to act pro-environmentally, |
| 5. Save energy in the household. |
| 6. Take public transportation instead of the car. |
| 7. Avoid food waste |
| 8. Make climate-friendly food choices. |
| 9. Take part in a protest related to protecting the environment |
| 10. Engage in a climate change protest organization. (Fridays for future, extinction rebellion, etc.) |
| 11. Sign a petition given out by climate change organization about taking climate protective actions |
| 12. Ask my friends and family to engage more in behaviors that will save CO2 emissions. |

| For each of the following, please rate the extent to which these statements apply to you, using the scale as shown below. Please, respond as you really feel, rather than how you think most people feel. |
|---|
| 13. Choose courses or programs at the university that focus on combating climate change |
| 14. Join a local environmental initiative to help speed up the transition to a more climate neutral society, such as a sustainable energy citizens' initiative or recycling initiative |

*Note.* Items were answered on a 5-point Likert scale with answer options 'Never', 'Sometimes', About half the time', 'Most of the time' and 'Always'

**Table A3**

*Climate Change Anxiety Scale*

| For each of the following, please rate the extent to which these statements apply to you, using the scale as shown below. Please, respond as you really feel, rather than how you think most people feel. |
|---|
| 1. Thinking about climate change makes it difficult for me to concentrate. |
| 2. Thinking about climate change makes it difficult for me to sleep. |
| 3. I have nightmares about climate change. |
| 4. I find myself crying because of climate change. |
| 5. I think, "why can't I handle climate change better?" |
| 6. I go away by myself and think about why I feel this way about climate change. |
| 7. I write down my thoughts about climate change and analyze them. |
| 8. I think, "why do I react to climate change this way?" |
| 9. My concerns about climate change make it hard for me to have fun with my family or friends. |
| 10. I have problems balancing my concerns about sustainability with the needs of my family. |
| 11. My concerns about climate change interfere with my ability to get work or school assignments done. |
| 12. My concerns about climate change undermine my ability to work to my potential. |
| 13. My friends say I think about climate change too much. |

*Note.* Items were answered on a 5-point Likert scale with answer options 'Never', 'Sometimes', About half the time', 'Most of the time' and 'Always'

**Table A4**

*Climate Change Worry Scale*

| For each of the following, please rate the extent to which these statements apply to you, using the scale as shown below. Please, respond as you really feel, rather than how you think most people feel. |
|---|
| 1. I worry about climate change more than other people. |
| 2. Thoughts about climate change cause me to have worries about what the future may hold. |
| 3. I tend to worry when I hear about climate change, even when the effects of climate change may be some time away. |
| 4. I worry that outbreaks of severe weather may be the result of a changing climate. |
| 5. I noticed that I have been worrying about climate change. |
| 6. Once I begin to worry about climate change, I find it difficult to stop. |
| 7. I worry about how climate change may affect the people I care about. |

*Note.* Items were answered on a 5-point Likert scale with answer options 'Strongly disagree', 'Somewhat agree', 'Neither agree nor disagree', 'Somewhat agree' and 'Strongly agree'

**Table A5**

*Item Measuring Information Seeking*

| For each of the following, please rate the extent to which these statements apply to you, using the scale as shown below. Please, respond as you really feel, rather than how you think most people feel. |
|---|
| 1. How often, in a typical week, do you intentionally seek out information about climate change? |

*Note.* Items were answered on a 5-point Likert scale with answer options 'Never', 'Sometimes', About half the time', 'Most of the time' and 'Always'

**Table A6**

*GAD-7 Scale Measuring Generalised Anxiety*

| For each of the following, please rate the extent to which these statements apply to you, using the scale as shown below. Please, respond as you really feel, rather than how you think most people feel. |
|---|
| 1. Feeling nervous, anxious, or on edge |
| 2. Not being able to stop or control worrying |
| 3. Worrying too much about different things |
| 4. Trouble relaxing |
| 5. Being so restless that it is hard to sit still |
| 6. Becoming easily annoyed or irritable* |
| 7. Feeling afraid, as if something awful might happen |

*Note.* Items were answered on a 5-point Likert scale with answer options 'Never', 'Sometimes', 'About half the time', 'Most of the time' and 'Always'

*Note.* Item removed for the analysis

**Table A7**

*Open Question Generalised Anxiety*

| 1. If you indicated to feel to some extent anxious in the question above, can you say in a few words what makes you most anxious? |
|---|

**Table A8**

*NR-6 Scale Measuring Nature Relatedness*

| For each of the following, please rate the extent to which these statements apply to you, using the scale as shown below. Please, respond as you really feel, rather than how you think most people feel. |
|---|
| 1. My ideal vacation spot would be a remote, wilderness area. |
| 2. I always think about how my actions affect the environment. |
| 3. My connection to nature and the environment is a part of my spirituality. |
| 4. I take notice of wildlife wherever I am. |
| 5. My relationship to nature is an important part of who I am. |
| 6. I feel very connected to all living things and the earth. |

*Note.* Items were answered on a 5-point Likert scale with answer options 'Strongly disagree', 'Somewhat agree', 'Neither agree nor disagree', 'Somewhat agree' and 'Strongly agree'

**Table A9**

*FFMQ-18 Scale Measuring Mindfulness*

| For each of the following, please rate the extent to which these statements apply to you, using the scale as shown below. Please, respond as you really feel, rather than how you think most people feel. |
|---|
| 1. I pay attention to physical experiences, such as the wind in my hair or sun on my face. |
| 2. I notice visual elements in art or nature, such as colours, shapes, textures, or patterns of light and shadow. |
| 3. I notice the smells and aromas of things |
| 4. I find it difficult to stay focused on what's happening in the present moment. |
| 5. I rush through activities without being really attentive to them. |
| 6. It seems I am running on automatic without much awareness of what I'm doing. |
| 7. I make judgments about whether my thoughts are good or bad |
| 8. I think some of my emotions are bad or inappropriate and I shouldn't feel them |
| 9. I tell myself I shouldn't be feeling the way I'm feeling |
| 10. I'm good at finding words to describe my feelings |
| 11. It's hard for me to find the words to describe what I'm thinking. |
| 12. I can easily put my beliefs, opinions, and expectations into words |
| 13. Even when I'm feeling terribly upset, I can find a way to put it into words |

| For each of the following, please rate the extent to which these statements apply to you, using the scale as shown below. Please, respond as you really feel, rather than how you think most people feel. |
|---|
| 14. When I feel something in my body, it's hard for me to find the right words to describe it. |
| 15. Usually when I have distressing thoughts or images I am able just to notice them without reacting. |
| 16. When I have distressing thoughts or images, I feel calm soon after. |
| 17. I watch my feelings without getting carried away by them. |
| 18. When I have distressing thoughts or images, I don't let myself be carried away by them. |

*Note.* Items were answered on a 5-point Likert scale with answer options 'Never', 'Sometimes', About half the time', 'Most of the time' and 'Always' and Items 3, 4, 8, 9, 11, 12, 16, and 18 were reverse scored.

**Table A10**

*Items Measuring Self-Efficacy Adapted from Van Zomeren et al. (2010)*

| For each of the following, please rate the extent to which these statements apply to you, using the scale as shown below. Please, respond as you really feel, rather than how you think most people feel. |
|---|
| 1. There are simple things I can do that reduce the negative consequences of the climate crisis. |
| 2. I can change my daily routines to combat the climate crisis. |
| 3. There are things I can do that can make a difference in reducing the negative consequences of the climate crisis. |
| 4. My individual actions will contribute to a solution of the climate crisis. |
| 5. Changes in my daily routines will contribute to reducing the negative consequences of the climate crisis. |

*Note.* Items were answered on a 5-point Likert scale with answer options 'Strongly disagree', 'Somewhat agree', 'Neither agree nor disagree', 'Somewhat agree' and 'Strongly agree'

# Appendix B

## Informed Consent


Dear participant,
In this questionnaire, you will be asked to answer questions about your pro-environmental behaviour, emotions in relation to climate change, and further psycho-social and demographic factors. The data will be used for our Bachelor theses about the influencing factors on pro-environmental behaviour.

The questionnaire will take approximately 20 minutes to complete. Participating in this questionnaire is completely voluntary and you can withdraw at any time without consequences. All personal information will be anonymised before the data is analysed and it will not be possible to link your answers back to you. The data will only be used for research purposes. Information obtained within this questionnaire will remain confidential and will only be shared with the researchers of this study.

- I have read and understood the study information.
- I consent voluntarily to be a participant in this study and I know that I can withdraw from the study at any time.
- I understand that taking part in the study involves answering questions honestly.
- I understand that the information I provide will be used for research purposes only and that my participation is completely anonymous.
- Incomplete responses might be excluded during the data analysis.

◯ Yes
◯ No

## Appendix C
## End Note of the Survey and Contact Information

Thank you for participating in the study.

For further questions and/or information about the study, you can contact the researchers:
Nora Zühlsdorff: n.m.zuhlsdorff@student.utwente.nl
Theresa Sellmaier: t.l.i.sellmaier@student.utwente.nl

If the questionnaire has made you feel anxious or triggered in another way, please contact your general practitioner or the UT study advisors.

If you want to take action against climate change you can contact Students for Future Enschede, Vegan Students Association Twente, or Extinction Rebellion Enschede.

For further questions or concerns about your rights as a research participant please contact the Ethics Committee of the Faculty of Behavioural, Management, and Social Sciences: ethicscommittee-bms@utwente.nl

## Appendix D

## Results of the Analysis Without the Log-Transformation

**Table D1**

*Correlation Matrix of Variables*

| Variable | Correlations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
| 1. Information Seeking | - | | | | | | | |
| 2. Generalised Anxiety | .08 | - | | | | | | |
| 3. Nature Relatedness | .40** | -.02 | - | | | | | |
| 4. Mindfulness | .18 | -.18 | .24* | - | | | | |
| 5. Self-Efficacy | .02 | -.10 | .29* | .14 | - | | | |
| 6. Climate Anxiety | .50** | .32* | .41** | .12 | .19 | - | | |
| 7. Climate Concern | .36** | .33* | .38** | -.01 | .04 | .48** | - | |
| 8. PEB | .54** | .02 | .57** | .13 | .17 | .48** | .45** | - |

*Note.* Measured on a 5-point Likert Scale

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

**Table D2**

*Results of Multivariate Regression Analysis with Independent Variables Information Seeking, Generalised Anxiety, Nature Relatedness, Mindfulness, Self-Efficacy, PEB and Dependent Variables Climate Anxiety and Climate Concern*

| Parameter | B | SE | t | *p* | 95% CI |
|---|---|---|---|---|---|
| Climate Anxiety | | | | | |
| Intercept | -0.88 | 0.90 | -0.93 | .334 | [-2.68, 0.92] |
| Information Seeking | 0.28 | 0.07 | 3.92 | <.001** | [0.14, 0.42] |
| Generalised Anxiety | 0.27 | 0.08 | 3.52 | .001* | [0.12, 0.43] |
| Nature Relatedness | 0.14 | 0.07 | 2.01 | .047* | [0.00, 0.28] |
| Mindfulness | 0.13 | 0.29 | 0.47 | .641 | [-0.44, 0.71] |
| Self-Efficacy | 0.10 | 0.06 | 1.65 | .104 | [-0.02, 0.21] |
| Climate Concern | | | | | |
| Intercept | 2.12 | 1.36 | 1.56 | .122 | [-0.58, 4.83] |
| Information Seeking | 0.23 | 0.11 | 2.17 | .033* | [0.02, 0.44] |
| Generalised Anxiety | 0.36 | 0.12 | 3.11 | .003* | [0.13, 0.60] |
| Nature Relatedness | 0.30 | 0.10 | 2.89 | .005* | [0.09, 0.51] |
| Mindfulness | -0.30 | 0.43 | -0.69 | .490 | [-1.16, 0.56] |
| Self-Efficacy | -0.02 | 0.09 | -0.18 | .855 | [-0.19, 0.16] |

*Note.* Climate Anxiety: *R2 = .41* (*Adjusted R2 = .37), F*(5, 78) = 10.66, *p* <.001 and Climate Concern: *R2 = .30* (*Adjusted R2 = .26), F*(5, 78) = 6.78, *p* <.001

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

**Table D3**

*Results of a Multiple Linear Regression Analysis with Independent Variables Climate Anxiety and Climate Concern and the Dependent Variable PEB*

| Parameter | B | SE | t | *p* | 95% CI |
|---|---|---|---|---|---|
| Intercept | 1.31 | 0.29 | 4.47 | < .001** | [0.73, 1.90] |
| Climate Anxiety | 0.40 | 0.13 | 3.18 | .002* | [0.15, 0.66] |
| Climate Concern | 0.25 | 0.09 | 2.76 | .007* | [0.07, 0.43] |

*Note. R2 = .29* (*Adjusted R2 = .28), F*(2, 81) = 16.86, *p* <.001

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

**Table D4**

*Results of a Multiple Linear Regression Analysis with the Independent Variables Information Seeking, Generalised Anxiety, Nature Relatedness, Mindfulness, and Self-Efficacy and the Dependent Variable PEB*

| Parameter | B | SE | t | *p* | 95% CI |
|---|---|---|---|---|---|
| Intercept | 1.46 | 1.04 | 1.41 | .163 | [-0.61, 3.53] |
| Information Seeking | 0.34 | 0.08 | 4.16 | <.001** | [0.18, 0.50] |
| Generalised Anxiety | -0.01 | 0.09 | -0.11 | .909 | [-0.19, 0.17] |
| Nature Relatedness | 0.34 | 0.08 | 4.27 | <.001** | [0.18, 0.50] |
| Mindfulness | -0.19 | 0.33 | -0.57 | 0.570 | [-0.84, 0.47] |
| Self-Efficacy | 0.04 | 0.07 | 0.53 | .599 | [-0.10, 0.17] |

*Note. R2 = .58* (*Adjusted R2 = .42), F*(5, 78) = 12.79, *p* <.001

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

**Table D5**

*Results of a Multiple Regression Analysis with the Independent Variables Information Seeking, Generalised Anxiety, Nature Relatedness, Mindfulness, Self-Efficacy, Climate Anxiety and Climate Concern and the Dependent Variable PEB*

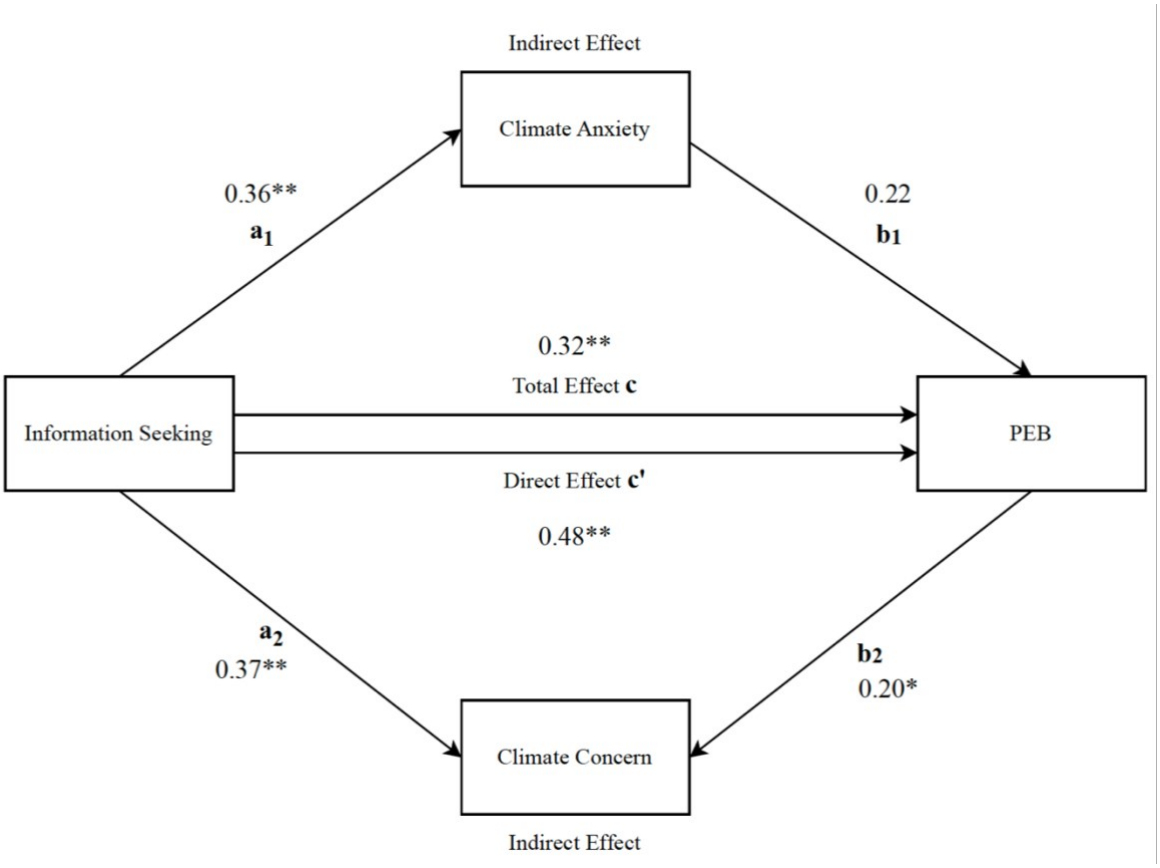
| Parameter | B | SE | t | *p* | 95% CI |
|---|---|---|---|---|---|
| Intercept | 1.27 | 1.03 | 1.23 | .223 | [-0.79, 3.33] |
| Information Seeking | 0.25 | 0.09 | 2.89 | .005* | [0.08, 0.43] |
| Generalised Anxiety | -0.12 | 0.10 | -1.23 | .222 | [-0.31, 0.07] |
| Nature Relatedness | 0.27 | 0.08 | 3.24 | .002* | [0.10, 0.43] |
| Mindfulness | -0.16 | 0.32 | -0.51 | .614 | [-0.80, 0.48] |
| Self-Efficacy | 0.02 | 0.07 | .317 | .752 | [-0.11, 0.15] |
| Climate Anxiety | 0.18 | 0.13 | 1.37 | .176 | [-0.08, 0.44] |
| Climate Concern | 0.16 | 0.09 | 1.90 | .062 | [-0.01, 0.34] |

*Note. R2 = .50* (*Adjusted R2 = .45), F*(7, 76) = 10.74, *p* <.001

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

**Figure D1**

*Path Model Diagram with the Results of a Parallel Mediation Analysis with Information Seeking as the Independent Variable, Climate Anxiety and Climate Concern as Mediator Variables and PEB as the Dependent Variable PEB*




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

**Table D6**

*Indirect Effects of Information Seeking on PEB*

| | Effect | Boot SE | Boot 95% CI | Significant |
|---|---|---|---|---|
| Total | .15 | .07 | [0.04, 0.30] | Yes |
| Climate Anxiety | .08 | .06 | [-0.02, 0.20] | No |
| Climate Concern | .07 | .04 | [0.01, 0.15] | Yes |
| Difference in Mediation Effects | .01 | .07 | [-0.13, 0.15] | No |

*Note.* A significant effect is determined when the CI does not include zero.

**Table D7**

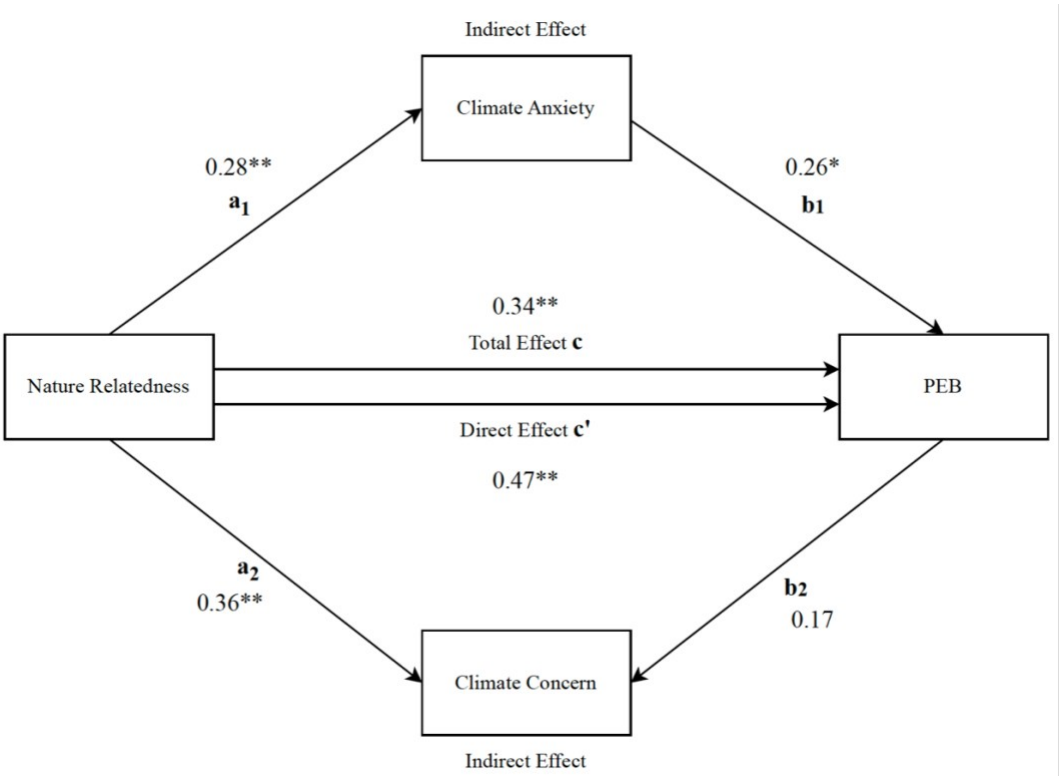
*Standardised Indirect Effects of Information Seeking on PEB*

| | Effect | Boot SE | Boot 95% CI | Significant |
|---|---|---|---|---|
| Total | .17 | .07 | [0.04, 0.32] | Yes |
| Climate Anxiety | .09 | .06 | [-0.03, 0.22] | No |
| Climate Concern | .08 | .04 | [0.01, 0.17] | Yes |
| Difference in Mediation Effects | .01 | .08 | [-0.15, 0.17] | No |

*Note.* A significant effect is determined when the CI does not include zero.

**Figure D2**

*Path Model Diagram with the Results of a Parallel Mediation Analysis with Nature Relatedness as the Independent Variable, Climate Anxiety and Climate Concern as Mediator Variables and PEB as the Dependent Variable PEB*




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

**Table D8**

*Indirect Effects of Information Seeking on PEB*

| | Effect | Boot SE | Boot 95% CI | Significant |
|---|---|---|---|---|
| Total | .13 | .05 | [0.04, 0.25] | Yes |
| Climate Anxiety | .07 | .04 | [0.00, 0.16] | Yes |
| Climate Concern | .06 | .04 | [0.00, 0.14] | Yes |
| Difference in Mediation Effects | .01 | .06 | [-0.10, 0.13] | No |

*Note.* A significant effect is determined when the CI does not include zero.

**Table D9**

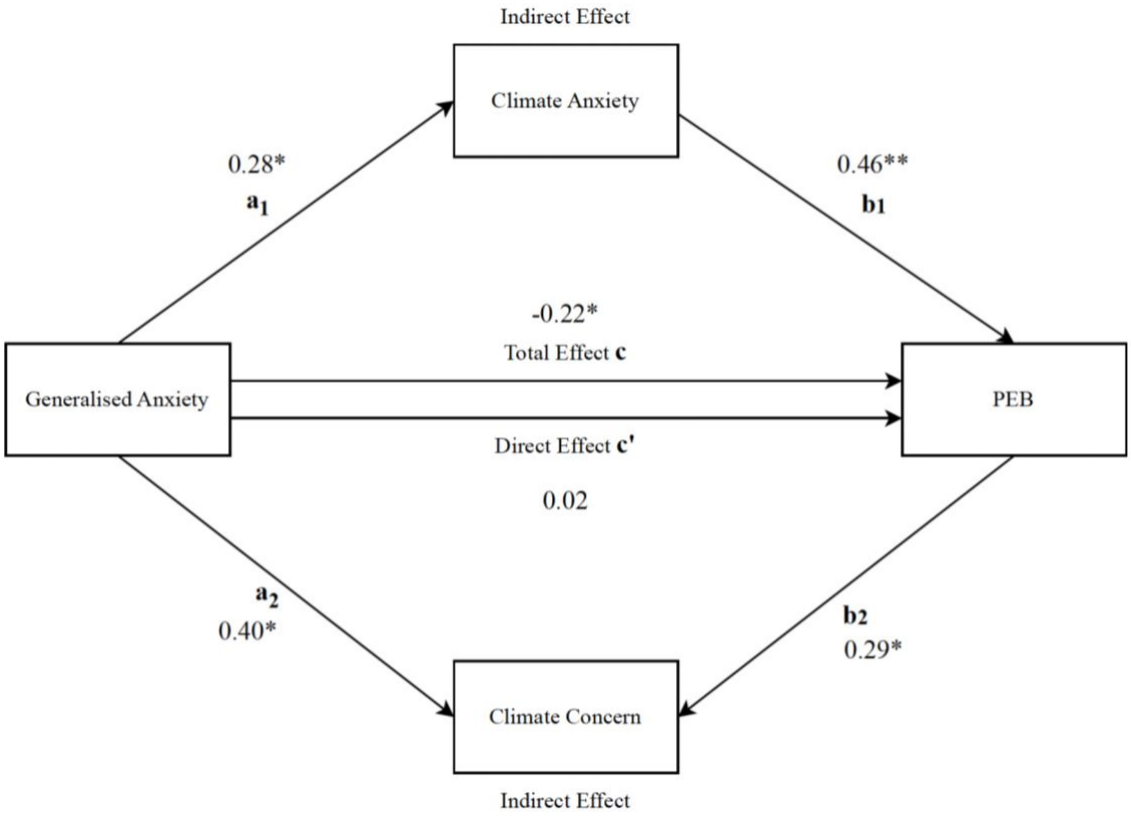
*Standardised Indirect Effects of Information Seeking on PEB*

| | Effect | Boot SE | Boot 95% CI | Significant |
|---|---|---|---|---|
| Total | .16 | .06 | [0.05, 0.29] | Yes |
| Climate Anxiety | .09 | .05 | [0.00, 0.20] | Yes |
| Climate Concern | .07 | .04 | [0.00, 0.17] | Yes |
| Difference in Mediation Effects | .01 | .07 | [-0.12, 0.15] | No |

*Note.* A significant effect is determined when the CI does not include zero.

**Figure D3**

*Path Model Diagram with the Results of a Parallel Mediation Analysis with Generalised Anxiety as the Independent Variable, Climate Anxiety and Climate Concern as Mediator Variables and PEB as the Dependent Variable PEB*




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

**Table D10**

*Indirect Effects of Generalised Anxiety on PEB*

| | Effect | Boot SE | Boot 95% CI | Significant |
|---|---|---|---|---|
| Total | .24 | .08 | [0.09, 0.41] | Yes |
| Climate Anxiety | .13 | .05 | [0.04, 0.23] | Yes |
| Climate Concern | .12 | .05 | [0.02, 0.24] | Yes |
| Difference in Mediation Effects | .01 | .07 | [-0.13, 0.14] | No |

*Note.* A significant effect is determined when the CI does not include zero.

**Table D11**

*Standardised Indirect Effects of Generalised Anxiety on PEB*

| | Effect | Boot SE | Boot 95% CI | Significant |
|---|---|---|---|---|
| Total | .23 | .07 | [0.09, 0.38] | Yes |
| Climate Anxiety | .12 | .05 | [0.04, 0.22] | Yes |
| Climate Concern | .11 | .05 | [0.02, 0.22] | Yes |
| Difference in Mediation Effects | .01 | .06 | [-0.12, 0.14] | No |

*Note.* A significant effect is determined when the CI does not include zero.

# Appendix E

## Residual Plots of Variables

**Figure E1**

*Residual Scatter Plot of Mindfulness (IV) and PEB (DV*

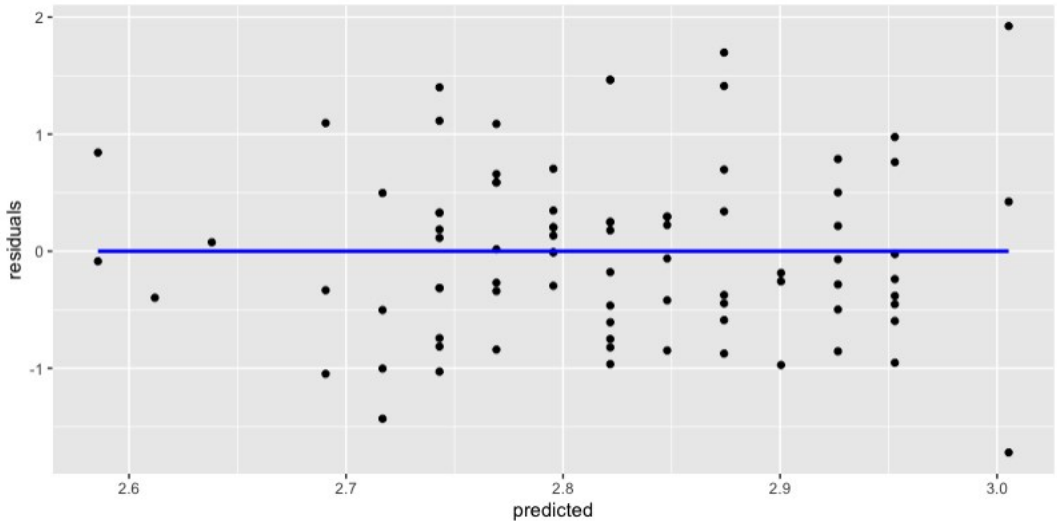



**Figure E2**

*Residual Scatter Plot of Mindfulness (IV) and Climate Anxiety (DV)*

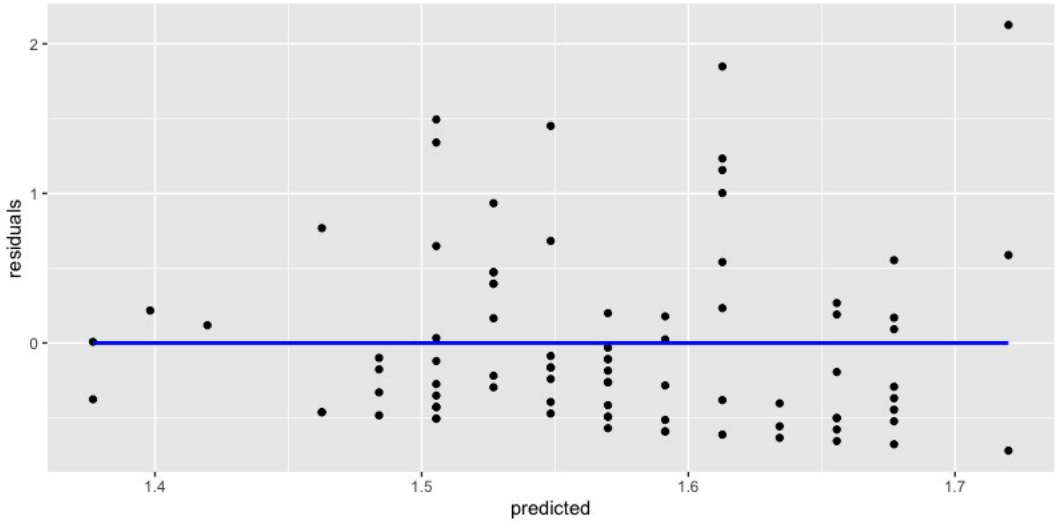


**Figure E3**

*Residual Scatter Plot of Mindfulness (IV) and Climate Concern (DV)*

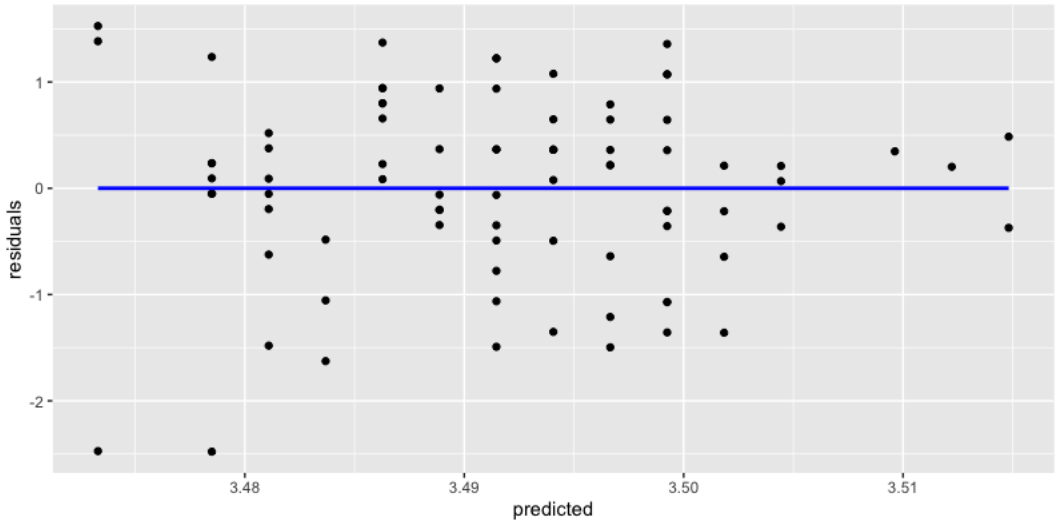



**Figure E4**

*Residual Scatter Plot of Generalised Anxiety (IV) and PEB (DV)*

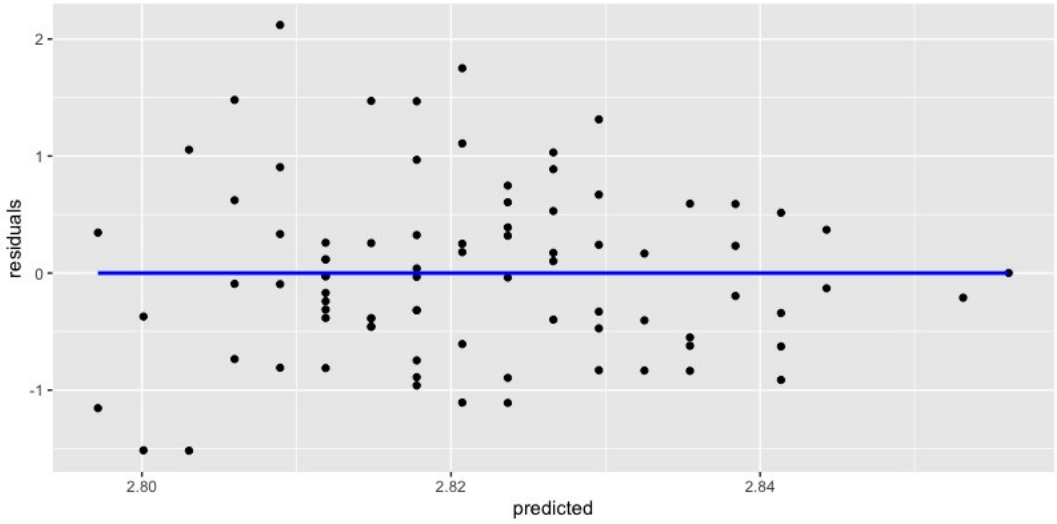


**Figure E5**

*Residual Scatter Plot of Generalised Anxiety (IV) and Climate Anxiety (DV)*

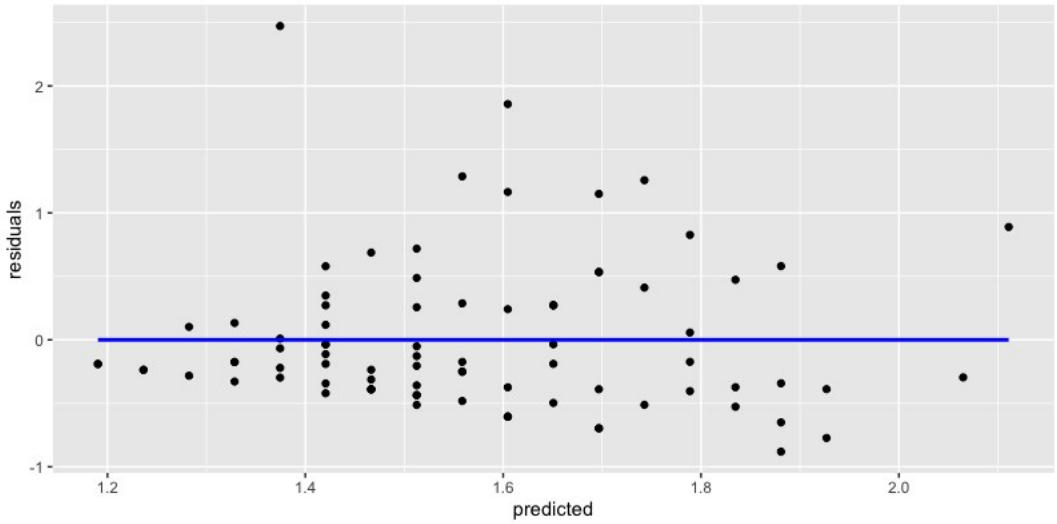



**Figure E6**

*Residual Scatter Plot of Generalised Anxiety (IV) and Climate Concern (DV)*

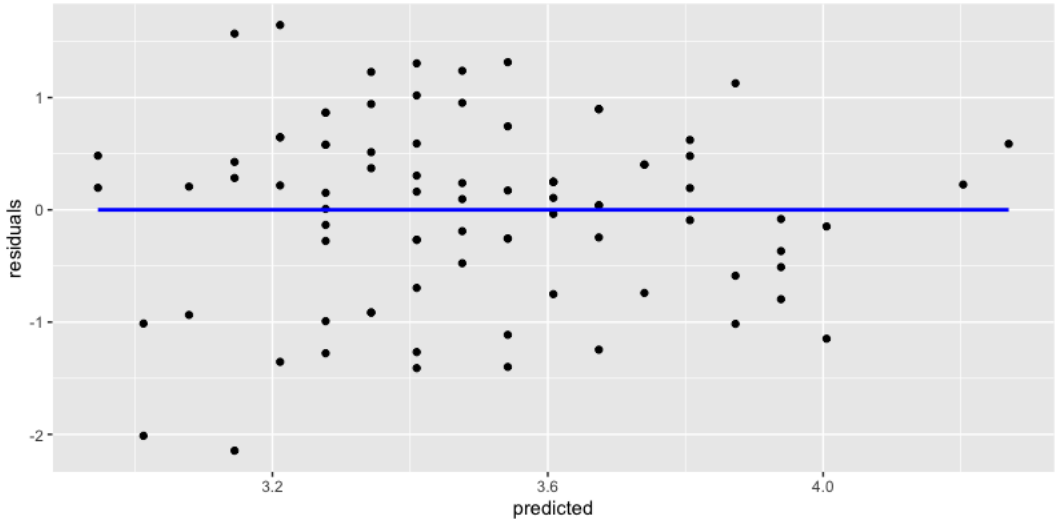


**Figure E7**

*Residual Scatter Plot of Nature Relatedness (IV) and PEB (DV)*

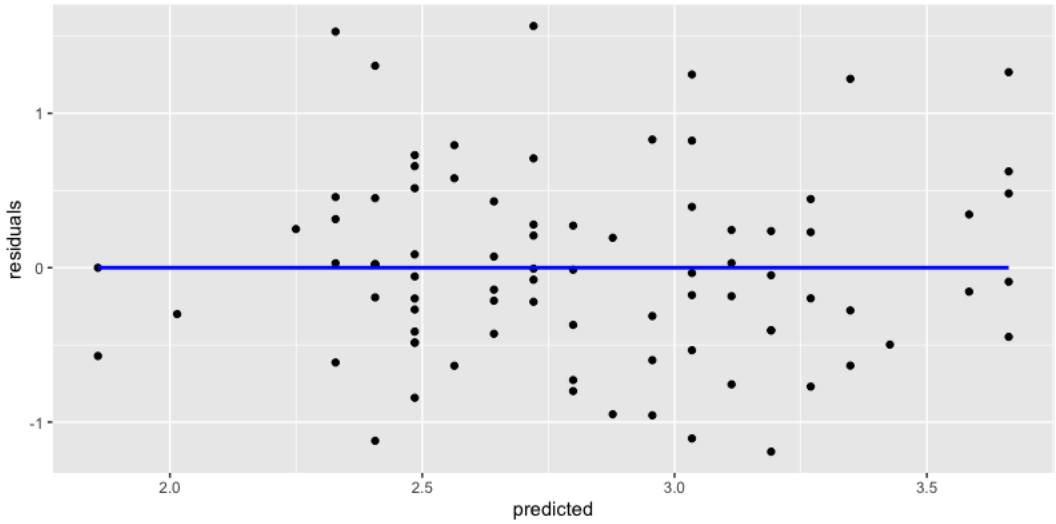



**Figure E8**

*Residual Scatter Plot of Nature Relatedness (IV) and Climate Anxiety (DV)*

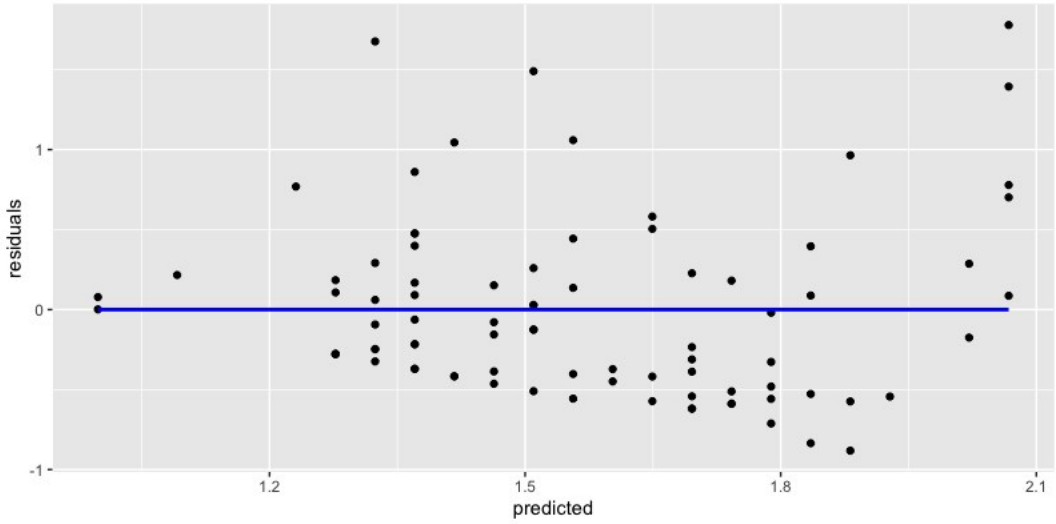


**Figure E9**

*Residual Scatter Plot of Nature Relatedness (IV) and Climate Concern (DV)*

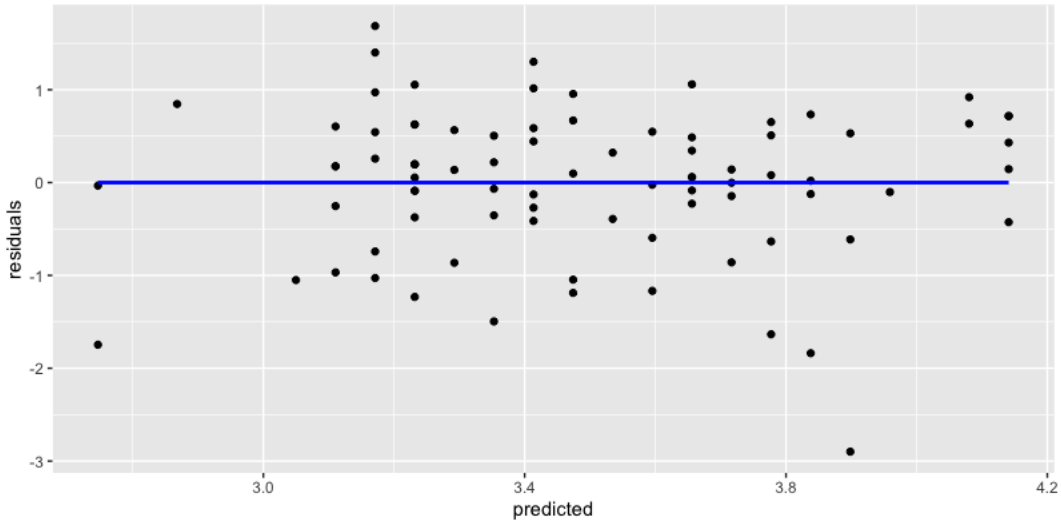



**Figure E10**

*Residual Scatter Plot of Self-Efficacy (IV) and PEB (DV)*

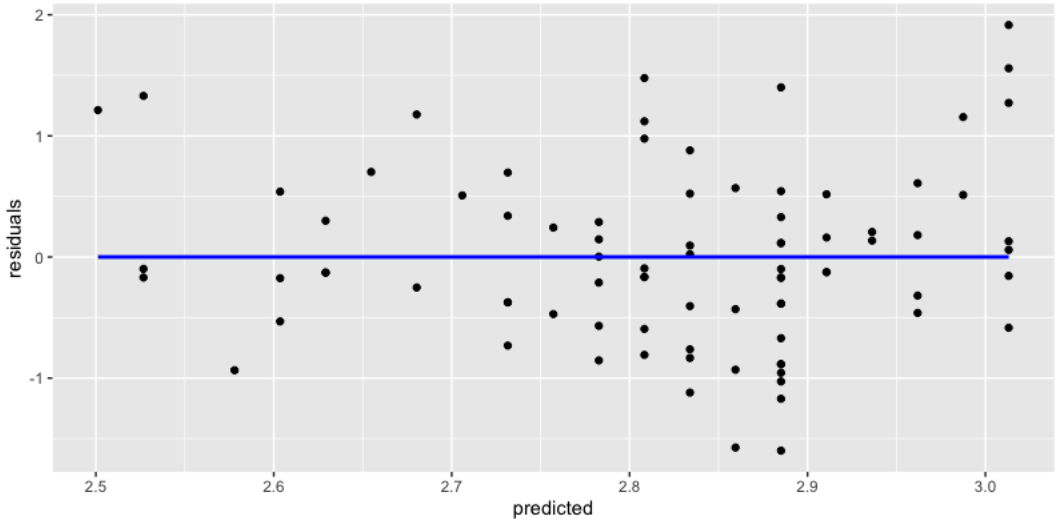


**Figure E11**

*Residual Scatter Plot of Self-Efficacy (IV) and Climate Anxiety (DV)*

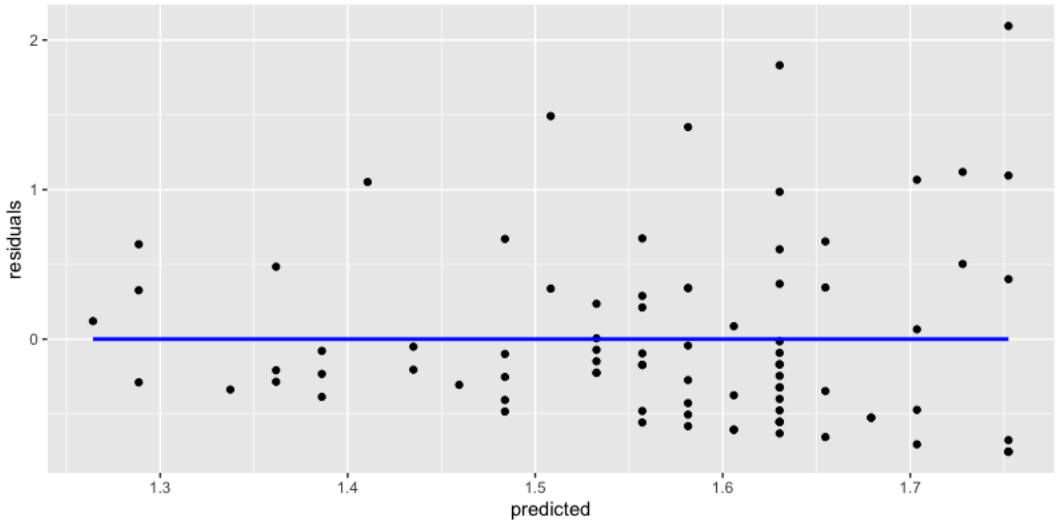



**Figure E12**

*Residual Scatter Plot of Self-Efficacy (IV) and Climate Concern (DV)*

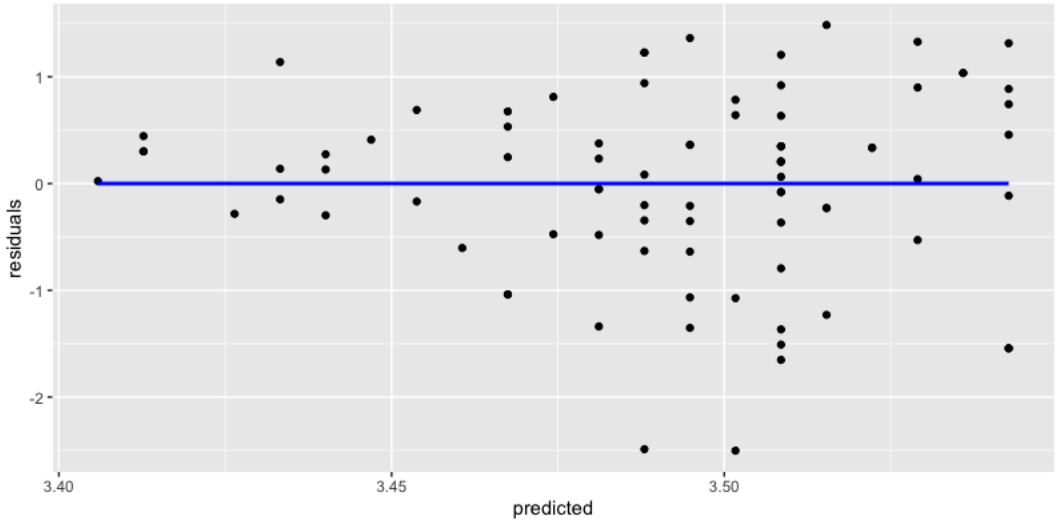


**Figure E13**

*Residual Scatter Plot of Information Seeking (IV) and PEB (DV)*

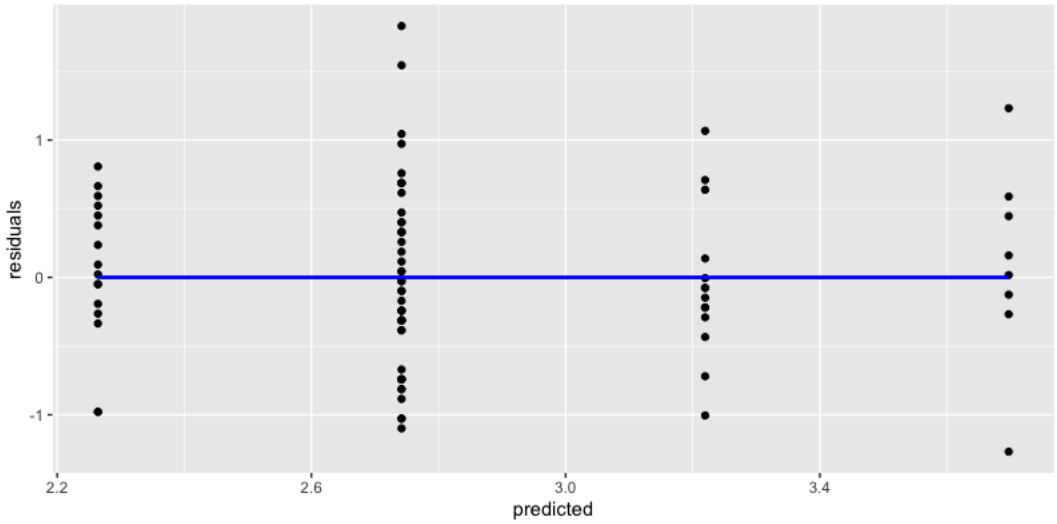



**Figure E14**

*Residual Scatter Plot of Information Seeking (IV) and Climate Anxiety (DV)*

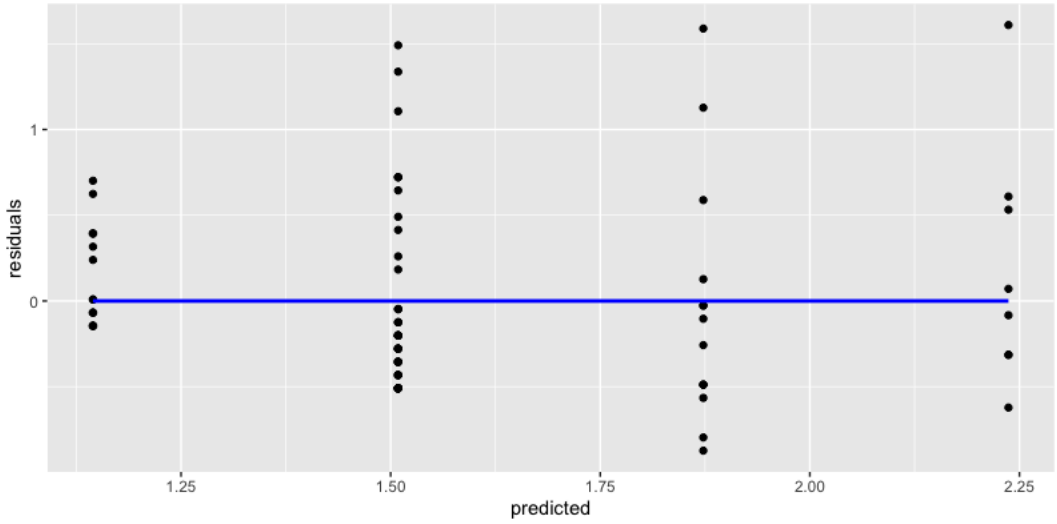


**Figure E15**

*Residual Scatter Plot of Information Seeking (IV) and Climate Concern (DV)*

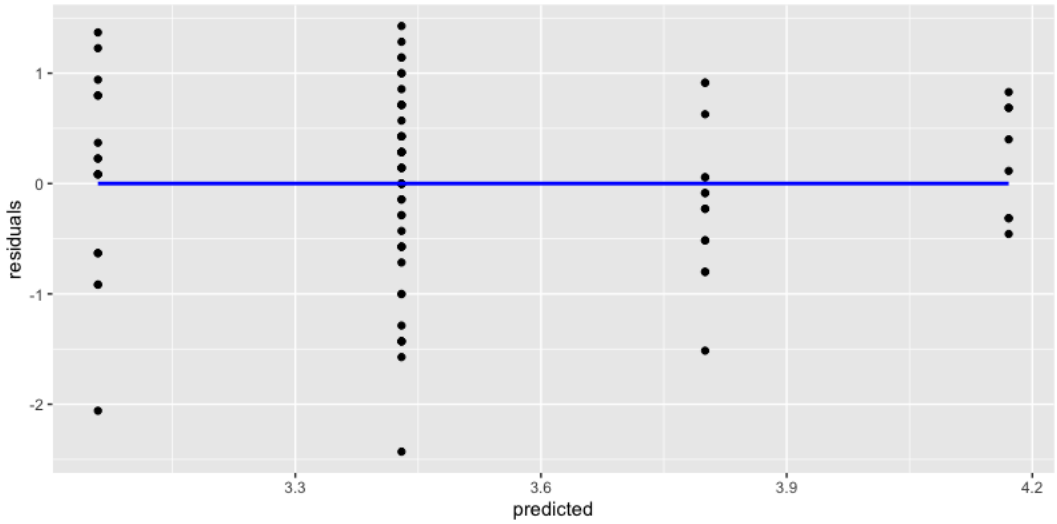



**Figure E16**

*Residual Scatter Plot of Climate Anxiety (IV) and PEB (DV)*

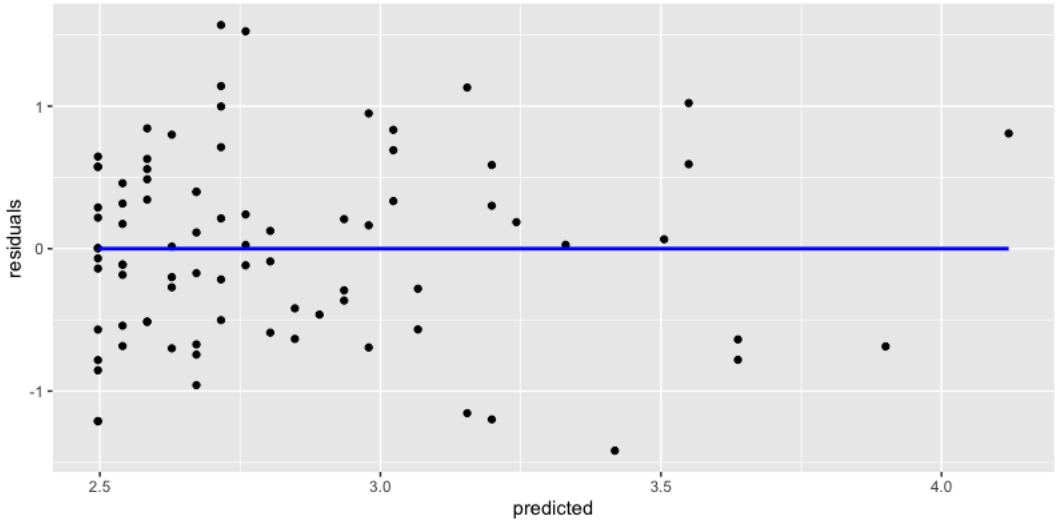
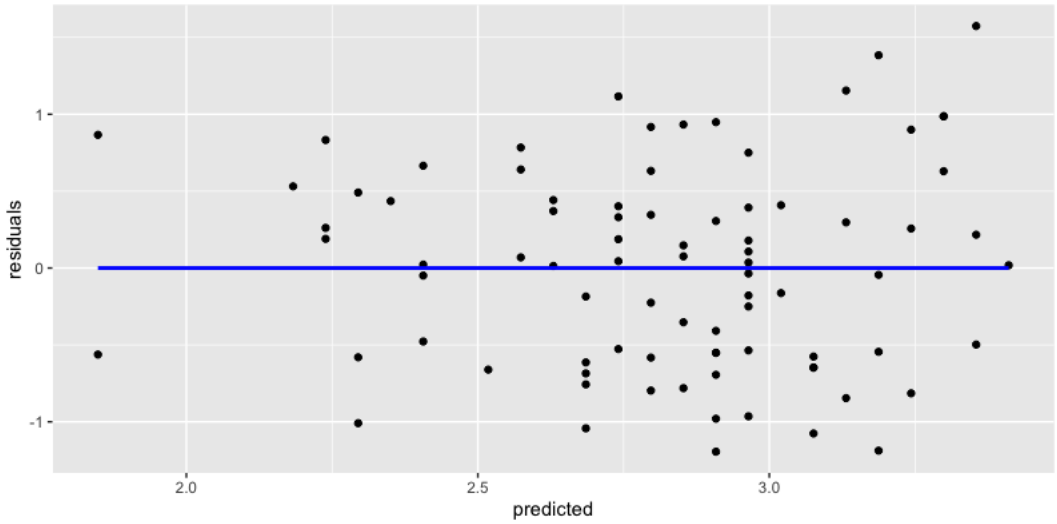


**Figure E17**

*Residual Scatter Plot of Climate Concern (IV) and PEB (DV)*



# Appendix F

## Histograms of Variables

**Figure F1**

*Histogram of Nature Relatedness*

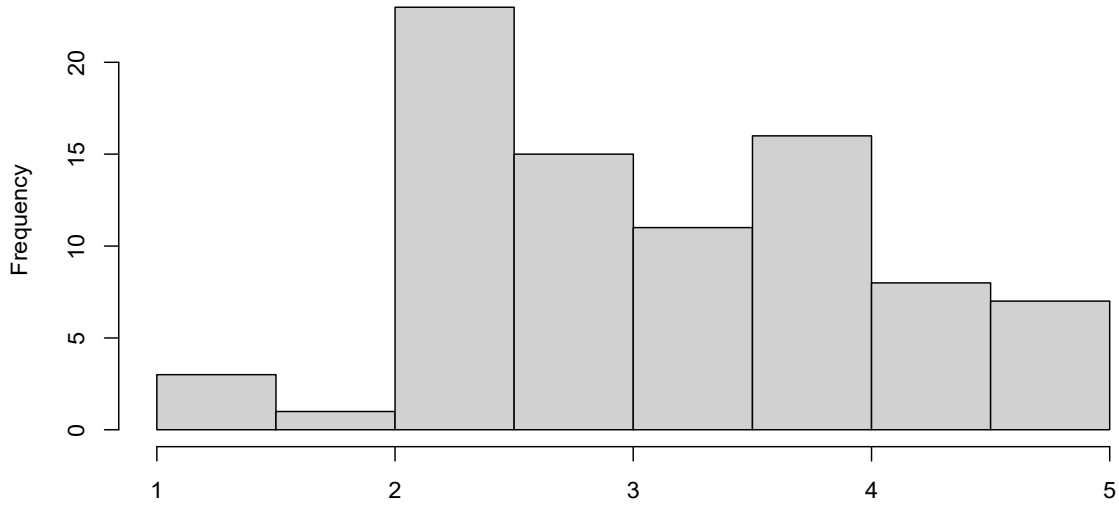



**Figure F2**

*Histogram of Mindfulness*

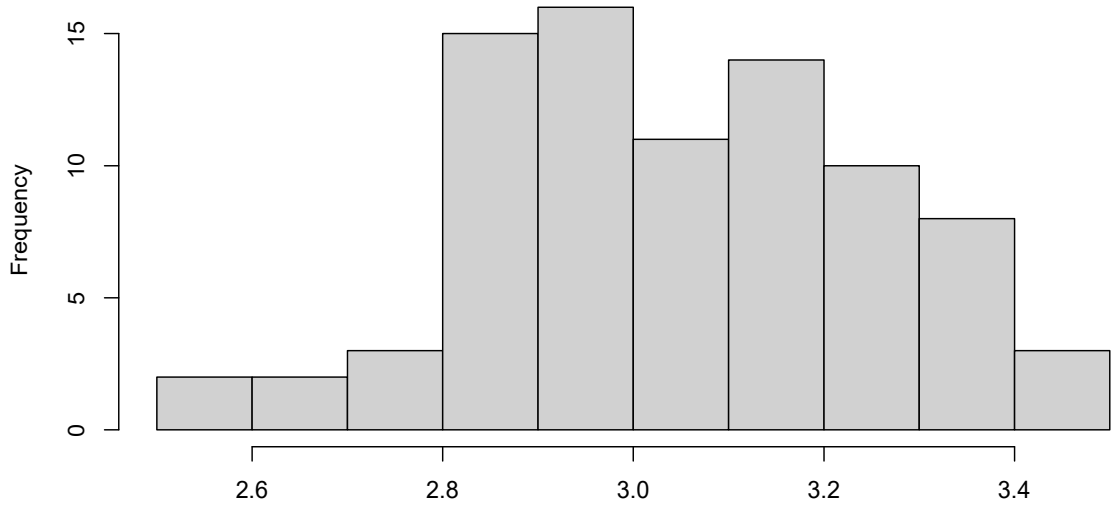


**Figure F3**

*Histogram of Generalised Anxiety*

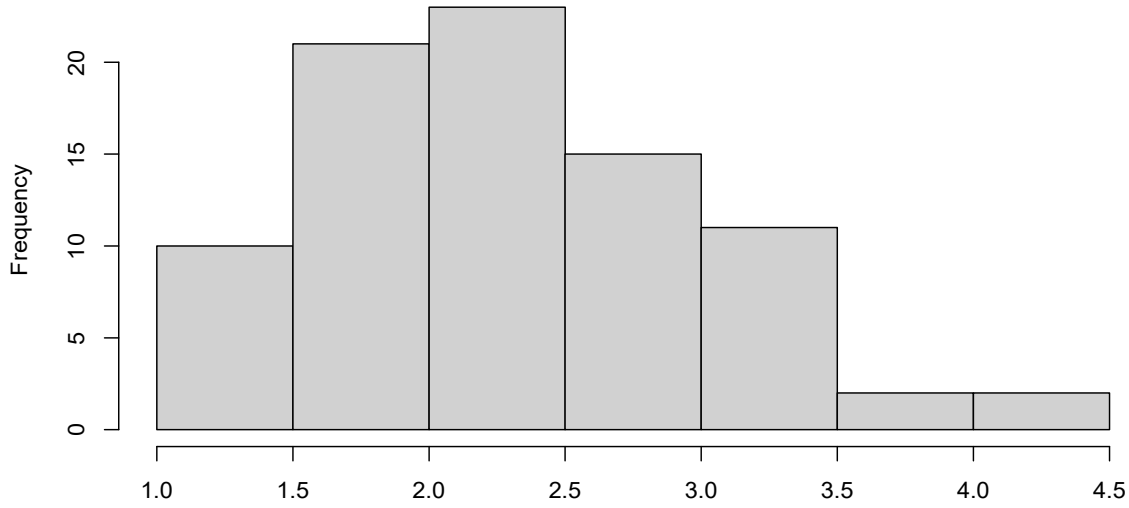



**Figure F4**

*Histogram of PEB*

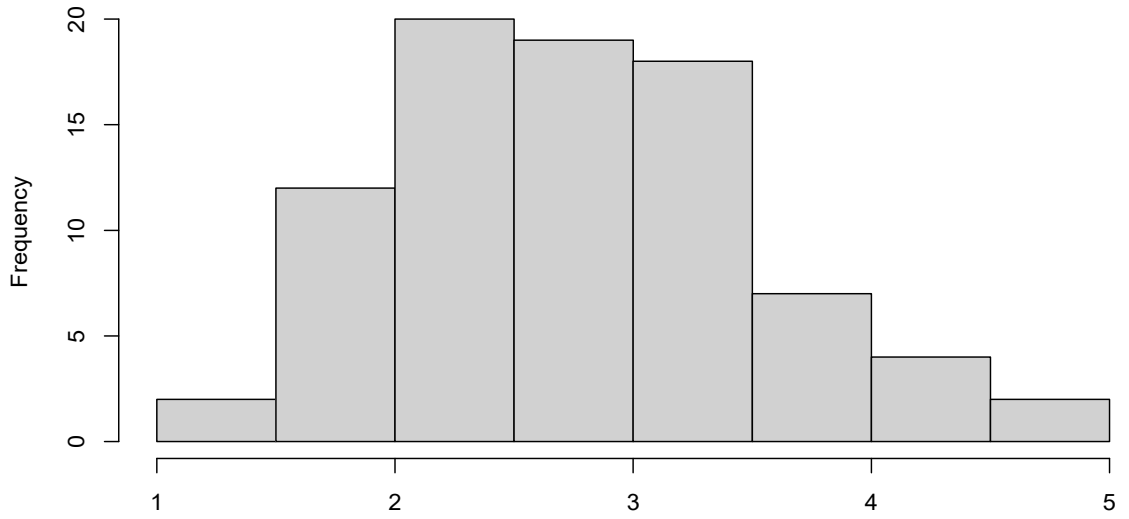


**Figure F5**

*Histogram of Climate Concern*

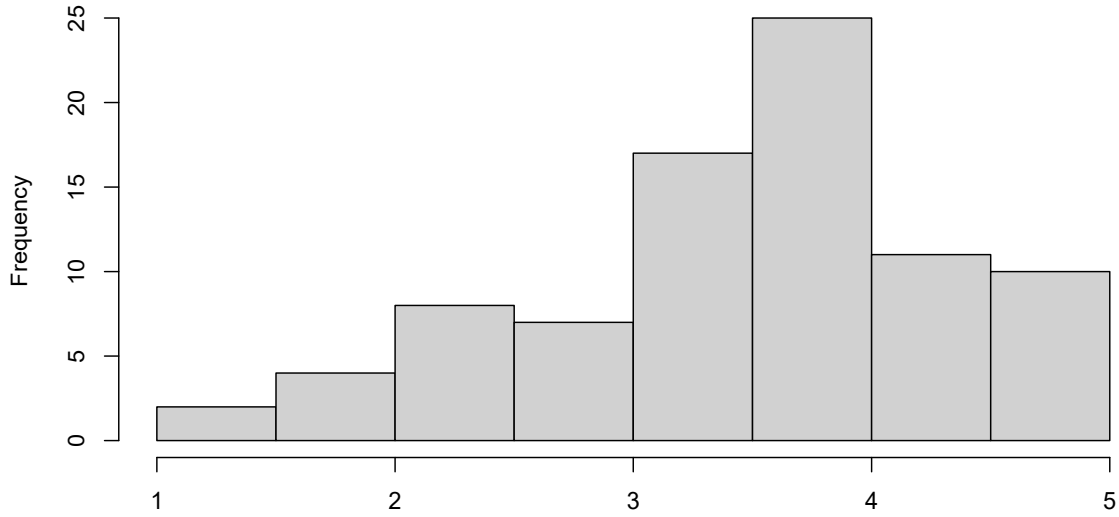



**Figure F6**

*Histogram of Climate Anxiety*

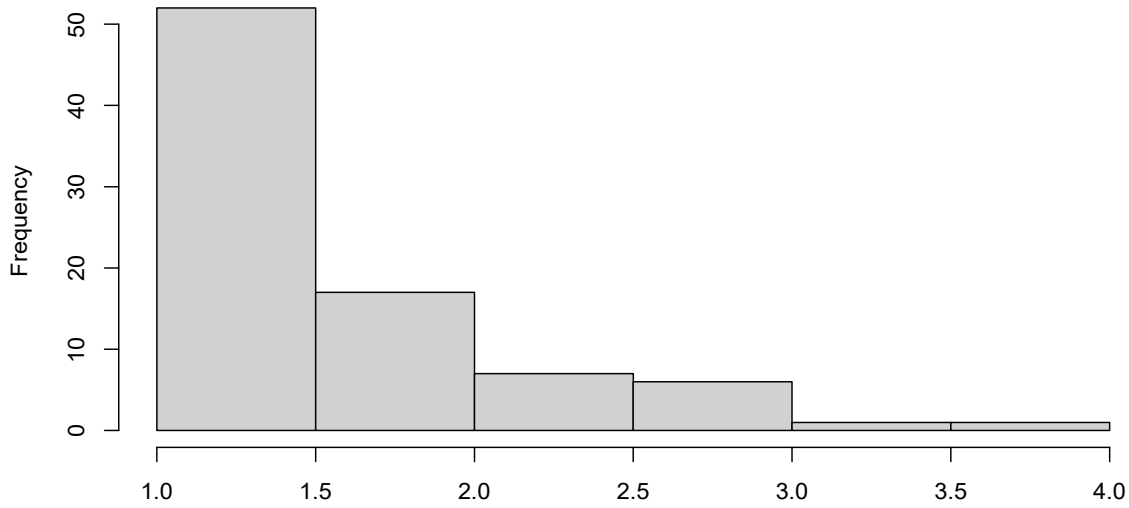


**Figure F7**

*Histogram of Self-Efficacy*

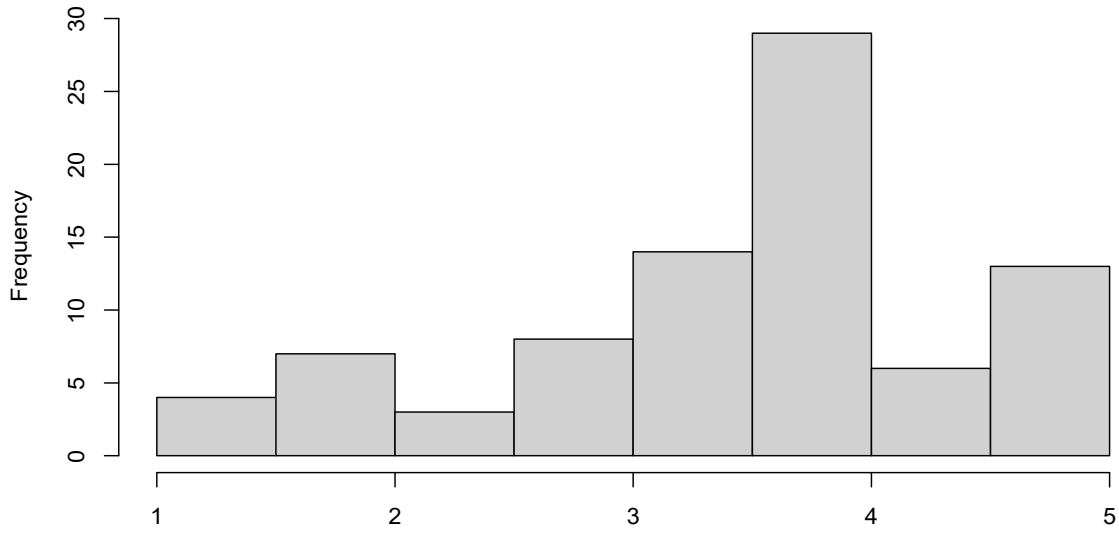
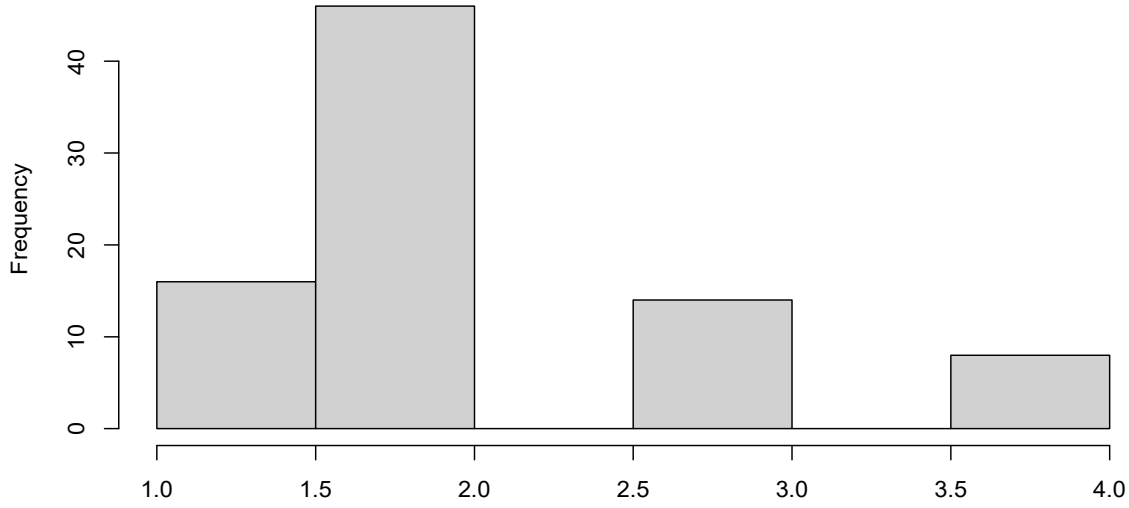



**Figure F8**

*Histogram of Information Seeking*



## Appendix G

## Histogram of Transformed Variables

**Figure G1**

*Histogram of Log-Transformed Variable Measuring Climate Anxiety*

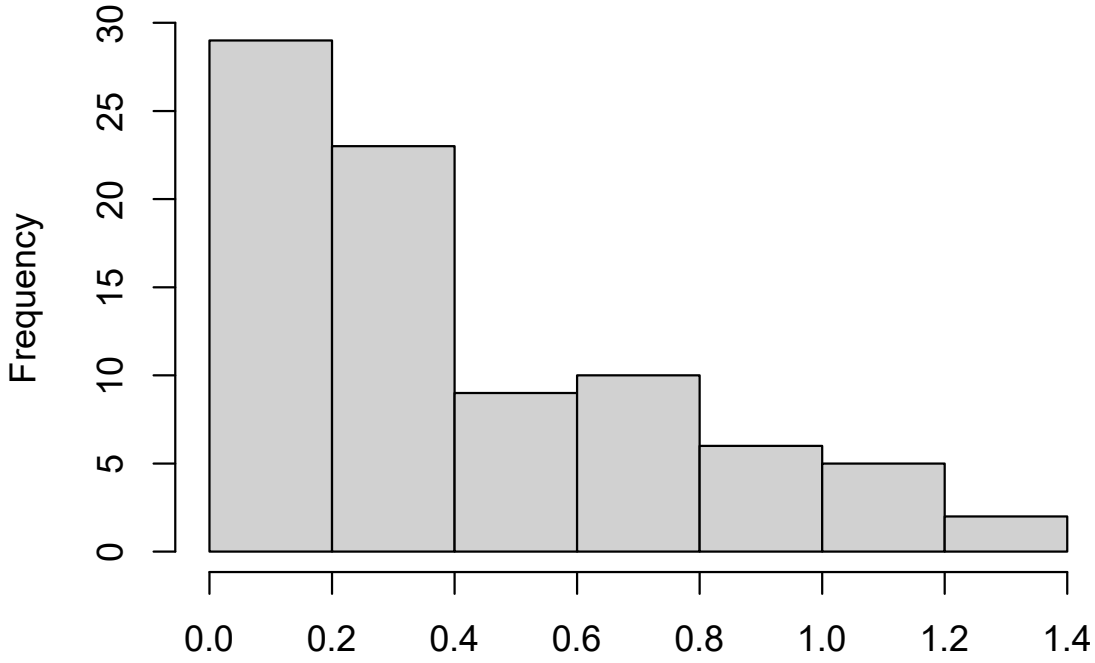



**Figure G2**

*Histogram of Log-Transformed Variable Measuring Climate Concern*

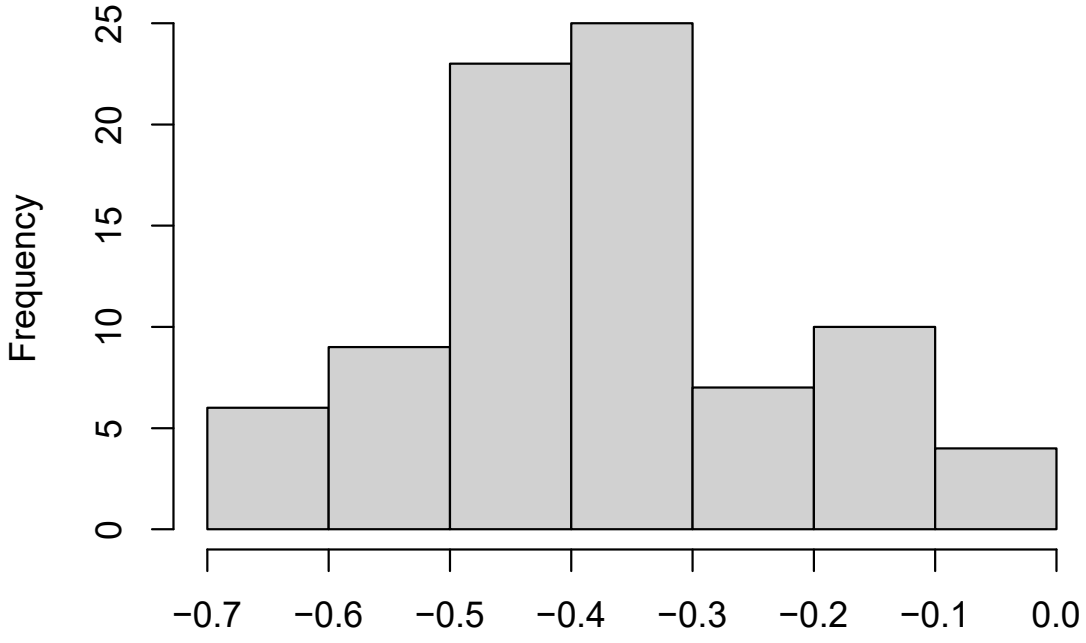


**Figure G3**

*Histogram of Log-Transformed Variable Measuring Self-Efficacy*

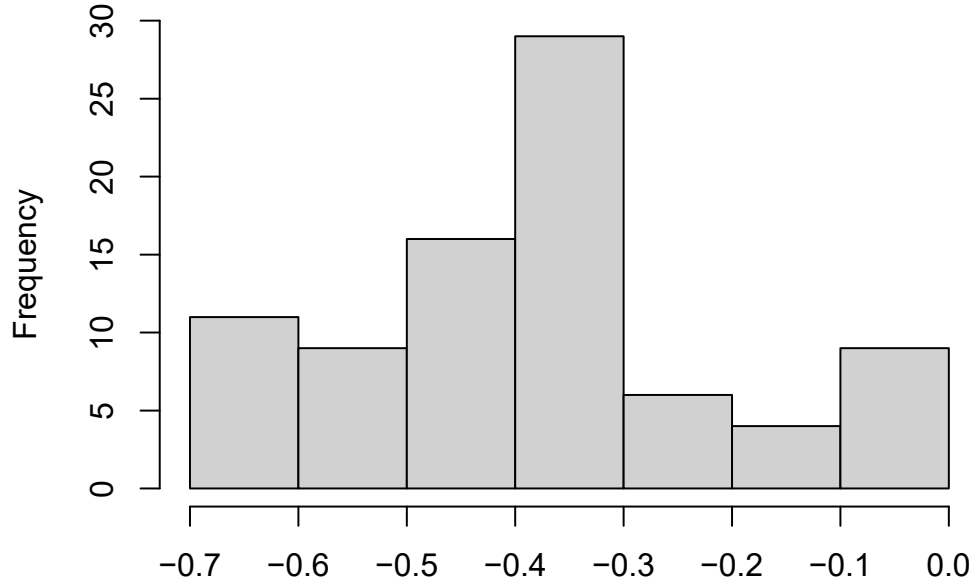



**Figure G4**

*Histogram of Log-Transformed Variable Measuring Information Seeking*