Abstract

Climate change anxiety—overwhelming feelings of distress about climate change—is increasingly recognized as an important mental health consequence of climate change. A growing body of literature has documented positive associations between climate change anxiety, information seeking/avoidance, and pro-environmental behavioral intentions. Recent speculation exists about the possibility of non-linear associations between climate anxiety and other outcomes; for example, among people with very high climate anxiety, information seeking might be lower— because it is too distressing —than among those with moderate anxiety. Similarly, very high levels of climate anxiety might result in lower behavioral intentions. The present research aimed to replicate and extend findings concerning relations between climate anxiety, information seeking/avoidance, and pro-environmental behavioral intentions by correlating these variables and testing for possible non-linearities in the relationships. Results confirmed that climate anxiety was positively correlated with information seeking, avoidance, and a measure of hypothetical behavioral intentions. Quadratic regression models yielded mixed evidence for the presence of non-linearities, with non-linearity present for some variables (e.g., information avoidance and hypothetical behavioral intentions) but not for others (e.g., seeking out data about climate change). We consider implications of our results and discuss directions for future research to bolster understanding of how climate anxiety relates to information seeking, avoidance, and behavior.

Keywords: climate change, climate change anxiety, information seeking, emotion, pro-environmental behavior

Examining the (Non-Linear) Relationships between Climate Change Anxiety, Information Seeking, and Pro-Environmental Behavioral Intentions

1. Introduction

As humanity's carbon budget dwindles (Lamboll et al., 2023) and we experience increasing negative impacts of climate change (e.g., Abatzoglou & Williams, 2016; Li & Otto, 2022), a pressing need exists to attend to the physical and mental health implications of climate change (Adger et al., 2011; Fankhauser, 2017; Manning & Clayton, 2018). In the current paper, we focus on one identified mental health impact—climate change anxiety (Clayton, 2020)—and examine how this anxiety may influence information seeking and avoidance behaviors related to climate change media as well as pro-environmental behavioral intentions. Understanding these processes is important to identifying methods to alleviate extreme climate change distress and to move people from fear to action.

1.1 Emotions and Climate Change

Research on the psychology of climate change has identified emotions such as fear, anger, and anxiety as important features of risk perceptions and decision making (Brosch, 2021). These findings are consistent with functional theories of emotion which propose that emotions evolved to serve specific motivations (Frijda, 1986). Strong negative emotions such as fear and anger, for example, are more associated with climate change policy support than other emotional states such as hope (Wang et al., 2018). Similarly, anger about the climate crisis is associated with engagement in pro-climate activism (Stanley et al., 2021). However, the presence of strong emotions about climate change may also be associated with negative mental health impacts for individuals. Climate change anxiety, sometimes discussed in reference to a broader "eco-anxiety" (Coffey et al., 2021), might be one such impact.

1.2 Defining Climate Change Anxiety

van Valkengoed et al. (2023) defined climate anxiety as "persistent anxiety (apprehensiveness) and worry about climate change, that is difficult to control…", and identified a series of emotional, cognitive, physiological, and behavioral indicators such as nervousness, irritability, muscle tension, fatigue, difficulty concentrating, and sleep disturbances. Climate change anxiety might worsen with direct exposure to negative events such as climate-related disasters, but it can also occur among people without such experiences (Ogunbode et al., 2022). Although the clinical nature of the definition might imply that climate anxiety is inherently maladaptive, researchers frequently note that experiencing anxiety about climate change may be a reasonable response to the severity of the threat (e.g., Clayton & Karazsia, 2020). Furthermore, at moderate levels, negative emotions such as anxiety about climate change may motivate individuals to take pro-climate actions (Whitmarsh et al., 2022). Nonetheless, in a more extreme form, climate anxiety might have significant negative impacts on well-being (van Valkengoed et al., 2023). In an investigation of children and young adults aged 16-25 across ten countries, more than 45% reported negative impacts of worry about climate change on their daily functioning (Hickman et al., 2021). Climate change anxiety correlates positively with measures of generalized anxiety disorder and depression (Clayton & Karazsia, 2020; Wullenkord et al.,

2021). Across countries, it correlates negatively with psychological well-being (Ogunbode et al., 2022).

1.3 Climate Change Anxiety, Information Seeking/Avoidance, and Behavioral Intentions

A growing body of literature examines climate anxiety and its correlates. Central to this research has been the development of the climate anxiety scale by Clayton and Karazsia (2020). This scale aims to capture the dimensions of climate anxiety and can be used to facilitate large-scale, quantitative investigations of such anxiety experiences. Although other scales exist to tap into anxiety about ecological harm more broadly, such as the Hogg eco-anxiety scale (Hogg et al., 2021), we used Clayton's climate-focused climate anxiety scale.

In the present research, we focus on relationships between climate anxiety, information acquisition (both approach and avoidance), and pro-environmental behavioral intentions. We focus on information processes because understanding how and why individuals engage with climate media is essential for understanding how to reach key audiences, potentially treat mental health issues, and translate information into action. Moreover, we focus on behavioral intentions because influential behavior frameworks such as the theory of planned behavior suggest that intentions are important, albeit imperfect, predictors of actual behavior (Ajzen, 1991). In this research, we ultimately operationalize behavioral intentions through a measure which asks respondents to indicate whether they would engage in various behaviors if they were asked. This form of intention measure might be better categorized as a hypothetical intention measure than a true behavioral intention measure. Therefore, throughout the results, we refer to this measure as "hypothetical behavioral intentions". While we believe this measure still carries value as an indicator of abstract intentions, readers should interpret results for this measure with appropriate caution.

Overall, preliminary evidence exists of positive correlations between climate anxiety and both information seeking and avoidance (van Valkengoed et al., 2023). Whitmarsh et al. (2022) found that climate change anxiety related to 1) information exposure ($r = 0.39$)—a self-report of how frequently people get information about climate change from different sources—and 2) climate information seeking ($r = 0.23$)—a self-report of how often they intentionally seek out information about climate change—in relation to climate anxiety. Using a different measure of climate anxiety, Ogunbode et al. (2022) found that climate anxiety was associated with exposure to climate change impacts information, but not solutions information. Wullenkord et al. (2021) correlated climate anxiety with a measure of self-reported avoidance of thinking about climate change, again using Clayton and Karazsia's scale, and found a positive correlation of $r = 0.17$ between these measures.

Positive correlations have also been found between climate anxiety and measures of pro-environmental behavioral intentions. Ogunbode et al. (2022) found climate anxiety to be positively associated with engagement in environmental activism and pro-environmental behavior in their regression models. Similarly, Wullenkord et al. (2021) found a positive correlation between Clayton and Karazsia's (2020) climate anxiety scale and a measure of pro-environmental intentions, $r = 0.44$. However, in their original scale development, Clayton and

Karazsia (2020) failed to find a relationship between climate anxiety and behavioral engagement. Thus, there is mixed evidence regarding the relationship between climate anxiety and behavioral intentions, although there appears to be more evidence in favor of a positive relationship than no relationship.

Drawing on these findings, the first purpose of the present research is to replicate and extend previous findings on climate anxiety's relationships with information seeking, avoidance, and pro-environmental intentions. In doing so, we included two different measures of information seeking, a scale aimed at capturing information avoidance, and a scale of pro-environmental intentions. Because the pro-environmental intentions analysis was not included in our study pre-registration, we present hypotheses for this measure as exploratory.

Hypothesis 1 (H1). Positive correlations will exist between climate change anxiety and measures of information seeking.

Hypothesis 2 (H2). A positive correlation will exist between climate change anxiety and information avoidance.

Exploratory Hypothesis 3 (H3). A positive correlation will exist between climate change anxiety and pro-environmental behavioral intentions.

1.4 Possible Non-Linear Associations with Climate Change Anxiety

Recently, van Valkengoed et al. (2023) published a brief narrative review of climate anxiety research and identified an agenda for future research. One critical point was the potential for non-linearities in the relationship between climate change anxiety and outcomes of interest. Specially, a lack of any anxiety might mean individuals are not motivated to engage in information seeking or other pro-environmental actions; more engagement may occur with more anxiety. However, among individuals experiencing very high levels of climate anxiety, a sense of overwhelming anxiety might paralyze action and promote avoidance. Together, these processes could result in non-linear relationships between climate anxiety and outcomes.

Past research has largely relied on simple correlations and linear regression models to characterize the relationship between climate anxiety and outcomes such as information seeking and pro-environmental behavioral intentions. However, if non-linearities exist, the linear relationships documented by these correlations and regressions would not adequately estimate the true relationship between these variables, potentially under-estimating or over-estimating it. In addition to statistical issues such as under- or over-estimation of correlations, documenting possible nonlinearities also are theoretically important for understanding how individuals cope with climate change-related distress, in this case perhaps by adaptively engaging with information depending on distress levels.

As of this writing, just one study has directly investigated the possibility of non-linear relationships between climate anxiety and behavioral intentions (Hogg et al., 2024). In their analysis, anxiety about environmental issues exhibited a non-linear relationship with pro-environmental behavioral intentions such that initial increases in intentions with increased anxiety were subsequently followed by decreases in intentions at the highest levels of anxiety.

This finding supports the hypothesis of an inverse u-shaped relationship between climate anxiety and pro-environmental behavioral intentions. To our knowledge, no studies have looked at non-linearities in the relationships between climate anxiety and information seeking and avoidance.

Therefore, a second purpose of the present research was to examine possible non-linear relationships between climate change anxiety, information seeking, information avoidance, and pro-environmental intentions. Drawing on van Valkengoed et al. (2023), we would expect a non-linear, inverse u-shaped relationship between information seeking and climate change anxiety such that information-seeking levels would be greatest among those at moderate levels of anxiety and weakest at lower and higher levels of anxiety. Following this same logic, we would expect to see the opposite pattern, i.e., a u-shaped relationship, for climate change anxiety and information avoidance. Specifically, avoidance would be greatest at high levels of anxiety, and lowest at moderate levels of anxiety. Drawing from the findings of Hogg et al. (2024), we expected an inverse u-shaped relationship for pro-environmental behavioral intentions. Again, because the behavioral intentions analysis was not included in our study pre-registration, we frame the hypothesis for this measure as exploratory.

Hypothesis 4 (H4). An inverse u-shaped relationship will exist between climate change anxiety and information seeking.

Hypothesis 5 (H5). A u-shaped relationship will exist between climate change anxiety and information avoidance.

Exploratory Hypothesis 6 (H6). An inverse u-shaped relationship will exist between climate change anxiety and pro-environmental behavioral intentions.

2. Materials and Methods

2.1 Participants

A total of $N = 1{,}532$ individuals from the United States were recruited to participate using Amazon Mechanical Turk and the Cloud Research platform. After removing those who did not consent and did not finish the study as described in our preregistered analysis plan (LINK BLINDED FOR PEER REVIEW), we had $N = 1{,}503$ participant data available for analysis. Participants reported an average age of 45 years ($SD = 13$), with a minimum age of 20 and maximum of 85. Table 1 provides the full demographic information on the sample. Table S1 in the online supplement compares some of our basic demographic measures against those in the most recent U.S. census (where comparable data exist). Compared with the population, our sample had higher education, more individuals identifying as white, and a lower median household income. This study was approved by the [BLINDED FOR PEER REVIEW] institutional review board (IRB #11182019.027). Data collection for this project was one component of a larger survey for which we collected the maximum number of participants that we could financially afford to collect; thus, a priori power analyses were not performed for this manuscript.

Table 1

Participant Demographics (N =1,503)

Variable	***Level***	***n***	***%***
Education	HS Degree or GED	362	24
	2-year college	246	16
	4-year college	648	43
	Master's	198	13
	PhD or Professional	49	3
Income	Less than 10k	55	4
	10-19,999	102	7
	20-29,999	126	8
	30-39,999	143	10
	40-49,999	171	11
	50-59,999	160	11
	60-69,999	135	9
	70-79,999	117	8
	80-89,999	90	6
	90-99,999	89	6
	100-119,999	101	7
	120-149,999	99	7
	150,000 or more	114	8
Gender	Woman	696	46
	Man	782	52
	Transgender	3	< 1
	Non-binary/Non-conforming	10	1
	Other	1	< 1
	Prefer not to respond	11	1
Race	White (non-Hispanic)	1185	79
	Black	115	8
	Hispanic	57	4
	Asian	100	7
	Native American	2	< 1
	Middle Eastern	3	< 1
	Multiple	36	2
	Other	5	< 1
Political Party	Republican Party	430	29
	Democratic Party	800	53
	Libertarian Party	57	4
	Green Party	22	1
	Other	194	13
Political Ideology	Very conservative	106	7
	Conservative	284	19
	Moderate	373	25
	Liberal	494	33
	Very liberal	246	16

2.2 Measures

2.2.1 Climate Anxiety

Clayton and Karazsia's (2020) scale was used to measure climate anxiety. The scale consists of 13 questions assessing the extent to which participants experience anxiety about the threat of climate change, seeking to measure ways in which such anxiety impairs functioning. The original scale was devised to have two subscales, one for cognitive/emotional impairment (8 items; e.g., "Thinking about climate change makes it difficult for me to concentrate") and one for functional impairment (5 items; e.g., "My concerns about climate change interfere with my ability to get work or school assignments done"), although most research uses the global index of all 13 items (Whitmarsh et al., 2022; Wullenkord et al., 2021). The only modification we made from the original scale was to switch the outcome scaling from a 1-5 frequency scale (1 = *never*, 5 = *almost always*) to a traditional Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). We felt that these anchors were more intuitive for the wording of the scale items. The full 13-item scale was highly reliable, Cronbach's $\alpha = 0.94$. Consistent with past research, the scale had a low average score, $M = 1.5$, $SD = 0.61$.

Although we retain use of the full 13-item scale for the main analyses, we also report analyses involving the two subscales in the supplementary materials. The cognitive/emotional subscale had a Cronbach's $\alpha = 0.90$, $M = 1.5$, $SD = 0.63$. The functional subscale had a Cronbach's $\alpha = 0.85$, $M = 1.5$, $SD = 0.65$. The two subscales were highly correlated—$r = 0.85$ [*95% CI* = 0.84, 0. 87], $p < 0.001$, $R^2 = 72.55\%$—and exhibited similar results.

2.2.2 Climate Media Seeking

To assess participants' media seeking behaviors related to climate change, seven survey items were created for the purpose of this study. We measured how frequently participants reported looking at news about climate change by asking: "In general, about how often do you look at news about climate change from the following sources?" The following sources were included: local newspapers, national newspapers, television news, social media, internet websites (excluding social media), radio, and talking with others (friends, family, and/or work colleagues). These items were measured on a 5-point frequency scale with the following options: *never, 1-2 times per year, 2-4 times per month, 1-4 times per week, 5 or more times per week.* A reliable composite was created by averaging together responses to these items, $M = 2.27$, $SD = 0.76$, Cronbach's $\alpha = 0.80$. Additional information on the psychometric properties of this composite measure can be found in the online supplement.

As noted by a reviewer of an earlier version of this manuscript, it can be reasonably argued that "talking with others" might not conceptually fit with the other media seeking measures. Although our principal components analysis (see online supplement) suggests that this rating statistically fits with the others, we have elected to also run our analyses on the media seeking measure after excluding the "talking with others" measure. These results are provided in the online supplement (see Table S8), and substantively match those reported in the main text.

2.2.3 Climate Data Seeking

In addition to measuring climate change media seeking in general, we also included two items to specifically measure participants' consumption of data related to climate change, such as statistics and graphs. These items were created for the purpose of this study. One of these items

captured this consumption in general ("In general, how often do you look at graphs and statistical information concerning climate change?") on a 5-point scale with the following response options: *never, 1-2 times per year, 2-4 times per month, 1-4 times per week, 5 or more times per week.* A second item asked participants to report on their consumption of such media in the past week ("In the past week, how many days did you look at graphs and statistical information concerning climate change"). These two items were correlated at $r = 0.65$ [*95% CI* = 0.62, 0.68], $p < 0.001$, $R^2 = 42.68\%$. A composite was created by first z-scoring each measure to place them on a common scale ($M = 0$, $SD = 1$), and then aggregating the z-scores together, $M = 0$, $SD = 0.91$.

2.2.4 Climate Information Avoidance

Whereas the prior measures assessed seeking of information, we also included items to specifically assess avoidance of information. We developed three new items for this purpose. The first asked participants "Do you find yourself actively trying to avoid news about climate change?", followed by a second item which asked, "Do you find yourself actively trying to avoid new statistics about climate change?". A third item asked participants "Do you feel 'glued' to news about climate change, as if you can't stop following it?" which we intended to include in the composite after reverse-scoring the item. Each item was scored on a 5-point Likert scale (1 = *strongly disagree,* 5 = *strongly agree*). However, the reverse-scored item did not correlate in the expected direction with these two items, meaning that the reverse-scored item had negative rather than positive correlations with the two non-reverse-scored items. Our preregistered analysis plan considered this as a possibility, and therefore we instead formed a two-item composite of the active avoidance items and retained the third item as a separate, additional measure of media seeking (i.e., we did not reverse-score the measure). The two avoidance items were highly correlated, making a reliable composite, $r = 0.84$ [*95% CI* = 0.83, 0.86], $p < 0.001$, $R^2 = 71.14\%$. The avoidance composite had $M = 1.74$, and $SD = 0.91$.

2.2.5 Hypothetical Pro-Environmental Behavioral Intentions

Hypothetical pro-environmental behavioral intentions were measured using a 5-item scale created for this research. Participants were given the following prompt: "If asked, how willing do you think you would be to do each of the following?" The five items included: "Reduce your household energy use."; "Reduce your meat consumption."; "When possible, take other forms of transit (bike, bus) instead of driving."; "Reduce your household water use."; and "Learn more about how to reduce your carbon footprint.". Each item was scored on a 4-point scale ranging from 1 = *not at all* to 4 = *a great deal*. These items were averaged together into a reliable composite index: $M = 2.75$, $SD = 0.84$, Cronbach's $\alpha = 0.87$. A principal components analysis performed on this measure is provided in the online supplement, which confirmed that validity of treating this measure as a single composite index. As noted in the introduction, this measure can be more accurately described as a measure of hypothetical behavioral intentions, which might be further removed from actual behavior than other possible measures of intentions.

2.3 Data Analysis

To test our hypotheses, we performed a series of correlational analyses using Pearson's *r* correlation coefficients and quadratic regression modeling. Our analysis plan was preregistered except for the analyses marked as exploratory. The pre-registration can be found here: [LINK BLINDED FOR PEER REVIEW]. H1's analysis consists of testing whether there are positive correlations between climate anxiety and the two separate information seeking measures, i.e., the media seeking and data seeking composites. Because the third item created for the information avoidance battery is technically an information seeking item (i.e., "Do you feel 'glued' to news about climate change, as if you can't stop following it?"), we report the results of the correlational analysis for this variable with the other results for H1. For H2, we tested whether a positive correlation existed between climate anxiety and the information avoidance composite. Exploratory H3 tests for the positive correlation between climate anxiety and hypothetical pro-environmental behavioral intentions.

Testing H4 and H5 involved performing a series of quadratic regression models to test for inverse-u (H4) and u-shaped (H5) relationships between climate anxiety and each of the information approach (H4) and avoidance (H5) measures. Similarly, exploratory H6 tests for the inverse-u relationship between climate anxiety and hypothetical pro-environmental behavioral intentions. For each model, climate anxiety was entered as the predictor and the other variable was entered as the outcome. Linear and quadratic terms were entered to model both trajectories. To reduce collinearity in these terms (non-linear terms tend to be highly collinear), we used orthogonal polynomial regression terms, which are scaled to reduce the collinearity. For all analyses, we used a p-value threshold of $p < 0.05$ as indication of statistical significance, in line with our preregistered analysis plan.

In addition to testing each hypothesis with the full climate anxiety composite measure, we also performed separate exploratory models for each of the two climate anxiety subscales. These analyses were highly similar to those reported for the full composite scale, and thus we report these additional exploratory analyses in the supplementary materials. In addition, due to substantial skew in the climate anxiety measure, as a robustness check we also performed identical analyses where we winsorized (Dixon & Tukey, 1968) the climate anxiety measure. Winsorization was done by assigning any value greater than 1.5*interquartile range to the next lowest value lying at 1.5*interquartile range, i.e., 3.38. These analyses, which can be found in the online supplement, are substantively similar to the results reported in the main text.

All analyses were performed using R version 4.3.2 (R Core Team, 2023). Data analysis was performed using base R functions (e.g., lm for linear modeling), with additional plotting support from ggplot2 (Wickham, 2016) and patchwork (Pedersen, 2024). The data and code necessary to reproduce the reported findings can be found along with the pre-registered analysis plan here: LINK BLINDED FOR PEER REVIEW.

3. Results

3.1 Descriptive Statistics of Study Measures

Table 2 provides a summary of the descriptive statistics for each of the primary study measures. Some measures, especially climate anxiety, had skewness statistics exceeding a value of one, indicating skew in the data.

Table 2

Descriptive Statistics of Study Measures

	Mean	*SD*	*Median*	*MAD*	*Skewness*	*SE*
Climate Anxiety	1.50	0.61	1.23	0.34	1.59	0.02
Media Seeking	2.27	0.76	2.14	0.85	0.51	0.02
Data Seeking	0.00	0.91	-0.09	0.82	0.89	0.02
"Glued" Seeking Variable	1.75	0.97	1.00	1.58	1.23	0.02
Information Avoidance	1.74	0.91	1.50	0.74	1.35	0.02
Hypothetical Behavioral Intentions	2.75	0.84	2.80	0.89	-0.34	0.02

Note. SD = standard deviation. MAD = median absolute deviation. SE = standard error.

3.2 Correlations Among Dependent Measures

There was a positive correlation between the media and data seeking variables: $r = 0.62$ [*95% CI* = 0.59, 0.65], $p < 0.001$, $R^2 = 38.45\%$. No significant correlations emerged between the media seeking variables and the information avoidance measures. Specifically, the correlation between media seeking and avoidance was $r = 0.01$ [*95% CI* = -0.04, 0.06], $p = 0.755$, $R^2 < 0.10\%$, and the correlation between data seeking and avoidance was $r = 0.02$ [*95% CI* = -0.03, 0.07], $p = 0.345$, $R^2 < 0.10\%$. The 'glued' to climate media variable was positively correlated with media seeking, $r = 0.43$ [*95% CI* = 0.38, 0.47], $p < 0.001$, $R^2 = 18.19\%$, and data seeking, $r = 0.45$ [*95% CI* = 0.41, 0.49], $p < 0.001$, $R^2 = 20.34\%$. The 'glued' to climate media variable was also positively correlated with the information avoidance composite, $r = 0.18$ [*95% CI* = 0.13, 0.23], $p < 0.001$, $R^2 = 3.12\%$.

The media seeking variable was positively associated with hypothetical pro-environmental intentions, $r = 0.42$ [*95% CI* = 0.37, 0.46], $p < 0.001$, $R^2 = 17.34\%$. The data seeking variable was also positively correlated with hypothetical behavioral intentions, $r = 0.38$ [*95% CI* = 0.34, 0.42], $p < 0.001$, $R^2 = 14.54\%$. The 'glued' to climate media variable was positively correlated with hypothetical pro-environmental intentions, $r = 0.32$ [*95% CI* = 0.28, 0.37], $p < 0.001$, $R^2 = 10.32\%$. Finally, information avoidance was negatively associated with hypothetical pro-environmental intentions, $r = -0.13$ [*95% CI* = -0.18, -0.08], $p < 0.001$, $R^2 = 1.70\%$.

3.3 Hypothesis 1: Media Seeking and Data Seeking

Consistent with H1, a positive correlation emerged between climate anxiety and the media seeking composite measure, $r = 0.43$ [*95% CI* = 0.39, 0.47], $p < 0.001$, $R^2 = 18.66\%$. There was also a positive correlation between climate anxiety and the data seeking composite measure, $r = 0.44$ [*95% CI* = 0.40, 0.48], $p < 0.001$, $R^2 = 19.25\%$. For the 'glued' variable, there

was a positive correlation with climate anxiety, $r = 0.59$, [*95% CI* = 0.55, 0.62], $p < 0.001$, $R^2 = 34.43\%$. H1 was supported.

3.4 Hypothesis 2: Information Avoidance

H2 also was supported, despite the lack of correlation between information seeking and avoidance measures. Climate anxiety was positively correlated with climate information avoidance, $r = 0.28$, [*95% CI* = 0.23, 0.33], $p < 0.001$, $R^2 = 7.79\%$. However, the magnitude of this association was about half of the size of the correlations documented in H1.

3.5 Exploratory Hypothesis 3: Hypothetical Pro-Environmental Behavioral Intentions

H3 was supported. There was a moderate, positive correlation between climate anxiety and hypothetical pro-environmental behavioral intentions, $r = 0.28$ [*95% CI* = 0.24, 0.33], $p < 0.001$, $R^2 = 8.01\%$.

3.6 Hypothesis 4: Quadratic Models of Information Seeking Variables

To test H4, separate quadratic regression models were fit for: a) media seeking, b) data seeking, and c) the "glued" to information variable originally intended to be reverse scored for the avoidance composite. As the "glued" variable is a single ordinal item as opposed to a composite measure, we report on the results of regression models in which this item is treated as linear as well as an ordinal probit. The results were similar; for simplicity, we rely on the linear model when discussing the results and for subsequent exploratory analyses. Table 3 provides the parameter estimates and statistical significance thresholds for each model term. Figure 1 plots the linear and quadratic curves for each model.

For media seeking, a significant linear pattern existed between climate anxiety and media seeking. The quadratic regression term was only marginally significant ($p = 0.085$), although it was in the expected direction (see Figure 1). When performing this same analysis after excluding the "talking with others" rating from the media seeking measure, the quadratic regression term remained non-significant (see online supplement, Table S8). For the data seeking measure, the linear trend was again significant, but the quadratic term was not ($p = 0.728$). Thus, for these two measures, there was not significant support for H4.

However, for the "glued" measure, we did find evidence of a significant quadratic term. As depicted in Figure 1, at higher levels of climate anxiety, participants were less likely to report being "glued" to climate change news than would be predicted by the linear regression line. The shape of this relationship, however, is not a clean inverse-u shape as predicted by H4, although the pattern is in the expected direction. Thus, H4 is partially supported and only for the "glued" measure.

At the suggestion of a reviewer, we also performed the quadratic regression models after first log-transforming each of the dependent variables to improve normality, which can be found in Table S9 of the online supplement (see Figure S4 for a plotted version). In these models, we found significant support for a quadratic effect in the predicted direction for media seeking, data seeking, and the "glued" to climate news variable. However, as this data transformation was not

preregistered, we interpret these results as tentative and exploratory, and present them in the online supplement.

Table 3

Regression Results for Hypotheses 4-6

Outcome Variable	*Term*	*b*	*SE*	*t-value*	*p-value*
Information seeking variables					
Media Seeking R^2 = 18.82%	Intercept	2.27	0.02	128.45	< 0.001
	Linear	12.71	0.68	18.57	< 0.001
	Quadratic	-1.18	0.68	-1.72	0.085
Data Seeking R^2 = 19.26%	Intercept	-1.02	0.13	-7.65	< 0.001
	Linear	0.70	0.15	4.74	< 0.001
	Quadratic	-0.01	0.04	-0.35	0.728
"Glued" Seeking Variable (as linear) R^2 = 34.99%	Intercept	1.75	0.02	86.98	< 0.001
	Linear	22.02	0.78	28.18	< 0.001
	Quadratic	-2.82	0.78	-3.61	< 0.001
"Glued" Seeking Variable (as ordinal probit) Nagelkerke's R^2 = 37.20%	Linear	29.27	1.24	23.55	< 0.001
	Quadratic	-7.71	1.13	-6.85	< 0.001
Information avoidance measure					
Information Avoidance R^2 = 8.19%	Intercept	1.74	0.02	77.32	< 0.001
	Linear	9.87	0.87	11.28	< 0.001
	Quadratic	2.23	0.87	2.55	0.011
Hypothetical pro-environmental behavioral intentions measure					
Hypothetical Behavioral Intentions R^2 = 10.03%	Intercept	2.75	0.02	134.44	< 0.001
	Linear	9.17	0.79	11.56	< 0.001
	Quadratic	-4.60	0.79	-5.80	< 0.001

Note. For the ordinal probit model, we report a z-value, not a t-value.

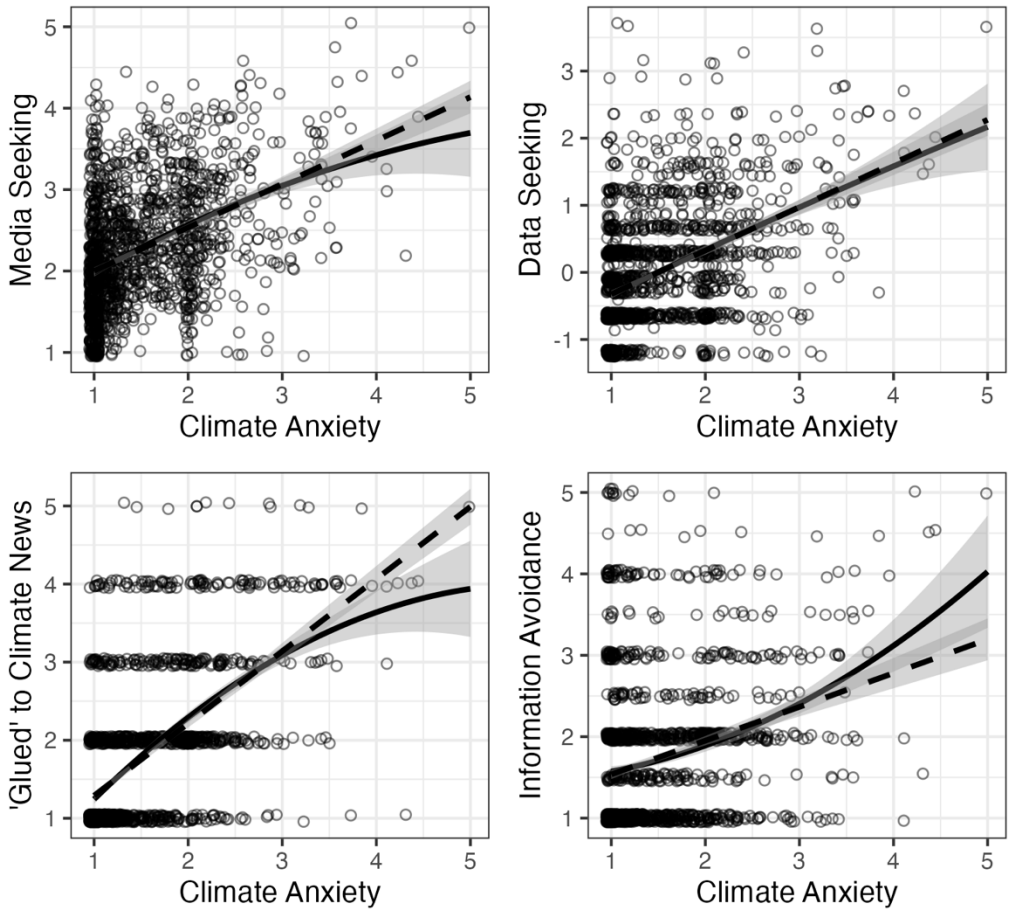
3.7 Hypothesis 5: Quadratic Model of Active Information Avoidance

Table 3 provides the parameter estimates for the avoidance model, and the bottom-right panel of Figure 1 provides a plot of the results. Consistent with the correlational analysis, a significant positive linear relationship existed between climate anxiety and information avoidance. There was also evidence for a significant u-shaped pattern at the upper end of the climate anxiety scale, such that at high levels of anxiety avoidance increases by a greater amount than what can be captured by the linear curve alone. We did not, however, see evidence for non-linearities at the lower end of the climate anxiety, i.e., avoidance is not higher at the lowest levels of anxiety. Thus, partial support existed for the u-shaped pattern of H5. We again also performed this analysis after first log transforming the information avoidance measure to improve

normality. In the log transformed model, the quadratic term for information avoidance was not significant (see Table S9 and Figure S4 in the online supplement). However, again, as this analysis was not preregistered, it should be interpreted with caution.

Figure 1

Linear and Quadratic Relationships between Climate Anxiety and Information Approach and Avoidance Measures



Note. Figure 1 depicts the associations between climate anxiety and each of the four outcome measures of information seeking and avoidance. Scatterplot datapoints are plotted with a small amount of jittering to improve visualization. Dashed lines reflect linear regression lines and solid black lines reflect quadratic regression lines. Shaded areas are 95% confidence intervals of the regression lines. For each model, the linear regression lines are significant at the $p < 0.001$ level. The quadratic regression lines are significant at the $p < 0.05$ in the bottom two panels only.

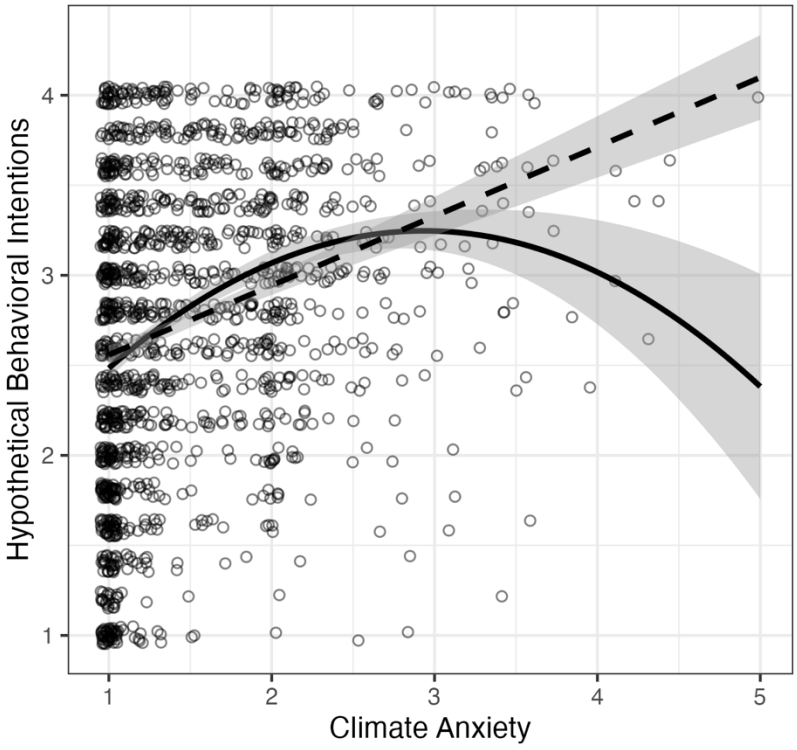
3.8 Exploratory Hypothesis 6: Quadratic Model of Hypothetical Pro-Environmental Behavioral Intentions

Our exploratory research question asks whether there is an inverse u-shaped relationship between climate anxiety and hypothetical pro-environmental behavioral intentions. Results of the

quadratic regression model reveal a significant linear trend as well as a significant quadratic trend. Consistent with our expectations, a significant non-linear relationship emerged between climate anxiety and hypothetical pro-environmental intentions such that hypothetical behavioral intentions are higher among those with moderate climate anxiety, compared to lower and higher climate anxiety (see Figure 2). Finally, we again performed this model after log transforming the hypothetical behavioral intentions measure. In this model the results remained consistent with those reported here (see Table S9 and Figure S4 in the online supplement).

Figure 2

Linear and Quadratic Relationships between Climate Anxiety and Hypothetical Pro-Environmental Behavioral Intentions.



Note. Figure 2 depicts the association between climate anxiety and hypothetical pro-environmental behavioral intentions. Scatterplot datapoints are plotted with a small amount of jittering to improve visualization. Dashed lines reflect linear regression lines and solid black lines reflect quadratic regression lines. Shaded areas are 95% confidence intervals of the regression lines. Both the linear and quadratic regression slopes are significant at the $p < 0.001$ level.

4. Discussion

The purpose of this research was two-fold. We sought to: 1) replicate and extend findings from prior research on the relationship between climate change anxiety, information

seeking/avoidance, and pro-environmental behavioral intentions and 2) test for non-linearities in the associations between these measures.

Consistent with past research and in support of our hypotheses, we found that people higher compared to lower in climate change anxiety reported greater information seeking (H1), more information avoidance (H2), and greater pro-environmental intentions (H3). These findings replicate past research and extend it to novel measures of information seeking and avoidance. They further suggest that information avoidance in the context of climate change is not necessarily the opposite end of the spectrum from information seeking; individuals experiencing climate change anxiety appear to be simultaneously motivated to approach and avoid information. Despite these shared positive correlations, one unexpected result was that our measures of information seeking and avoidance were not themselves correlated. This finding indicates that such measures can be orthogonal in the context of climate change anxiety, and measurement approaches need to assess each process independently rather than treating the inverse of one as a proxy for the other. Consistent with findings from Wullenkord et al. (2021) and others, we found a positive correlation between climate anxiety and hypothetical pro-environmental behavioral intentions.

Mixed results emerged when assessing the possible presence of non-linearities in relationships of climate change anxiety with our outcomes. For information-seeking H4, a significant quadratic relationship existed in the predicted direction only for our measure of being 'glued' to climate media. The effect was only marginally significant for media seeking and was nonsignificant for data seeking. We speculate that participants may have had an easier time responding on the agreement scale for the "glued" measure than the time-frequency scale (e.g., 1-2 times per year, 1-4 times per week) used in the other information-seeking scales, thus allowing their feelings to guide responses and the nonlinearity to appear. For information-avoidance H5 (also assessed on an agreement scale), we found support for significant non-linearity in the hypothesized direction. Moreover, for hypothetical behavioral intentions H6, we found clear support for a non-linear, inverse u-shaped relationship with climate anxiety, consistent with Hogg et al. (2024).

For each non-linear hypothesis, the shape of the non-linear pattern was not as pronounced as the u and inverted-u shapes hypothesized by van Valkengoed et al. (2023). Instead, non-linearities existed only at the upper end of the climate change anxiety scale, where responses were more extreme and fewer datapoints existed. Finally, in follow-up analyses examining results for the sub-composites of the climate change anxiety scale as well as a winsorized version of the total scale, we saw largely consistent results (see the online supplement). In fact, after performing the winsorization procedure, the results appear stronger in some cases (e.g., the quadratic slope for media seeking becomes significant, $p < 0.05$), suggesting that our results were not solely driven by the limited data points at the upper end of the anxiety scale.

4.1 Limitations and Future Directions

There are several limitations to the present findings. As noted previously, it is possible that the non-linearities were more difficult to observe using the Clayton and Karazsia (2020)

measure, given that the scale consistently exhibits substantial skew with only a small number of participants falling at the upper end of the scale. This makes it quite difficult to detect non-linearities at the upper-end of the scale. As a result, future research will need to collect larger samples to generate a more robust estimate at the upper end of the distribution, or deliberately sample from groups expected to be higher in climate anxiety. Alternatively, or in addition, research should consider replicating and extending these results using other measures related to climate change anxiety, such as those used by Ogunbode et al. (2022). Comparing the results for climate anxiety against more general, holistic measures of negative climate change affect might also be a fruitful direction for future research. More generally, as can be seen from the descriptive statistics in Table 2, several study measures exhibited statistical skew in their measurement. When exploratory follow-up models were performed in which we first log transformed each of the skewed dependent measures, we found significant quadratic effects consistent with H4 (media and data seeking) and H6 (hypothetical behavioral intentions), but not H5. Given that the results appear somewhat sensitive to how we deal with skewness in the data, future research would benefit by developing refined and statistically validated survey measures which possess less skew than those presented here.

Consistent with past research, our measures of information seeking/avoidance and hypothetical pro-environmental intentions are all based on self-report scales. Future research should consider adopting experimental approaches to test for non-linearities. Moreover, it bears repeating that our measure of behavioral intentions is abstract, being measured through a hypothetical scenario. This form of intention measure is likely an additional step removed from actual behavior compared with traditional behavioral intention measures. As such, results for this measure perhaps best capture a form of general motivation rather than strictly behavioral intentions. The results for this measure, therefore, should be interpreted with caution as it is likely several steps removed from actual behavior. In future research, a behavioral task could be developed to test whether individuals of varying levels of climate change anxiety choose to selectively expose themselves to climate change information in an experimental setting. Studies of the relationship between anxiety and actual pro-environmental behavior would also provide a better estimate of the relationship than our measure of intentions, even though intentions can be a good, albeit imperfect, predictor of behavior (Ajzen, 1991).

Another possibility not explored in this research is whether differentiating between types of climate change information might influence our results. Ogunbode et al. (2022), for example, found climate change anxiety to be associated with exposure to information about climate change impacts such as stories about natural disasters linked to climate change, but not about climate solutions such as stories about progress being made on reducing greenhouse gas emissions. The measures used in the present study are not able to differentiate how different types of climate change information might influence approach and avoidance processes. Future research should examine, for example, whether people—and especially those higher in climate anxiety—avoid media coverage of climate change's impacts more than its solutions, as the solutions information might be less distressing. In conjunction with the experimental approach identified above, it might be possible to experimentally test for relationships between climate change anxiety and seeking/avoidance in different types of information.

Another avenue for future research would be to develop theory and experimental tests to examine whether interactions exist between climate change anxiety and other psychological constructs which might influence the relationships between anxiety, information seeking/avoidance, and pro-environmental behavior. Van Valkengoed et al. (2023), for example, highlighted the potential for multiple emotions to work in conjunction with one another to affect decision making. Those high in climate anxiety and approach-oriented emotions such as anger might be more likely to seek out information, less likely to avoid it, and more likely to engage in certain forms of environmental behavior, for instance. Empirical study of the valence vs discrete emotion approach would also be valuable to both emotion theory and our understanding of the psychology of climate change (see Peters et al., 2004 for an example of such study in a different domain).

Finally, future research would benefit from additional theorizing and empirical investigation into the underlying mechanisms at play in the relationships described in this manuscript, as well as possible moderators of the observed relationships. One possibility, for example, is that the relationship between climate anxiety and, e.g., media seeking, might be related to the coping mechanisms individuals employ to deal with distressing information. Future research should consider incorporating measures of information regulation and coping styles, or propose alternative constructs, which might help us further unpack and understand the relationship between climate anxiety and outcomes of interest.

4.2 Conclusion

In conclusion, this research used a correlational design to examine the relationship between climate change anxiety and information seeking, avoidance and pro-environmental behavioral intentions, while also testing for non-linearities in these relationships. Replicating and extending past research, we found positive associations between climate change anxiety, information seeking and avoidance, as well as pro-environmental intentions. We also found partial support for the hypothesis that non-linear relationships exist between climate change anxiety, information seeking/avoidance, and pro-environmental intentions. Future research should aim to extend the results, ideally through experimental testing and consideration of psychological variables which might moderate these relationships.

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