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Exploring the Relationship between Subjective Social Disconnectedness and Climate Change Anxiety

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ABSTRACT

Climate change is contributing to mental health challenges globally and there is a need to identify pathways that can mitigate these effects. Relational factors that are linked with higher resilience and improved mental health are understudied in relation to climate distress. We examine the association between social (dis)connection and climate change anxiety among a sample of individuals, aged 16+, living in British Columbia, Canada. Cross-sectional online surveys administered between May and December 2021 were conducted with a sample of participants recruited via online social media advertisements. We conducted multivariable linear regression analyses to assess associations between social disconnection and climate change anxiety. Mediation analyses were also conducted to assess if generalized psychological distress mediated the pathways of interest. Findings revealed that (a) subjective social disconnection was associated with greater climate change anxiety, and (b) this effect was mediated by higher levels of generalized psychological distress. Dominance analyses revealed social disconnection and political orientation as key contributors to climate change anxiety. We conclude that building resilience through supportive social networks and communities may mitigate the harmful effects of climate change anxiety. Interventions may benefit from group-based and community-building modalities. Further research on such interventions is needed.

Keywords: *Climate Change Anxiety; Non-specific Psychological Distress; Subjective Social Disconnection*

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INTRODUCTION

Average global atmospheric, oceanic, and surface temperatures are increasing (Masson-Delmotte et al., 2021). These increases are driven primarily by atmospheric emissions from human activities and worsened by natural cyclical processes (He & Silliman, 2019; Masson-Delmotte et al., 2021). Given past performance towards emissions targets aiming to curtail the negative effects of climate change, it is unlikely in the near-term that we will achieve meaningful reductions in human atmospheric emissions in order to stave off the worsening, cascading, and accelerating impacts of climate change (Masson-Delmotte et al., 2021). As such, climate change poses considerable challenges to people across the globe (Watts et al., 2015).

Challenges associated with climate change include increased prevalence and intensity of heat waves, forest fires, excessive precipitation, floods, and other natural disasters (Watts et al., 2015). These events destroy agriculture, livestock, greenspace, and housing—in turn compounding existing emotional, psychological, and existential problems already facing individuals and society (Morganstein & Ursano, 2020). To date, researchers have documented experiences of worry, anxiety, sorrow, pain and hopelessness in relation to climate change (H. L. Berry et al., 2010; Clayton, 2020; Fergusson et al., 2014; First et al., 2017; Vergunst & Berry, 2022; Wardell, 2020). These functional emotional responses in turn have resulted in climate change-related mental health conditions such as anxiety, post-traumatic stress, and depression (Bratu et al., 2022; Clayton, 2020, 2021). Climate change also exacerbates and amplifies existing social inequities and preexisting mental health challenges and can also intensify the impacts of social and health issues that are already under resourced. There is a growing concern among researchers and practitioners that people suffering from climate change anxiety may represent "sentinel populations" and that these problems will only continue to worsen as the threat to our environments, livelihoods, and homes increases (Clayton, 2021; Jordan & Huitema, 2014; Usher et al., 2019).

Existing approaches to address climate change primarily focus on technological innovation (e.g., improving buildings, levies, carbon capture) and emergency response systems (e.g., disaster relief counselling; (Weinstein et al., 2019). However, intensifying, cascading, and accelerating consequences of climate change will make it increasingly difficult to adequately respond to climate-related threats – particularly those that impact not only built infrastructure, but also human health (Vergunst & Berry, 2022). As such, there is a need to pre-emptively build "pre-traumatic resilience" rather than solely address post-traumatic distress. This can be accomplished by investments that support individuals holistically and focus on upstream prevention of climate change and poor mental health (Döring et al., 2015; Feldmeyer et al., 2019; McEvoy et al., 2013; Morecroft et al., 2012; Patel et al., 2017).

In particular, investments to build resilience are needed to support the mental health of individuals and populations facing climate change (Babić et al., 2020; Döring et al., 2015; Feldmeyer et al., 2019; Patel et al., 2017; Roeckner et al., 2021). Among multiple factors, social connectedness is a key contributor to individual and community resilience. In fact, most scientific instruments of resilience measure some dimension of social support, including the Connor-Davison Resilience Scale, the Adult Resilience Scale, Wagnild and Youngs's Resilience Scale, the Scale of Protective Factors, and the Predictive 6-Factor Resilience Scale (Connor & Davidson, 2003; Fernandes et al., 2018; Friborg et al., 2003; Ponce-Garcia et al., 2014; Rossouw & Rossouw, 2016). The importance of social connectedness to resilience likely operates through a variety of biological, psychological, and social mechanisms that collectively influence our abilities to cope and adaptively deal with distress (Ozbay et al., 2007). Indeed, being connected to others—especially those who are empathic, supportive, and emotionally available—provides an opportunity to process one's experiences, pool resources to cooperatively

address problems, and reduce tensions and stress through relaxation and recreation (Chen et al., 2020) Connecting with other concerned individuals, and working together to address shared concerns about the climate can also foster a spirit of action that allows people to cope in productive ways that can support climate resilience (Baudon & Jachens, 2021). For these reasons and others, social connectedness has been identified as a key adaptation strategy for dealing with climate-related events, such as extreme heat events (Kafeety et al., 2020; Kim et al., 2020). However, few studies have empirically examined the relationship between these factors.

In sum, there is strong reason to believe that social health may be important to averting distress arising from climate anxiety. However, empirical tests of this relationship are needed to understand how social connections could be leveraged to promote positive mental health in the face of climate change. To address these gaps, the present study aims to: (a) examine associations between social connectedness and climate change anxiety, (b) explore the extent to which protective effects of social connectedness against climate change anxiety are mediated by their effect on generalized psychological distress, and (c) identify the most salient factors underlying climate change anxiety.

METHODS

Data Collection

This analysis used data from the third wave of the British Columbia Climate Distress Monitoring System (BC-CDMS), which recruited participants living in British Columbia, Canada, aged 16+, using paid social media advertisements on Facebook and Instagram. Advertisements for the third wave of the BC-CDMS were publicized between 30-Nov-2021 to 4-Dec-2021, approximately two weeks following the November 2021 Pacific Northwest floods (Bratu et al., 2022). BC-CDMS participants were screened for eligibility (i.e., BC residence, age 16+), provided informed consent, and completed a 10-minute questionnaire. Data from the first two waves of the BC-CDMS were not used as they did not include any scales measuring social connectedness. Analytic exclusion criteria further restricted the present sample to cases with complete data across the variables included in this analysis. The BC-CDMS was reviewed and approved by the research ethics board at Simon Fraser University.

Variables

Climate Change Anxiety. The primary outcome variable for this analysis was climate change anxiety, defined as a summary scale reflecting the mental and emotional response to climate change. Several candidate scales assessing climate change anxiety are beginning to emerge, allowing for the first quantitative epidemiological assessments of these phenomena (Clayton & Karazsia, 2020; Hogg et al., 2021). These scales attempt to isolate specific experiences of distress attributable to climate change. Empirical investigations examining the relationship between ecological distress and generalized psychological distress demonstrate that ecological distress is a distinct phenomenon, though the concepts are correlated and likely mutually reinforcing (Hogg et al., 2021). Among existing scales, Clayton and Karazsia's Climate Change Anxiety Scale (CCAS) was the first developed scale to account for these cognitive and functional impairments (Clayton & Karazsia, 2020). We used the CCAS to measure climate change anxiety. The CCAS consists of 13-items assessing frequency and persistence of anxious symptoms (e.g., "*Thinking about climate change makes it difficult for me to concentrate*", "*My concerns about climate change undermine my ability to work to my potential*"). Each item is scored on a five-point Likert scale ranging from "Never" to "Almost Always." For each item, a higher score reflects a greater endorsement of the content covered by the item. Final scores are calculated as an average of scale items and range from 1 (Low Climate Change Anxiety) to 5 (High Climate Change Anxiety).

Generalized Psychological Distress. In addition to the CCAS, we included the 6-item Kessler Psychological Distress Scale (K6; Stolk et al., 2014) to measure generalized, or non-specific, psychological distress. The K6 consists of six items measuring the frequency and persistence of symptoms of non-specific psychological distress (e.g., "Felt restless," "Felt Hopeless"). Each item is scored on a five-point Likert scale ranging from "None of the time" to "All of the time." Final scores are calculated by summing the individual items and range from 0 (Low non-specific psychological distress) to 24 (High non-specific psychological distress).

Subjective Social (Dis)connection. To measure subjective social disconnection, we used a four-item scale. Items on this scale were created by our team and modeled after the questions used in the K6 to allow for seamless integration of the scale within the BC-CDMS's ongoing serial cross-sectional survey without the addition of multiple lengthy scales. The items were written to cover four domains of social disconnectedness: (1) loneliness (e.g., the feeling of being disconnected from others), (2) existential aloneness (e.g., the feeling of not being like others and unable to connect with them), (3) community belonging (i.e., the feeling of not having a community), and (4) perceived social support (i.e., the feeling of not having people to count on for support) (Mansfield et al., 2021; McNamara et al., 2021; Rosedale, 2007; Thompson, 2021; Wang et al., 2018; Yanguas et al., 2018). The four questions asked participants how often in the past 4 weeks they "felt lonely," "felt like no one understands you," "felt like you were not a part of your community," and "felt like you had no one to turn to when you needed help." Participants responded to these prompts on a five-point Likert Scale: (1) "None of the time," (2) "A little of the time," (3) "Some of the time," (4) "Most of the time," (5) "All of the time." The internal consistency of these items was tested using Cronbach's Alpha and indicated good reliability (α = 0.89, 95% CI = 0.88-0.89). As shown in **Table 1**, all items had strong item-to-total correlations and removing any of the items from the scale would result in reduced reliability.

Table 1. Social Connectedness Scale

Item	Descriptives		Exploratory Factor Analysis		Cronbach's Alpha (α = 0.89, 95% CI = 0.88-0.89)	
	Mean (SD)	Median (Q1-Q3)	Uniqueness	Factor Loadings	Reliability if item dropped	Item-to-total correlation
Felt lonely	2.07 (1.20)	2.00 (1.00-3.00)	0.372	0.793	0.87	0.85
Felt like no one understands you	1.95 (1.20)	1.00 (1.00-3.00)	0.342	0.811	0.86	0.86
Felt like you were not a part of your community	2.12 (1.32)	2.00 (1.00-3.00)	0.331	0.818	0.86	0.87
Felt like you had no one to turn to when you needed help	1.87 (1.19)	1.00 (1.00-3.00)	0.268	0.793	0.85	0.88

Notes: Factor Analysis: Sum of squared loadings 2.687; Proportion of Variance Explained = 0.672; χ^2 = 2.05, df = 2, p-value = 0.36. Higher scores represent greater disconnectedness.

Parallel Analysis (See **Figure 1**) was used to determine the number of factors included in the scale, indicating a single factor structure. Exploratory factor analysis was used to explore factor structures for a 1-factor structure. The χ^2 test indicated data-model fit for the single factor structure (p = 0.36) – with 67.2% of the model variance explained by a single factor. A single factor structural equation model (SEM) was also used to confirm factor structure. The χ^2 test for the SEM model indicated strong data-model fit (p = 0.62), as did the RMSEA (0.000, 90% CI = 0.000-0.068), Comparative

Fit Index (1.00), Tucker-Lewis Index (1.055), and the Standardized Root Mean Square Residual (0.011). A sum score was calculated by adding together the values of each scale. Final scale scores ranged from 0 to 20, with higher scores indicating greater feelings of disconnectedness. Scale scores were right skewed (Mean = 8.01, SD = 4.26, Median = 7.00, Q1-Q3 = 4.00-11.00), with most participants reporting low social disconnectedness. Subjective Social Disconnectedness scores were strongly correlated with scores from K6 (Spearman's ρ = 0.741, p-value < 0.0001) and CCAS scores (Spearman's ρ = 0.552, p-value < 0.0001); which were also correlated with each other (Spearman's ρ = 0.739, p-value < 0.0001).

Figure 1. Parallel Analysis Scree Plot to Determine Factor Structure of the 4-item Connectedness Scale
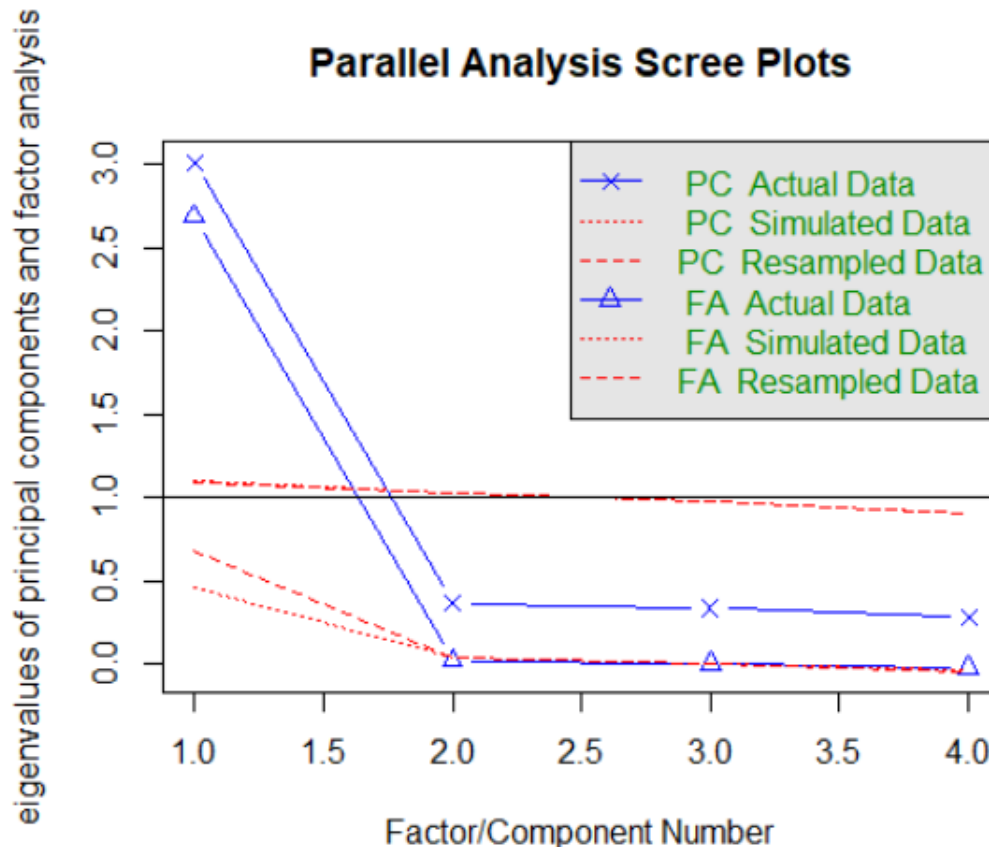

Confounding Variables. Age (16-24, 25-44, 45-64, 65+), gender identity (man, woman, non-binary; transgender participants were classified as the gender they identified as, not their biological sex), income (<$30,000, $30,000-$59,999, $60,000-$89,999, $90,000+), education (high school or less, some post-secondary training, bachelor's degree or higher), population density (low [>300/sq.km.], medium [300 – 1,499/sq.km.], high [>1500/sq.km.]; Dijkstra, 2020), and political orientation (A standard 7-point scale with answers from "extremely conservative" to "extremely liberal"; Haltom, 1990) were included as confounders. Population density was assessed by linking participant's self-reported Forward Sortation Area (FSA) code to 2016 census estimates of FSA-level population density. Population density was reported as per 100 people per square kilometer. Age, gender, ethnicity, income, and education were assessed using single demographic items.

Data Analysis

All data analyses were conducted in R (R Core Team, 2021). Frequencies (N) and proportions (%) are reported for categorical variables, and means and standard deviations are reported for continuous variables. Chi-square (χ^2) tests were used to test bivariable differences on categorical variables, one-way ANOVA tests were used for continuous normal variables, and Kruskal–Wallis tests were used for continuous non-normal variables. Spearman correlation coefficients tested relationships between CCAS scores, K6 Scores and Subjective Social Disconnection Scores. Multivariable linear regression was used to assess the associations between the exposure variable of subjective social disconnectedness and the outcome variable of climate change anxiety. Standard diagnostic plots were used to assess assumptions of linear regression using the plot() function.

Additionally, a mediation analysis tested the mediating effect of K6 scores on the relationship between social disconnectedness and climate change anxiety (See **Figure 2**). These mediation models included the same confounders used for the overall analyses. Quasi-Bayesian confidence intervals were constructed for mediating effects using the mediation() package in R. Finally, dominance analysis (i.e., a comparison of the relative importance of predictors in multiple regression based on R^2 contribution) (Budescu, 1993), with CCAS scores stratified at their median value, was conducted to assess the contribution of each variable to the model's explanatory power.

Figure 2. Hypothesized Mediation Model Tested
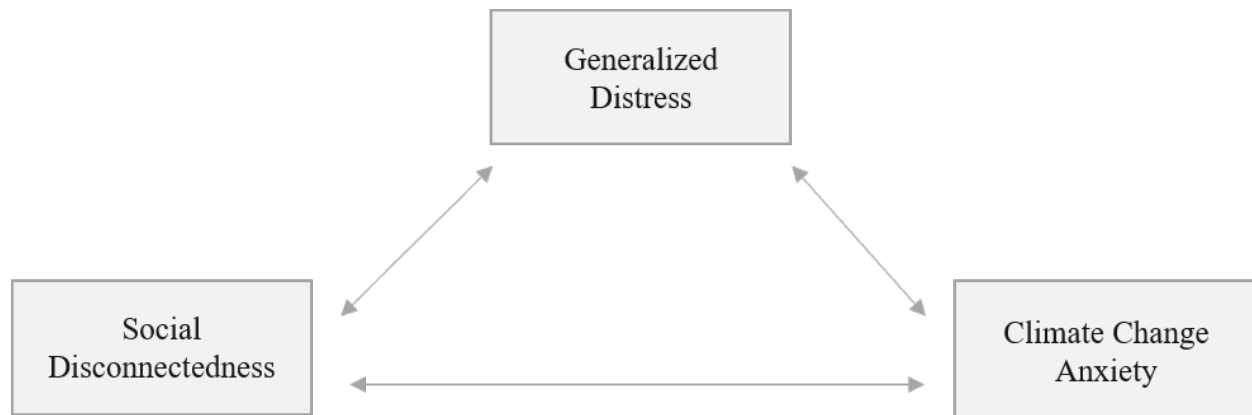
RESULTS

Of a total of 580 respondents who were recruited to complete the survey used in wave 3 of the BC-CDMS, 427 were included in our analyses, and 153 were excluded due to missing data. **Table 2** provides an overview of the analytic sample, with descriptive outcomes stratified by the median value for the Subjective Social Disconnection Scale scores. The median CCAS score was 1.46 (Q_1, Q_3: 1.00, 2.15) and the median K6 score was 7 (Q_1, Q_3: 2.00, 12.00).

In adjusted linear regression analyses, the association between subjective social disconnectedness and increased Climate Change Anxiety Scale scores was statistically significant (β = 0.069, SE = 0.007, p-value < 0.0001) when the K6 scale for generalized distress was not considered. In a bivariable Spearman Rank correlation, social disconnectedness was strongly associated with CCAS scores (rho = 0.535, p < 0.0001). However, upon inclusion of the K6, the effect of Subjective Social Disconnectedness on Climate Change Anxiety Scale scores became non-significant (β = 0.001, SE = 0.009, p-value = 0.906).

Table 2. Sample Description (n = 427)

	Overall	SSD* $\geq$ 7	SSD $\leq$6	
	N = 427	N = 236	N = 191	p-value
Age				<0.001
16-24	49 (11.5)	37 (15.7)	12 (6.3)	
25-44	162 (37.9)	96 (40.7)	66 (34.6)	
45-64	153 (35.8)	82 (34.7)	71 (37.2)	
65 years and over	63 (14.8)	21 (8.9)	42 (22.0)	
Gender				0.014
Man	210 (49.2)	105 (44.5)	105 (55.0)	
Non-binary	14 (3.3)	12 (5.1)	2 (1.0)	
Woman	203 (47.5)	119 (50.4)	84 (44.0)	
Ethnicity				0.524
BIPOC	63 (14.8)	32 (13.6)	31 (16.2)	
White	364 (85.2)	204 (86.4)	160 (83.8)	
Income				<0.001
Less than $30,000	157 (36.8)	108 (45.8)	49 (25.7)	
$30,000 to $59,999	98 (23.0)	57 (24.2)	41 (21.5)	
$60,000 to $89,999	86 (20.1)	38 (16.1)	48 (25.1)	
$90,000 or more	86 (20.1)	33 (14.0)	53 (27.7)	
Education				0.005
High School or Less	72 (16.9)	52 (22.0)	20 (10.5)	
Some Post-Secondary Training	143 (33.5)	77 (32.6)	66 (34.6)	
Bachelor's Degree or higher	212 (49.6)	107 (45.3)	105 (55.0)	
Population Density/100/sq.km.	12.57 (20.49)	13.54 (22.71)	11.37 (17.33)	0.277
Low (>300/sq.km.))	226 (52.9)	118 (50.0)	108 (56.5)	0.219
Medium (300 – 1,499/sq.km.)	77 (18.0)	49 (20.8)	28 (14.7)	
High (>1500/sq.km.))	124 (29.0)	69 (29.2)	55 (28.8)	
Political Orientation Score	4.77 (1.94)	5.16 (1.78)	4.28 (2.03)	<0.001
Extremely conservative	23 (5.4)	4 (1.7)	19 (9.9)	<0.001
Moderately conservative	55 (12.9)	22 (9.3)	33 (17.3)	
Slightly conservative	38 (8.9)	20 (8.5)	18 (9.4)	
Neither liberal nor conservative	83 (19.4)	47 (19.9)	36 (18.8)	
Slightly liberal	22 (5.2)	13 (5.5)	9 (4.7)	
Moderately liberal	96 (22.5)	53 (22.5)	43 (22.5)	
Extremely liberal	110 (25.8)	77 (32.6)	33 (17.3)	
CCAS Score	1.71 (0.79)	1.98 (0.84)	1.38 (0.55)	<0.001
1.46 or higher	217 (50.8)	157 (66.5)	60 (31.4)	<0.001
Less than 1.46	210 (49.2)	79 (33.5)	131 (68.6)	
Subjective Social Disconnection (SSD)	8.40 (4.36)	11.51 (3.51)	4.55 (0.75)	<0.001

As shown in **Table 3**, a multivariable causal mediation analysis was undertaken to examine whether generalized psychological distress mediated the pathway from subjective social disconnectedness to climate change anxiety. Mediation analyses with 1,000 bootstraps generating Quasi-Bayesian Confidence intervals showed that 98.6% (p < 0.0001) of the indirect effect of social
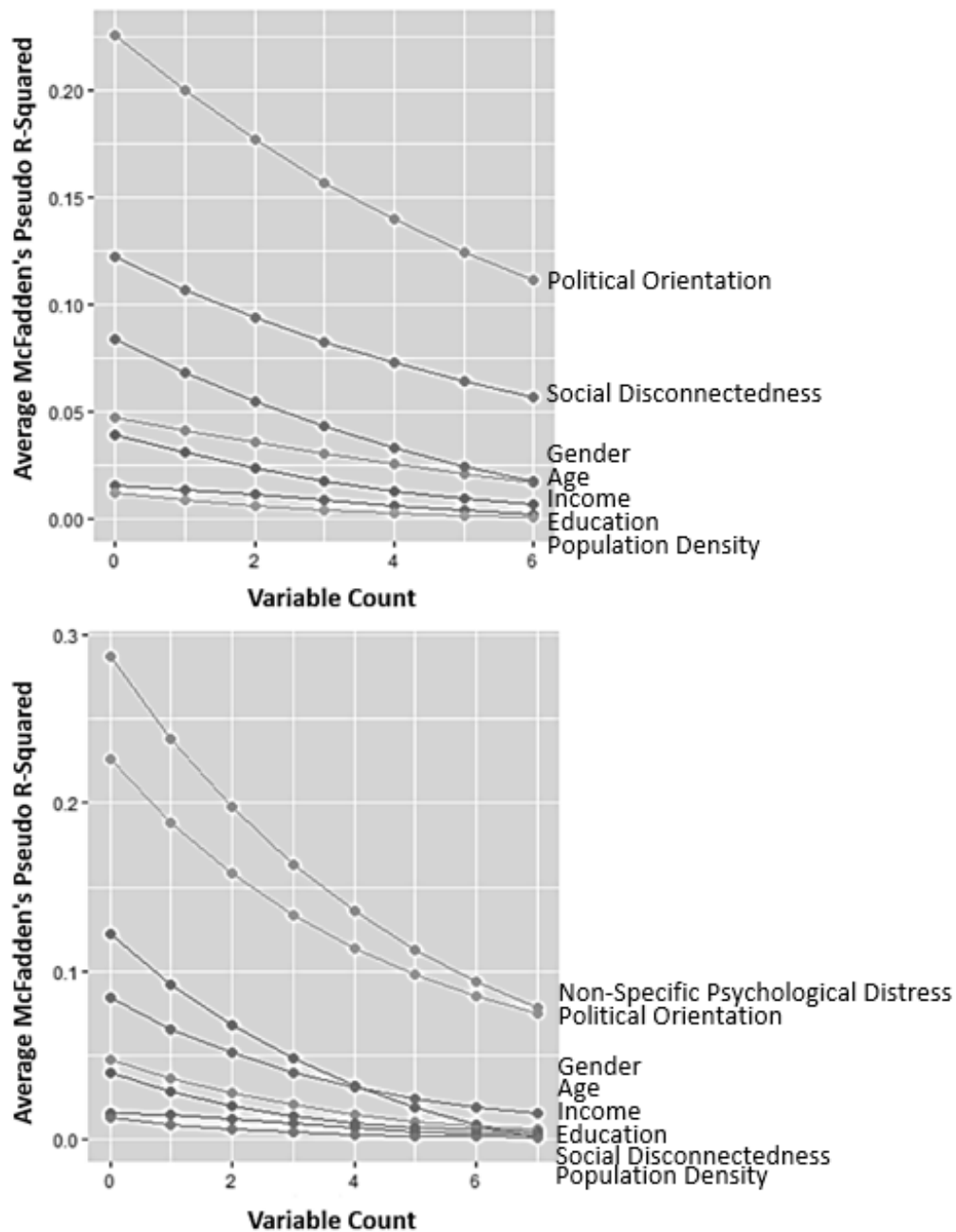
disconnectedness on climate change anxiety was operationalized through increased psychological distress (ACME = 0.068 [0.054- 0.080], ADE = 0.001 [-0.018, 0.020], Total Effect = 0.690 [0.054, 0.080]).

Table 3. Multivariable Linear Regression Model Predicting Higher CCAS

	Model 1: Without K6 Scores			Model 2: With K6 Scores		
	β	SE	p-value	β	SE	p-value
Primary Explanatory Variable						
Subjective Social Disconnectedness, per 1 point increase	**0.07**	**0.01**	**0.00**	0.00	0.01	0.91
Confounding Variables						
Age (Ref = 16-24)						
25-44	**-0.20**	**0.11**	**0.06**	**-0.19**	**0.10**	**0.05**
45-64	**-0.31**	**0.11**	**0.00**	-0.16	0.10	0.11
65 years and over	**-0.43**	**0.12**	**0.00**	-0.18	0.11	0.11
Gender (Ref = Man)						
Non-binary	**0.48**	**0.17**	**0.01**	**0.43**	**0.15**	**0.01**
Woman	**0.27**	**0.07**	**0.00**	**0.21**	**0.06**	**0.00**
Ethnicity (Ref = BIPOC)						
White	0.01	0.09	0.47	-0.03	0.08	0.71
Income (Ref = Less than $30,000)						
$30,000 to $59,999	0.06	0.08	0.47	0.07	0.07	0.36
$60,000 to $89,999	0.09	0.09	0.28	0.10	0.08	0.21
$90,000 or more	-0.08	0.09	0.41	-0.02	0.08	0.79
Education (Ref = Bachelors or Higher)						
High School or Less	-0.08	0.09	0.38	-0.10	0.08	0.22
Some Post-Secondary Training	-0.11	0.07	0.12	-0.10	0.06	0.12
Population Density, per 100/sq.km.	0.001	0.002	0.47	0.001	0.001	0.45
Political Orientation, per 1 point increase towards greater liberalness	**0.10**	**0.02**	**0.00**	**0.06**	**0.02**	**0.00**
K6 Non-specific Psychological Distress Scores, per 1 point increase	-	-	-	**0.07**	**0.01**	**0.00**

Dominance analysis, with CCAS scores stratified at their median value (1.46), was conducted as part of the mediation analysis to assess the contribution of each variable to the model's explanatory power (Budescu, 1993). Conditional dominance analyses tested for models with and without the K6 scale included (See **Figure 3**) – findings reinforced the mediating effect of psychological distress on the relationship between subjective social disconnectedness and climate change anxiety. The dominance analyses also revealed a persistent association between political orientation and climate change anxiety.

Figure 3. Conditional Dominance Analysis for Models with (top) and without (bottom) Kessler 6-item Psychological Distress Scale Scores Included

DISCUSSION

Primary Findings

The present study (1) identified a significant association between subjective social disconnectedness and climate change anxiety, (2) explored the mediating effect of generalized psychological distress on this relationship, and (3) highlighted political orientation and generalized psychological distress as key correlates to climate change anxiety.

Comparison to Existing Literature

Despite relatively little evidence directly examining the association between climate change anxiety and social connectedness, our findings are conceptually consistent with a broad and growing literature base underscoring the importance of social connection to mental well-being and stress reduction (Harandi et al., 2017; Mushtaq et al., 2014; Robb et al., 2020; Saeri et al., 2018; Santini et al., 2020). Indeed, the link between social connection and distress is already well established (H. Berry & Shipley, 2009; Fu et al., 2017; McGinty et al., 2020). The present study furthers this existing literature by providing initial evidence that social disconnection might worsen specific anxieties, such as climate change anxiety, by contributing to increased generalized (non-specific) psychological distress. This research exists in the context of previous studies showing that efforts to build resilience to psychological distress by building social connection is beneficial. This is especially needed given research showing that environmental degradation removes an important source of solace for individuals by destroying their homes and landscapes (Eisenman et al., 2015).

In addition to recovering these landscapes, social support can be one way to fill the gaps created by shifting environments. Worry about climate change is a normal response to the unknown challenges that may be posed by changing weather patterns and intensifying climate events. However, strategies are needed to cope and our data supports previous studies that point to building more resilient communities is a key coping strategy (Ojala et al., 2021). For example, Green et al. (2015) highlight social cohesion as a key factor for protecting communities from the harmful mental health effects associated with flooding. They argue that building social cohesion through increasing civic participation is a potentially inexpensive, albeit effective, defense against avoidable mental health harms that will arise from climate change (Greene et al., 2015). In the wake of Hurricane Sandy, community-based organizations stepped up to play an important role in building a social and structural response to the environmental devastations – demonstrating the importance of investments in human capital, not just structural capital to mitigate the effects of climate change (Schmeltz et al., 2013). Ebi and Semenza propose a multi-step wise course of action for promoting community-adaptation for climate change that leverages grassroots interventions mixed with top-down interventions implemented in organizations and agencies. These approaches, they note, will require robust mobilization of stakeholders and resources to achieve the protective effects of having a healthy community (Ebi & Semenza, 2008). Ultimately, we concur with Berry (2009), whom suggested that in the context of climate change it is important to find opportunities to build community capacity – which may not only address the immediate mental health effects of climate change, but also the cascading mental health benefits of creating more socially connected communities (Berry, 2009). Capacity for greater social connection requires not only the removal of social barriers (e.g., long or irregular working hours; social anxiety; discriminatory social attitudes) but also intentional efforts to build communities in ways that are more hospitable and conducive to socialization. This includes both investments in communities as well as architectural considerations for creating built and natural environments where people can connect (Corcoran & Marshall, 2017).

Our results also highlight the reality that these effects may be particularly salient for politically left-leaning individuals for whom levels of climate change anxiety and loneliness are elevated (Ojala et al., 2021). Indeed, political orientation and social connection were observed to be two key contributors to climate change anxiety – with much greater explanatory power than other person-level characteristics considered. Given the power of political orientation in contemporary social life, social and political organizing within and between political groups might be one strategy to provide effective outlets for social support and climate action. Previous studies have shown that political engagement and participation can be an important component of one's social identity and sense of belonging

(Gibson & McAllister, 2013). For example, Reilly (2017) demonstrated that more politically engaged individuals tended to be less isolated – and that this effect was similar for both ends of the left-right political spectrum. Leveraging existing political networks, and establishing new climate-engaged models of social participation might serve to support mobilization and provide healthy coping outlets for addressing climate change through political action (Kleres & Wettergren, 2017). However, given the economy of climate politics research is needed to understand how social organizers can avoid burnout among activists – which could worsen, rather than better, people's generalized and climate-specific anxiety (Gorski & Chen, 2015). For example, Conner et al. (2021) showed that large majorities of activists pay mental health costs for their labour. However, providing an optimistic counterpoint, previous research among Black and Latinx college students in the United States show that the effects of activism can provide secondary benefits as well – providing some protection and resilience against discrimination and stress (Hope et al., 2018). Ultimately, people who engage politically must be trained to protect their mental health and build the sort of resilient social networks that will benefit them most (Eiroa-Orosa & Lomascolo, 2018). Leveraging these sites of activism for coping and resilience building has the added benefits of providing immediate opportunities to transform anxieties into action – one common strategy endorsed by eco-psychologists (Baudon & Jachens, 2021).

Implications for Practice

These basic findings suggest that responses to climate change anxiety should consider the role of social connection as well as other factors that contribute to psychological distress. A number of interventions are already emerging to address climate change anxiety and other forms of inevitable ecological distress (Baudon & Jachens, 2021). A recent review by Baudon & Jachens (2021) highlights social connection as one of the four primary psychological approaches for group and individual treatments of climate change anxiety. Within this review, the authors identified an array of social health actions that can improve climate change anxiety, including encouraging patients to join established groups and organizations, group traditions and gatherings, and collective action on climate change and other environmental efforts (Baudon & Jachens, 2021). Our study adds indirect support for the potential individual and population utility of these emerging approaches and highlights the importance of investing in social health and wellbeing as a key component of interventions related to mental health in the era of climate change (Adger, 2010; Bains & Turnbull, 2019).

Limitations

This study has limitations. First, our study is based on an online convenience sample, which introduces the possibility that our findings are partially attributable to sampling and non-response bias. While we have used multivariable methods to adjust for potential confounding effects, there are likely omitted variables that we did not account for. We also note that due to ethical reasons are sample includes only individuals aged 16+, causing us to miss vital data about youth 15 years of age or younger. Second, our study relied on a short questionnaire that was designed to take less than 10 minutes to complete. As such, we were not able to include expansive measures of climate distress, social connection, or generalized distress. Where feasible, we have opted for the shortest, easiest to use scales. For instance, in the case of our scale of social (dis)connectedness we opted for a scale that would be seamlessly integrated with the existing K6 Psychological Distress scale and have thereby provided a novel short scale, with strong face validity evidence and appropriate statistical characteristics (e.g., internal reliability and factor structure). However, we recognize that this scale will require further validation and comparison with other scales measuring the manifold dimensions of social health. All results should be interpreted as preliminary and without final conclusions regarding direction of causal effects due to

the cross-sectional survey design. This is particularly true given likely bi-directional relationships and feedback loops between the variables under investigation here (e.g., climate anxiety may cause more distress, but distressed individuals may also be more prone to climate anxiety; or social disconnection may cause distress, but distressed individuals may also withdraw from social situations).

Future Research Directions

As this study is among the first in examining the relationships between social connection, psychological distress, and climate concerns, our findings require replication in larger samples more representative of the general population. Robust and nuanced scales will need to be used to better specify the effects tested here. Indeed, it is evident that social connectedness is likely only one of many variables at play in the relationships explored in this paper (Koger et al., 2011). For instance, recent research by Jia et al. (2021) suggests that one of several ways social connection can help address climate change is by promoting environmental engagement (Jia et al., 2021). More specifically, their work showed that social connection was associated with finding a greater meaning in life, which in turn was associated with pro-environmental behaviours (Jia et al., 2021). This would suggest that meaning-making activities and approaches are likely another candidate for supporting psychological wellbeing and resilience to distress (Li et al., 2019; Macià et al., 2021). At present, we are not confident that we fully understand what potential interventions might be effective at reducing climate anxiety. Health Canada's recent report titled "Health of Canadians in a Changing Climate" highlights climate adaptation strategies as only being in their infancy ("*Health of Canadians in a Changing Climate — Advancing Our Knowledge for Action*").

Given links between social connection, personal meaning, and positive psychology (Stavrova & Luhmann, 2016), it is clear that there is considerable nuance yet to be explored. Nevertheless, our study highlights a key opening and a myriad of opportunities for research focused on resilience-building in the climate change era and underscores key intersections between political ecology, social and civil society, the global environment, and our individual psychological wellbeing (Harrison et al., 2019; Mi et al., 2016; Roger et al., 2016). Clearly, further research in this area will improve our understanding of interactions between humans and their communities and their larger environments, and provide a clearer articulation—and stress the importance— of an eco-social understanding of health (Krieger, 2001; Levins & Lopez, 1999; Merz et al., 2021; Parkes et al., 2020).

CONCLUSION

In conclusion, our results indicate that subjective social disconnection contributes to psychological distress, which in turn contributes to climate change anxiety – suggesting that resilience building efforts and other approaches to address climate change anxiety should account for social and community components of interventions to ensure individuals are included and supported as they wrestle with concerns and anxieties about climate change. Further research is needed to better understand the social processes that might mitigate climate change anxiety to better understand how social networks and systems can be leveraged to promote resilience and wellbeing among those who are worried about climate change.

DECLARATIONS

AVAILABILITY OF DATA AND MATERIALS
Data and materials are available upon request to the corresponding author.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE
Ethical review for this study was completed by the Research Ethics Board at Simon Fraser University.

CONSENT FOR PUBLICATION
Not applicable.

COMPETING INTERESTS
The Authors declare they have no competing interests.

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