

Overlapping Pandemic- and Climate-Related Worry: Prevalence and Association with Mental Health Outcomes in a Canadian Sample

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ABSTRACT

*A growing body of research suggests the impacts of both the COVID-19 pandemic and climate change have negatively affected population mental health. However, evidence remains limited on the prevalence of overlapping pandemic- and climate-related worry and its association with mental health outcomes. The fourth round of the monitoring survey, *Assessing the Impacts of COVID-19 on Mental Health*, was administered to adults living in Canada, between November-December 2021, stratified and weighted by age, income, gender, and region. Respondents were asked about stressors related to the pandemic, including: “Worrying about the compounding effects of COVID-19 alongside the climate crisis”. Bivariate statistics and logistic regression were used to assess how responses to this question varied by sociodemographic characteristics and indicators of mental health. Overall, 3,030 respondents participated, with 36.1% endorsing overlapping pandemic- and climate-related worry. Prevalence varied significantly across sociodemographic characteristics, including gender, income, and disability status. Moreover, those who reported this worry were more likely to describe their current mental health as poor, to endorse suicidal ideation, and to be experiencing severe mental distress, even when controlling for pre-existing mental health conditions prior to the pandemic. These results suggest that overlapping pandemic- and climate-related worry is relatively common among adults in Canada. This reiterates the importance of attending to the social determinants of health when considering the mental health consequences of climate change and the pandemic.*

Keywords: COVID-19 pandemic; climate change; mental health; social determinants of health

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INTRODUCTION

There is a growing body of evidence documenting the deleterious and inequitable mental health impacts resulting from climate change (Charlson et al., 2021; Cianconi et al., 2020; Lawrance, Thompson, et al., 2022) and the COVID-19 pandemic (Aknin et al., 2022; Samji et al., 2022), including research specific to the Canadian context (Hayes et al., 2019; Jenkins et al., 2022). Emerging research has examined the interactions between these two crises (Coates et al., 2020; Usman et al., 2021) and some have suggested that these interactions may result in worsened outcomes for various aspects of physical (Cuschieri et al., 2021; Juarez et al., 2022; Pennea et al., 2021) and mental health (Marazziti et al., 2021). For example, Persad-Clem et al. (2022) have hypothesized that distress due to climate change and the pandemic “are likely to be compounded” (p. 522). Certainly, recent studies, such as by Lawrance and Jennings et al. (2022) in the United Kingdom, have simultaneously examined the mental health impacts of climate change and the pandemic; however, while the authors compared the relative impacts of the pandemic and climate change on youth distress, they did not examine their impacts in tandem. Such an approach, focused on comparison, is similarly seen in research in select other studies (Barchielli et al., 2022; Yatirajul et al., 2023).

To our knowledge, there is no Canadian research that explores the mental health impacts of co-occurring worry about the pandemic and climate change, which we refer to as “overlapping pandemic- and climate-related worry.” This study helps to address this gap by examining the prevalence of overlapping pandemic- and climate-related worry and its association with mental health outcomes in a nationally representative sample in Canada. We also present data on the ways in which this worry is disproportionately impacting certain population groups.

METHODS

Data Collection

This study draws on data from the fourth round of the cross-sectional monitoring survey, *Assessing the Impacts of COVID-19 on Mental Health*, conducted in partnership between researchers at the University of British Columbia and the Canadian Mental Health Association, aspects of which have been published elsewhere (Jenkins et al., 2022; Daly et al., 2023; Goodyear et al., 2023). National polling vendor, Maru/Matchbox, randomly distributed the anonymous online survey to adult members of their Canada Voice panel, composed of approximately 125,000 people, between November-December 2021. Participants were recruited to the Canada Voice panel via direct email, as well as targeted sampling through community partners to increase the inclusion of individuals who can be difficult to reach via the Internet. Invitations to panel members to participate in the present research were stratified by age, household income, gender, and geographic region and then weighted according to Statistics Canada data from the 2016 Census of Population (Statistics Canada, 2017) to yield a sample nationally representative by these characteristics. The survey was available in both English and French. The invitation-to-response rate was 30%.

Measures

Survey items used in the wider study on mental health and the COVID-19 pandemic were originally developed by the Mental Health Foundation of the United Kingdom in 2020. Item development was informed by research on past pandemics and a participatory process that included people with experience of mental health challenges. Some items were adapted by our research team for the Canadian context, and others were added in successive rounds of data collection to reflect emerging data priorities.

In addition to sociodemographic information, respondents were asked “Have you been stressed or worried about any of the following as a result of the COVID-19 pandemic in the past 2 weeks?” with one of the options being: “Worrying about the compounding effects of COVID-19 alongside the climate crisis.” Response options were “Yes,” “No” and “Don’t know/not applicable/prefer not to say.” This item was used to assess overlapping pandemic- and climate-related worry and was added to the fourth round of our monitoring survey in response to adverse climate events across Canada and the emerging literature linking climate change and mental health.

To examine mental health impacts, participants were asked to self-report on their mental health by responding to the question: “In general, would you say your mental health is: Excellent, Very Good, Good, Fair or Poor?”. This and other single-item measures of self-reported mental health have been widely used in population surveys (Ahmad et al., 2014), including the Canadian Community Health Survey (Statistics Canada, 2021). Participants were additionally asked about experiences of suicidal ideation: “Have you done or experienced any of the following, as a result of the COVID-19 pandemic in the past two weeks?” with “experienced suicidal thoughts/feelings” as one of the response options. The six-item version of the Kessler Psychological Distress Scale (K6) (Kessler et al., 2003) was used to assess mental distress over the past 30 days and has been used in numerous Canadian studies (Ferro, 2019; Marleau et al., 2022). The K6 asks respondents how often in the past 30 days they have felt “nervous,” “hopeless,” “restless or fidgety,” “so depressed that nothing could cheer you up,” “that everything was an effort,” and “worthless,” with response options for each of “none of the time,” “a little of the time,” “some of the time,” “most of the time,” and “all of the time,” corresponding to a range of zero to four points. When summed, the K6 yields an overall score between 0-24, with results ≥ 13 indicating severe mental distress, or high risk for serious mental illness (Kessler et al., 2003; Prochaska et al., 2012). The Cronbach’s alpha for the K6 in our study sample was 0.912, demonstrating strong internal consistency (Bland & Altman, 1997).

Statistical Analysis

Analyses were completed using SPSS version 28.0. Descriptive statistics and Chi-square were used to assess how endorsing overlapping pandemic- and climate-related worry varied by sociodemographic characteristics. Post-hoc analyses with Bonferroni corrections were conducted for multivariate categorical variables. Self-rated mental health was dichotomized to compare responses of “Poor” against all other response options (i.e., “Excellent”, “Very Good”, “Good”, and “Fair”). Logistic regression was used to calculate odds ratios, both unadjusted and adjusted for self-reported pre-existing mental health conditions prior to the pandemic, to explore relationships between overlapping pandemic- and climate-related worry and measures of mental health (poor self-rated mental health, suicidal ideation in the previous two weeks, and severe mental distress as determined by K6 score ≥ 13). Responses of “don’t know,” “not applicable” and/or “prefer not to answer,” for items with those response options, were excluded from bivariate and multivariate analyses. Results were considered statistically significant at $p < 0.05$.

RESULTS

Sociodemographic characteristics of the 3,030 respondents to the fourth round of this monitoring survey are presented in **Table 1** and **Table 2**.

Overall, 36.1% of the sample endorsed overlapping pandemic- and climate-related worry, 57.3% reported not experiencing this worry, and 6.6% responded, “Don’t know/not applicable/prefer

not to say". The prevalence of this worry varied significantly by sociodemographic characteristics (**Table 3**).

Specifically, the prevalence of overlapping pandemic- and climate-related worry was higher among people with lower annual household income, people reporting a pre-existing mental health condition (i.e., onset prior to the pandemic), people reporting a disability, and Indigenous Peoples. The prevalence of this worry was lower among parents/caregivers with children <18 years, cisgender men, and individuals aged 35-64 years old.

Table 1. Sociodemographic Characteristics of Sample

	N	%
Province		
Alberta	339	11.2
British Columbia	391	12.9
Quebec	714	23.6
Ontario	1157	38.2
Manitoba	125	4.1
Saskatchewan	97	3.2
Nova Scotia	94	3.1
New Brunswick	59	1.9
Newfoundland and Labrador	46	1.5
Prince Edward Island	8	0.3
Gender		
Cisgender Man	1479	48.8
Cisgender Woman	1500	49.5
Two-Spirit, non-binary, transgender and not listed [§]	43	1.4
Prefer not to answer	8	0.3
Age		
18-34	845	27.9
35-64	1461	48.2
65+	724	23.9
Annual Household Income		
< \$25k	217	7.2
25k to <50k	506	16.7
50K to <100k	955	31.5
100k+	1216	40.1
Don't know/Prefer not to say	135	4.5
Ethnicity^{§§}		
Racialized (non-Indigenous)	812	28.0
Indigenous	115	4.0
Non-racialized	1971	68.0
Parent/guardian with child <18 in household		
Yes	609	20.1
No	2421	79.9

[§] Two-Spirit (2), non-binary (23), transgender woman (9), transgender man (7) and not listed (2).

^{§§} Participants were asked to report their ethnicity. Those who reported only European origins were considered non-racialized, those who reported one or more non-European, non-Indigenous origins were considered racialized, and those who reported Indigenous origins were classified as Indigenous. Due to missing data this information is not available for all participants.

Table 2. Health Characteristics of Sample

	N	%
Identify as having a pre-existing mental health condition (pre-pandemic)		
Yes	575	19.0
No	2423	80.0
Prefer not to answer	32	1.1
Identify as having a disability		
Yes	335	11.1
No	2677	88.0
Prefer not to answer	29	0.9
Self-rated current mental health		
Excellent	452	14.9
Very good	1032	34.0
Good	913	30.1
Fair	498	16.4
Poor	134	4.4
Suicidal ideation in the previous two weeks, as a result of the COVID-19 pandemic		
Yes	252	8.3
No	2736	90.3
Prefer not to say	42	1.4
Kessler-6 (K6) mental distress categorization		
None or low (a K6 score \leq 7)	1478	48.8
Moderate (a K6 score \geq 8 and \leq 12)	1110	36.6
Severe (a K6 score \geq 13)	443	14.6

There were statistically significant differences in mental health outcomes between people who reported overlapping pandemic- and climate-related worry and those who did not as seen in **Table 4**. Even when controlling for a pre-existing mental health condition (i.e., onset prior to the pandemic), people who reported this overlapping worry were more likely to self-report their current mental health as poor (7.7% versus 2.2%; OR = 2.79, 95% CI = 1.84-4.23), to endorse suicidal ideation in the previous two weeks (14.3% versus 5.0%; OR = 2.38, 95% CI = 1.78-3.18), and to be experiencing severe mental distress (22.0% versus 9.8%; OR = 2.12, 95% CI = 1.69-2.65), compared to those who reported not having this overlapping worry.

DISCUSSION

Climate change has been referred to as a “threat multiplier” (Lawrance, Thompson, et al., 2022), intersecting with other social and political conditions to magnify risks. The present study suggests that overlapping pandemic- and climate-related worry is relatively common among the Canadian population and is associated with adverse mental health outcomes. This is in line with previously reported associations between various forms of climate distress and indicators of mental ill-health (Lawrance, Thompson, et al., 2022). While exploratory, our results build on those of Kulcar et al. (2022) who examined the combined mental health impacts of negative emotions brought on by climate change and the COVID-19 pandemic among a convenience sample of Austrian university students. They also align with the work of Weierstall-Pust (2022) who studied the simultaneous impacts of climate change, the COVID-19 pandemic and the war in Ukraine among a German sample. Unfortunately, differing measures and contexts preclude direct comparison of findings between our study and others.

Table 3. Prevalence of overlapping pandemic- and climate-related worry among participants with varying sociodemographic characteristics[§]

	n	%	P-value [§]
Gender^{§§}			
Cisgender Man (N=1393) ^a	433	31.1	
Cisgender Woman (N=1387) ^b	627	45.2	p < 0.001
Two-Spirit, non-binary, transgender and not listed (N=42) ^c	28	66.7	
Age			
18-34 (N=781) ^a	356	45.6	
35-64 (N=1377) ^b	464	33.7	p < 0.001
65+ (N=671) ^a	272	40.5	
Annual Household Income^{§§}			
< \$25k (N=19) ^a	92	48.4	
25k to <50k (N=467) ^a	204	43.7	
50K to <100k (N=904) ^{a,b}	358	39.6	p < 0.001
100k+ (N=1146) ^b	400	34.9	
Ethnicity^{§§§}			
Racialized (non-Indigenous)			
Indigenous			
Non-racialized			
Racialized (non-Indigenous) (N=743) ^a	286	38.5	
Indigenous (N=111) ^b	57	51.4	p = 0.027
Non-racialized (N=1868) ^a	723	38.7	
Parent/guardian with child <18 in household			
Yes (N=582)	187	32.1	
No (N=2247)	905	40.3	p < 0.001
Identify as having a pre-existing mental health condition (pre-pandemic)^{§§}			
Yes (N=543)	305	56.2	
No (N=2264)	781	34.5	p < 0.001
Identify as having a disability^{§§}			
Yes (N=307)	155	50.5	
No (N=2502)	929	37.1	p < 0.001

Notes: [§]P-values calculated via Chi-square. Post-hoc analysis with a Bonferroni correction was conducted for variables with more than two categories: Super-script letters denote subsets of a sociodemographic group whose proportions do not differ significantly from each other at the $p < 0.05$ level. Participants who responded “don’t know,” “not applicable,” and “prefer not to answer” to items were excluded from analysis, which is why the N-values do not match Table 1. ^{§§} Respondents who selected “prefer not to answer” for gender, income, pre-existing mental health conditions, having a disability, and those who selected “Don’t know/not applicable/prefer not to say” for overlapping pandemic- and climate-related worry were excluded from this analysis. ^{§§§} Participants were asked to report their ethnicity. Those who reported only European origins were considered non-racialized, those who reported one or more non-European, non-Indigenous origins were considered racialized, and those who reported Indigenous origins were classified as Indigenous. Due to missing data this information is not available for all participants.

In addition, our findings indicate that groups who are already overrepresented in adverse health outcome data, such as people with pre-existing mental health condition(s), a disability, lower income, and those who are Indigenous (Public Health Agency of Canada, 2018), are more likely to report this overlapping worry. As such, this study extends previous research identifying negative interactions between social and structural determinants of mental health and crises such as climate change (Berry & Schnitter, 2022) and the pandemic (Jenkins et al., 2022; Landry et al., 2021; Whitley et al., 2021).

Table 4. Odds Ratios Derived from Adjusted and Unadjusted Logistic Regression Models of Overlapping Pandemic- and Climate-Related Worry Predicting Individual Mental Health Outcomes

Mental health outcome	Variable(s) in logistic regression model			
	Overlapping pandemic- and climate-related worry		Pre-existing mental health condition prior to the onset of the COVID-19 pandemic	
	OR	95% CI	OR	95% CI
Poor mental health[§]				
Unadjusted model (N=2827) ^{§§}	3.71	2.51-5.48	---	---
Adjusted ^{§§§} model (N=2803)	2.79	1.84-4.23	8.44	5.63-12.65
Suicidal ideation in the previous two weeks^{§§§§}				
Unadjusted model (N=2800)	3.18	2.41-4.19	---	---
Adjusted model (N=2778)	2.38	1.78-3.18	6.97	5.24-9.26
Severe mental distress^{§§§§§}				
Unadjusted model (N=2827)	2.57	2.08-3.19	---	---
Adjusted model (N=2803)	2.12	1.69-2.65	4.87	3.86-6.13

Notes: [§] Respondents were asked: "In general, would you say your mental health is: Excellent, Very Good, Good, Fair or Poor?" For this analysis, the variable was dichotomized to compare responses of "Poor" to all other responses ("Excellent", "Very Good", "Good", "Fair") aggregated. ^{§§} The number of cases varies by model due to responses of "don't know," "not applicable," and "prefer not to answer" being excluded from analysis. ^{§§§} The adjusted models control for participants having a self-reported pre-existing mental health condition prior to the onset of the COVID-19 pandemic. ^{§§§§} Respondents were asked: "Have you done or experienced any of the following, as a result of the COVID-19 pandemic in the past two weeks?" with "experienced suicidal thoughts/feelings" as one of the response options. ^{§§§§§} Defined as a score on the Kessler Psychological Distress Scale (K6) ≥ 13 (Kessler et al., 2003)

Our results point to the presence of mental health inequities, given that certain groups in our sample were more likely to report overlapping worry about the pandemic and climate, a worry which, in turn, is associated with worsened mental health. The clustering of these impacts in specific populations is suggestive of the concept of syndemics, wherein wider social forces create a context in which multiple conditions overlap and are concentrated within a population, resulting in worsened outcomes (Singer et al., 2017). Scholars are now using the concept of syndemics to examine the interactions between climate change, the pandemic, and various health and social phenomena (Di Ciaula et al., 2021; Persad-Clem et al., 2022; Tsagkaris et al., 2023; Wheat et al., 2022).

However, it is notable that the majority of respondents who endorsed this overlapping worry did not identify as experiencing poor mental health, suicidal ideation, or severe mental distress. This aligns with previous scholarship arguing that a certain amount of worry about climate change is rational and can contribute to an adaptive response (Hickman et al., 2021; Lawrance, Thompson, et al., 2022). The work of researchers and clinicians lies in determining how to identify and support the subset of the population for whom this and other forms of worry about climate change are associated with worsened mental health, while avoiding pathologizing those for whom it is not.

This exploratory study provides important new insights to inform future research on the ways in which worry about the climate crisis overlaps with other health and social crises and their combined effects on population mental health, yet there are some limitations to acknowledge. Given that our study did not independently assess both climate and pandemic related worry, in addition to overlapping worry, it is not possible to state whether such worries "compound" as has been suggested by others, such as Persad-Clem et al. (2022) and Poletti et al. (2023). Our study also does not allow us to ascertain causal pathways or their directions, although as Verplanken et al. (2020) have discussed, it can be difficult to disentangle the mental health impacts of specific worries about climate change from worry and anxiety more generally. It remains possible that mental ill-health makes one more likely to endorse

various worries across the board, including but not limited to worries related to climate change and the pandemic.

Furthermore, our exploratory examination of overlapping pandemic- and climate-related worry uses a single-item measure, and while it has face validity, further research is needed to validate our interpretation of this item, such as via cognitive interviewing. Finally, while the sample was representative by age, gender, household income and wider geographic region, the sample did not include people from the Northwest Territories, the Yukon, and Nunavut, and was not necessarily representative of the Canadian population in terms of other sociodemographic characteristics.

CONCLUSION

This study is among the first to document the prevalence of overlapping pandemic- and climate-related worry and its association with mental health outcomes. There are several study strengths, including the large and nationally representative sample (by age, gender, region, and household income), and the inclusion of previously validated and robust measures of mental health. Moreover, the results were robust even when controlling for pre-existing mental health conditions. Findings from this study underscore the importance of avoiding a siloed approach when considering the mental health impacts of climate change and other crises, including but not limited to the pandemic. This is especially the case given that the impacts of climate change are expected to increase over time (IPCC, 2022), as well as the many overlapping crises currently playing out globally, the mental health effects of which are still unknown (Poletti et al., 2023). As such, awareness of how worries about climate change overlap and potentially interact with other crises is critical in developing responses that can best protect and promote the mental health of individuals and populations.

DECLARATIONS

ACKNOWLEDGEMENTS

We are appreciative of the support and partnership we received in mobilizing this project from the Canadian Mental Health Association and Mental Health Foundation in the UK. Thanks also to Maru/Matchbox for supporting survey deployment and data preparation, and Javiera Pumarino for contributions to data management. EJ and AG hold Scholar Awards from Michael Smith Health Research BC. EJ holds a Tier II Canada Research Chair in Population Health Approaches to Mental Health and Substance Use and AG holds a Tier II Canada Research Chair in Bio-Eco-Social Determinants of Child and Youth Mental Health. ZD and TG are supported by Canadian Institutes of Health Research (CIHR) Doctoral Awards. CM holds a CIHR Health Systems Impact Fellowship.

FUNDING

The Canadian Mental Health Association funded survey data collection through national polling vendor

Maru/Matchbox. The Canadian Mental Health Association had no further role in data collection, analysis, or interpretation related to this manuscript.

AVAILABILITY OF DATA AND MATERIALS

Data are available upon reasonable request to the corresponding author.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Study approval was obtained from the University of British Columbia Behavioural Research Ethics Board (H20-01273). Participants provided online informed consent prior to survey initiation, received a small honorarium from Maru/Matchbox, and were given information about mental health supports.

CONSENT FOR PUBLICATION

Not applicable.

COMPETING INTERESTS

CR reports receiving personal fees from the University of British Columbia during the conduct of this study. All other authors report no competing interests.

PUBLICATION DATES

Received: 24 February 2023

Accepted: 8 December 2023

Published: 29 December 2023

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