Research article

Coping during the COVID-19 pandemic: A mixed methods approach to understand how social factors influence coping ability

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ABSTRACT

The COVID-19 pandemic and public health protection measures aimed at mitigating the transmission of the virus have both resulted in tremendous physical and mental health impacts. The study at hand used a gender-based analysis and social determinants of health approach to investigate which communities had trouble coping during times of strict protection measures and symptoms and strategies employed during the COVID-19 pandemic.

Participants were recruited from previously established cohorts as a part of the COVID-19 Rapid Evidence Study of a Provincial Population-Based Cohort for Gender and Sex (RESPPONSE) study. Being a young adult, female, woman, gender diverse, low-income earner or LGBTQ/2S+ was significantly associated with not being able to cope during the first wave of the pandemic. The effects for females, women, and gender diverse were attenuated yet still significant when controlling for various covariates. Those who reported not coping were more likely to present maladaptive coping symptoms and strategies. Our findings demonstrate the need to support marginalized communities in coping with the current ongoing COVID-19 pandemic and build proactive support for future pandemics.

1. Introduction

Although the physical impacts of a SARS-CoV-2 infection (COVID-19) have dominated the literature, both COVID-19 and public health measures aimed at mitigating transmission have also resulted in many unintended mental health impacts. Data suggest that COVID-19 disease increases the relative risk for mental health disorders, particularly for people with severe disease (Taquet et al., 2020). In addition, the prevalence of depression and anxiety was found to be heightened during the initial COVID-19 lockdown in March 2020 (Idrissi et al., 2020). Levels of depression (Liu et al., 2020), anxiety (Liu et al., 2020), loneliness (Wong et al., 2020) and post-traumatic stress disorder (PTSD) symptoms (Carmassi et al., 2020) have all been reported to have increased during the pandemic. These mental health sequelae in response to the public health

measures disproportionately impacted particular populations such as young adults (Junior et al., 2020), females (Mazza et al., 2020; Özdin and Özdin, 2020), racialized communities (Anderson et al., 2022), those of lower education (Mazza et al., 2020) and lower income (Pieh et al., 2020). Additionally, females who were hospitalized due to COVID-19 experienced higher levels of depression, insomnia, and post-traumatic stress levels, relative to males, demonstrating alternative pathways in which particular communities may experience disproportionate impacts of the pandemic (Pappa et al., 2022).

Though the effects of pandemic control measures on mental health are well established, little research has sought to apply a sex and gender-based lens to mental health outcomes during the COVID-19 pandemic. Sex is a set of biological characteristics associated with physical and physiological features such as chromosomes, gene expression and

reproductive anatomy (CIHR, 2020a). Gender, on the other hand, is socially constructed by one's roles, behaviours and expressions and exists along a continuum. Examples of gender can include identities such as woman, man, cis, trans, or other identities that may not align with an individual's sex at birth, and which collectively fall under "gender diverse". Studies that analyze by sex and gender find that although most who identify as men are males, and most who identify as women are females, there is a subgroup of participants whose sex and gender do not align, emphasizing the importance of disaggregated sex and gender analysis. Both women and gender diverse individuals had higher levels of depression, anxiety, loneliness, and pandemic stress across different "phases" of the pandemic (Brotto et al., 2021).

In response to adverse mental health sequelae, individuals tend to employ a variety of coping mechanisms to mitigate psychological and physiological stress (Frydenberg, 2014). It is critical to understand which coping strategies individuals find helpful, particularly during the pandemic, so that psychological support can be better tailored to mitigate psychosocial symptoms. In the context of the COVID-19 pandemic, coping strategies, such as positive reframing, humour and acceptance, are associated with better mental health outcomes (Gurvich et al., 2020). In contrast, behavioural disengagement, instrumental support, and self-blame are associated with increased psychosocial symptoms (i.e., worse mental health outcomes) (Gurvich et al., 2020). While coping strategies during the pandemic are well-documented, relatively little research has been conducted using an equity lens to examine coping among key populations affected by the COVID-19 pandemic. Current research has highlighted the impact of resiliency on moderating the relationship between pandemic concerns and physiological symptoms of distress among LGBTQ + samples, demonstrating how the psychological impacts of the pandemic have manifested differently among various communities (Goldbach et al., 2021). Further research on coping strategies among marginalized groups, particularly the gender diverse, is needed to ensure resources can be appropriately allocated for the ongoing pandemic, in addition to future public health emergencies.

This study builds on previous analyses by viewing social determinants of health as risk factors (or protective factors) for one's ability to cope. Previous findings have highlighted coping strategies during the pandemic, such as one's religion and remaining optimistic (Kar et al., 2020). To our knowledge, however, little research has sought to provide information about which demographics are struggling to cope during the pandemic and what strategies these different groups utilize to cope. First, we sought to determine who was coping and who was not coping among a Canadian sample during the first wave of the COVID-19 pandemic in 2020. Then, we examined why these groups were not coping through analysis of confounding variables. Lastly, we investigated coping symptoms and subsequent strategies participants employed to cope with their symptoms.

2. Methods

2.1. Participant recruitment and study design

Study design, including methodology for recruitment has been outlined previously (Brotto, 2021; Brotto et al., 2021; Ogilvie et al., 2021). Participants aged 25–69 from previously established research cohorts, who consented to be contacted about future studies were invited to take part in this study. Participants were recruited to meet a target of n = 750 for nine five-year strata. This target recruitment was based on the assumption of a SARS-CoV-2 seroprevalence of 2% in each stratum, a statistic used for analyses in a separate manuscript. Eligible participants (aged 25–69; a resident of BC; able to fill out the survey in English) were sent a link via email to participate in the online survey (*Index Participants*). As most of the invitees were females and/or women, Index Participants were asked to invite a member from their household who identified as a different gender to improve representativeness (*Household Participants*).

Two months after the original cohort was invited, recruitment was expanded to those outside of existing cohorts to ensure target sample sizes were met. This included public recruitment through the REACH BC platform, social media, posts on the Women's Health Research Institute website (www.whri.org) and community engagement with stakeholders to facilitate recruitment. All respondents were entered into a draw to win a $100 e-gift card for completing the survey. Target recruitment was met for each stratum, with the exception of the 25–29 year group. Recruitment lasted from August 20, 2020 to March 1, 2021. Ethics approval was obtained from the BC Children's and Women's Research Ethics Board .

2.2. Survey design and measures

The online survey was administered via REDCap (Research Electronic Data Capture) (Harris et al., 2009). There were multiple topics covered in the survey; this analysis is based on sociodemographic information and questions from the psychosocial module (Brotto, 2021). Demographic information was collected and analyzed, including age, sex, gender, sexual orientation, ethnicity, Indigenous status, student status, relationship status, education level, household income, and rurality.

2.2.1. Sociodemographic information

Age was analyzed as both a continuous and categorical variable in regression analyses. Sex options included male, female or intersex. Self-reported current gender identity included man, woman, or another option grouping gender non-binary, trans gender, GenderQueer, agender or other gender identity. To account for low enrollment of certain LGBTQ+ and Two Spirt (LGBTQ+/2S) groups, sexual orientation was analyzed based on heterosexual and non-heterosexual (CIHR, 2020b). A similar approach was taken for Indigenous status, which allowed participants to identify as First Nations, Métis, Inuit, non-status First Nations, other Indigenous or not Indigenous. Rurality was determined based on the first three digits of the participants' postal code in which they were categorized into one of the four categories: census metropolitan area, strong metropolitan influence zone, moderate metropolitan zone, or weak to no metropolitan influence zone. Participants were given the option to select from the following racial groups: White, Chinese/Taiwanese, Black (African, Caribbean, or Other), South Asian (e.g., Indian, Bangladeshi, Pakistani, Punjabi, and Sri Lankan), and several other ethnicities who were analyzed an "Other" category. Income data was collected based at the household level. For the purpose of our analyses, the median (reference) income was set between $60,000 and $80,000, based on census data (StatisticsCanada, 2017). Last, participants were asked whether they were currently in a relationship or not.

2.2.2. Coping ability

The primary outcome of interest was participants' ability to cope during the pandemic. Participants were asked to rate how well they were coping during the first two months (i.e., March and April) of the COVID-19 pandemic lockdown in 2020, when public health protection measures were most strict (e.g., school closures, a ban on social gatherings, restaurant and movie theatre closures), on a scale from 1 to 5, with 1 being "Not able to cope" and 5 being "Coping very successfully." Those who responded that they were "not able to cope" or "found it challenging to cope", were classified as "Not Coping", whereas those who responded "neutral", "coping a little", or "coping very successful" were classified as "Coping." Those who did not answer this question were excluded from analyses.

2.2.3. Descriptive summary of qualitative responses

In addition to executing quantitative analyses, responses to an open-ended question were summarized to further our understanding of coping during the COVID-19 pandemic. Participants were asked: "*If you have been working from home at any time during the pandemic, what strategies or tools have you found helpful for coping or self-care?*" Qualitative responses were extracted from the raw dataset and were descriptively summarized.

To be classified into a "Qualitative Category," a theme needed to appear in more than 1% of responses. Some replies contained multiple categories, while others were too specific to be categorized. Responses were analyzed all together in addition to scanning responses from gender diverse respondents separately to determine if significant differences arose.

2.3. Statistical analyses

Analyses were carried out using R v.4.1.0. Logistic regression models were conducted to determine statistical differences in coping levels within groups. Once the groups who were not coping were identified (based on significance of $p < .05$), a multivariate model was created to identify further confounding variables between the sociodemographic characteristics with the highest odds of reporting not coping. This additional model further adjusted for age, ethnicity and education. These variables were chosen based on conceptualization in a directed acyclic graph (DAG), available data and *a priori* (Brouwer and Menard, 2020). Missing data were excluded from the analyses.

3. Results

3.1. Demographic characteristics of participants

A total of 5,083 participants met the inclusion criteria after screening for age (those aged 25–69) and provincial residence. An additional 274 participants (5.39%) were excluded due to missing data on the coping question, for a total of 4,809 respondents undergoing analysis. In our cohort, 81.5% (3,921/4,809) of participants were classified as coping, and 18.5% (888/4,809) were classified as not coping (Table 1). The mean age of survey respondents in this analysis was 51.3 years (Table 1). A total of 56 (1.8%) gender diverse individuals were included in the analysis. Overall, our sample was primarily white (82.9%), identified as a woman (89.3%), college or university-educated (86.3%), and lived in a census metropolitan area (94.8%). The stratification of respondents by coping versus not coping is presented in Table 1.

3.2. Sociodemographic analysis

When controlling for income, older age was positively associated with coping with an odds of 0.96 of not coping for every one-year increase in age (CI = 0.95–0.97, $p < .0001$, Table 2). Sex and gender results were similar, with females having 2.20 increased odds of reporting not coping relative to males (CI = 1.57–3.17, $p < .0001$, Table 2) and women having an increased odds of 2.11 relative to men (CI = 1.51–3.05, $p < .0001$, Table 2). Gender diverse respondents had 3.43 increased odds of reporting not coping when compared to men (CI = 1.67–6.84, $p = 0.0006$, Table 2). Relative to those earning median household incomes, those living in households with lower incomes were more likely to report not coping. For example, individuals from households earning less than $20,000 a year had 1.84 higher odds of reporting not coping, relative to those living in households earning $60,000 - $80,000 (CI = 1.15–2.91, $p = 0.01$, Table 2). Identifying as LGTBQ/2S+ was also associated with higher odds of not coping, relative to those identifying as heterosexual (OR = 1.54, CI = 1.24–1.89, $p < 0.0001$, Table 2). Ethnicity, living in a rural household, being Indigenous and relationship status were not associated with not coping.

3.3. Investigating confounding variables to the relationship between sex, gender and coping

To illustrate how confounding variables, such as ethnicity, income, age, and education, influenced the relationship between gender and coping, a model was constructed to account for additional covariates (Table 3). After adjusting for confounders, females remained significantly more likely to report not coping, relative to males (OR = 2.18, CI =

Table 1. Demographic information of survey respondents overall and by coping status (n = 4,809).

	All Participants	Coping	Not Coping
	N = 4,809 (100%)	N = 3,921 (81.5%)	N = 888 (18.5%)
Age M (SD)	51.3 (±10.6)	52.1 (±10.4)	47.9 (±10.7)
25–29	109 (2.3%)	76 (1.9%)	33 (3.7%)
30–39	649 (13.5%)	464 (11.8%)	185 (20.8%)
40–49	1282 (26.7%)	988 (25.2%)	294 (33.1%)
50–59	1474 (30.7%)	1,253 (32.0%)	221 (24.9%)
60–69	1295 (26.9%)	1,140 (29.1%)	155 (17.5%)
Sex			
Male	471 (9.8%)	431 (11.0%)	40 (4.5%)
Female	4,338 (90.2%)	3,490 (89.0%)	848 (95.5%)
Gender			
Man	460 (9.6%)	420 (10.7%)	40 (4.5%)
Woman	4293 (89.3%)	3,461 (88.3%)	832 (93.7%)
Gender Diverse	56 (1.2%)	40 (1.0%)	16 (1.8%)
Sexual Orientation (%)			
Heterosexual	4,115 (85.6%)	3,406 (86.9%)	709 (79.8%)
LGBTQ+/2S	676 (14.1%)	502 (12.8%)	174 (19.6%)
Ethnicity (%)			
White	3,988 (82.9%)	3,261 (83.2%)	727 (81.9%)
Black	25 (0.5%)	16 (0.4%)	9 (1.0%)
Chinese/Taiwanese	257 (5.3%)	215 (5.5%)	42 (4.7%)
South Asian	88 (1.8%)	73 (1.9%)	15 (1.7%)
Other ethnicity	427 (8.7%)	336 (8.6%)	91 (10.2%)
Indigenous Status (%)			
Indigenous	137 (2.8%)	102 (2.6%)	35 (3.9%)
Not Indigenous	4,451 (92.6%)	3,659 (93.3%)	792 (89.2%)
Current Student (%)			
Yes	189 (3.9%)	153 (3.9%)	36 (4.1%)
No	4,614 (95.9%)	3,764 (96.0%)	850 (95.7%)
In a Relationship? (%)			
Yes	3,927 (81.7%)	3,242 (82.7%)	685 (77.1%)
No	882 (18.3%)	679 (17.3%)	203 (22.9%)
Level of education (%)			
High school or less	650 (13.5%)	522 (13.3%)	128 (14.4%)
More than high school	4150 (86.3%)	3,391 (86.4%)	759 (85.5%)
Current Household Income (%)			
<$10,000–$20,000	119 (2.5%)	84 (2.1%)	35 (3.9%)
$20,000–$40,000	237 (4.9%)	163 (4.2%)	74 (8.3%)
$40,000–$60,000	398 (8.3%)	290 (7.4%)	108 (12.2%)
$60,000–$80,000	438 (9.1%)	357 (9.1%)	81 (9.1%)
$80,000–$100,000	589 (12.2%)	487 (12.4%)	102 (11.5%)
$100,000–$150,000	1,050 (21.8%)	863 (22.0%)	187 (21.1%)
>$150,000	1,279 (26.6%)	1,105 (28.2%)	174 (19.6%)
Rurality			
Census metropolitan area	4,559 (94.8%)	3,718 (94.8%)	841 (94.7%)
Strong metropolitan influence zone	56 (1.2%)	44 (1.1%)	12 (1.4%)
Moderate metropolitan influence zone	32 (0.7%)	74 (1.9%)	18 (2.0%)
Weak to No metropolitan influence zone	70 (1.5%)	25 (0.6%)	7 (0.8%)

Note: Values do not add up to 100% due to missing data. *M* refers to the mean age and *(SD)* standard deviation of participants.

1.54–3.56, $p < .0001$, Table 3). Similarly, women had 2.15 times higher odds of reporting not coping relative to men (CI = 1.50–3.07, $p < .0001$, Table 3). Gender diverse individuals had an attenuated odds and were 2.38 times more likely to report not coping relative to men (CI = 1.07–5.07, $p = .0279$, Table 3).

3.4. Coping symptoms and strategies

To highlight how coping or not coping manifested in participants' lives, we analysed both quantitative and qualitative responses. Table 4 demonstrates some of the coping symptoms and strategies prevalent among respondents with results stratified by our primary outcome. There are qualitative differences in symptoms between those who were coping and those who were not. For example, having difficulties sleeping (32.5% among coping versus 66.7% among not coping), finding it challenging to focus (23.7% among coping versus 62.8% among not coping) and being

pessimistic and worried about the future (32.1% among coping versus 56% among not coping) were all increased among those who reported not coping (Table 4).

Participants also reported a wide range of coping strategies (Table 4, Table 5). There were clear qualitative differences in strategies between the coping and not coping groups, such as spending less time talking to family and friends (16.2% among coping versus 59.1% among not coping, Table 4). Moreover, several qualitative categories were identified from the open-ended question such as: communicating with friends and family, physical activity, engaging in hobbies, staying in a routine, not having effective strategies, and practicing mindfulness and self-care (Table 5). Gender diverse respondents seemed to employ similar strategies or tools, with the exception of communicating with friends and family (45.37% among all participants versus 11.54% among gender diverse) and practicing mindfulness and self-care (3.57% among all participants versus 15.38% among the gender diverse) (Table 5).

4. Discussion

Our main findings highlight the proportion of participants that were not able to cope during the first wave of the pandemic. Furthermore, young adults, females, women, gender diverse, low-income earners (below $60,000/year) and those who identify as LGBTQ/2S + had higher odds of 'not coping,' when controlling for income. Although effects among women and gender diverse individuals were attenuated when ethnicity, age, and education were controlled for, there was a clear association between identifying as a woman or gender diverse individual and reporting not coping during the first phase of the COVID-19 public health response. Coping symptoms and strategies were diverse, with those reporting not coping experiencing a higher prevalence of negative symptoms and more maladaptive coping strategies.

It is well established that women experience a higher prevalence of common mental disorders, such as mood, anxiety and substance use disorders relative to men (Klose and Jacobi, 2004). These differences in mental health can also be attributable to societal structures (e.g., gender pay gaps, expectations that women take on more caretaking activities) as well as life stages (e.g., pregnancy, motherhood) (McBride, 1990). Worse mental health outcomes, in addition to societal pressures, can result in the need for women to employ more adaptive coping mechanisms than men to have similar outcomes. Though literature explaining these differences in coping mechanisms is limited, women are more likely to seek social support than men to cope with mental health issues, such as depression (Martínez-Hernáez et al., 2016), and given the increased prevalence of loneliness among women during multiple phases of the pandemic (Brotto et al., 2021), it is reasonable to expect that women had more coping challenges than men.

Gender diverse individuals also had higher odds of reporting not coping during the pandemic. It has been posited that transgender and gender-nonconforming individuals experience unique circumstances under the Minority Stress Model (Hendricks and Testa, 2012). Though few studies have sought to document the ability of non-cisgendered people to cope, Pinto et al. (2008) highlighted the importance of trans-specific social networks to maintain an in-group acceptance as a critical coping strategy (Pinto et al., 2008). This recommendation seems particularly fitting given our finding that gender diverse individuals communicated with friends and family less than the total participant pool. It is also possible gender diverse individuals have shifted their coping strategies in response to COVID-19 public health protection measures away from socializing towards more self-sufficient strategies like mindfulness and self-care.

Differences in coping abilities attributable to age and income were reported in our study. Older adults are more likely to employ more effective coping mechanisms, such as problem-focused strategies, in contrast to younger adults who are more likely to use escapism tactics, such as avoidance or substance use, to cope (Aldwin et al., 1996). These findings have also been supported in the context of the pandemic at hand,

Table 2. Effects of sociodemographic characteristics on not coping.

Predictors	Estimates	Odds Ratios (OR)	OR 95% CI	p-value
Age	−0.04	0.96	0.95–0.97	**<0.0001**
Age (categories)				
25–29	Reference			
30–39	−0.002	1.00	0.62–1.63	0.9920
40–49	−0.236	0.79	0.50–1.27	0.3203
50–59	−0.755	0.47	0.29–0.76	**0.0017**
60–69	−1.158	0.31	0.20–0.51	**<0.0001**
Sex				
Male	Reference			
Female	0.79	2.20	1.57–3.17	**<0.0001**
Gender				
Man	Reference			
Woman	0.749	2.11	1.51–3.05	**<0.0001**
Gender Diverse	1.23	3.43	1.67–6.84	**0.0006**
Ethnicity				
White	Reference			
South Asian	−0.14	0.87	0.44–1.57	0.6575
Black	0.41	1.51	0.54–3.74	0.3941
Chinese/Taiwanese	−0.30	0.74	0.48–1.09	0.1452
Other	0.12	1.12	0.85–1.46	0.3933
Indigenous Status				
Non-Indigenous	Reference			
Indigenous	0.16	1.17	0.74–1.80	0.4734
Household income				
<$10K to $20K	0.61	1.84	1.15–2.90	**0.0100**
$20K to $40K	0.69	2.00	1.39–2.89	**0.0002**
$40K to $60K	0.50	1.64	1.18–2.28	**0.0030**
$60K to $80K	Reference			
$80K to $100K	−0.08	0.92	0.67–1.28	0.6264
$100K to $150K	−0.05	0.96	0.72–1.28	0.7545
>$150K	−1.48	0.69	0.52–0.93	**0.0134**
Rurality				
Census metropolitan area	Reference			
Strong metropolitan influence zone	0.01	1.01	0.47–1.96	0.9883
Moderate metropolitan influence zone	−0.01	0.99	0.56–1.65	0.96629
Weak to No metropolitan influence zone	−0.14	0.87	0.29–2.16	0.78756
Sexual Orientation				
Heterosexual	Reference			
LGBTQ+/2S	0.43	1.54	1.24–1.89	**<0.0001**
Relationship Status				
Yes	Reference			
No	0.02	1.02	0.82–1.25	0.8888

Note: Odd ratios above one (i.e., estimates above zero) indicate a higher propensity to report not coping, while odds ratios below 1 (i.e., estimates below zero) indicate a higher propensity to report coping. All analyses are controlled for income.

Table 3. Multivariate model to explore confounding variables, ethnicity, income, and rurality, in the relationship between gender and not coping.

	Unadjusted Model			Model 1 (income)			Model 2 (age, ethnicity, and education)		
	Crude OR	CI	p-value	Adjusted OR	CI	p-value	Adjusted OR	CI	p-value
Sex									
Male	*Reference*			*Reference*			*Reference*		
Female	2.62	1.90–3.70	**<0.0001**	2.20	1.57–3.17	**<0.0001**	2.18	1.54–3.16	**<0.0001**
Gender									
Man	*Reference*			*Reference*			*Reference*		
Woman	2.52	2.12–8.07	**<0.0001**	2.11	1.51–3.05	**<0.0001**	2.11	1.50–3.07	**<0.0001**
Gender Diverse	4.20	1.83–3.57	**<0.0001**	3.43	1.67–6.84	**0.0006**	2.38	1.07–5.07	**0.0279**

Note: Odd ratios above one (i.e., estimates above zero) indicate a higher propensity to report not coping, while odds ratios below 1 (i.e., estimates below zero) indicate a higher propensity to report coping.

which have highlighted the use of resilience, self-reflection, and drawing on mental schemas as coping mechanisms that older adults may be more experienced with (Minahan et al., 2020). It is possible that younger demographics have not yet developed adaptive coping strategies and therefore are coping less effectively during the pandemic. Moreover, income is a major social determinant of health and therefore, it was unsurprising to find associations between income and coping abilities. These findings align with the complex relationship between income and coping that has been reported pre-pandemic in Canadian settings (Poetz et al., 2007).

It was surprising that ethnicity was not significantly associated with coping. In response to race-related stressors, such as racism and discrimination, visible minority populations tend to develop strong coping skills, such as emotion-focussed and adaptive coping skills, leading to increased resilience (Henderson et al., 2021). Given our results, it seems as though pandemic protection measures did not exacerbate experiences of racism and potentially even mitigated some of the discrimination that racialized communities experience due a lack of in-person interactions during the first wave of the pandemic. Black respondents did demonstrate a higher propensity, but not statistically significant, to report not coping. Future studies should aim to increase the sample size of Black participants to better characterize coping during the COVID-19 pandemic.

Our findings on coping symptoms and strategies align with established bodies of literature, both within the COVID-19 pandemic and outside of the pandemic. Previous findings from the COVID-19 pandemic have highlighted the importance of connecting outdoors, exercising,

modifying routines, staying socially connected, and many other health-promoting activities (Ferguson et al., 2021; Finlay et al., 2021). Strategies - such as meditation, boundary setting, social support, and engaging in hobbies–seem to be present both pre-pandemic and during the onset of COVID-19. Intuitively, those who reported not coping were more likely to engage in maladaptive coping strategies, such as social isolation, changes in eating behaviours and alcohol and cannabis use. These findings highlight the need for public health officials to identify who is not coping, and subsequently, help to facilitate social support, resources on disordered eating and substance use.

4.1. Strengths and limitations

Several strengths and limitations contribute to the validity and generalizability of our findings. We benefited from a large sample size and are one of the few population-level studies that have taken on a sex and gender-based analysis to understand coping and psychosocial symptoms during the COVID-19 pandemic. Despite our large sample size, our gender diverse sample was still relatively small. Future studies should aim to collect both sex and gender information – a simple, yet powerful modification which allows for data disaggregation. Given the cross-sectional, retrospective nature of our study, it is possible that recall bias impacted the accuracy of responses, in addition to the lack of directionality of our exposures and outcomes. Our sample was largely educated, white women, which may limit the generalizability of our findings, though this concern is partially mitigated by the large overall sample size. Last, our primary outcome of coping versus not coping was

Table 4. An overview of coping symptoms and strategies among respondents.

Coping Symptoms	Coping		Not Coping	
	Reported "Yes"	Reported "No"	Reported "Yes"	Reported "No"
Having difficulties sleeping (sleeping too much or not enough)	1,275 (32.5%)	2,646 (67.5%)	592 (66.7%)	296 (33.3%)
Being optimistic and confident about the future	943 (24%)	2,978 (76%)	137 (15.4%)	751 (84.6%)
Finding it challenging to focus	929 (23.7%)	2,992 (76.3%)	558 (62.8%)	330 (37.2%)
Spending more time talking to family and friends	2,036 (51.9%)	1,885 (48.1%)	368 (41.4%)	520 (58.6%)
Able to concentrate just as well, if not better than before	957 (24.4%)	2,964 (75.6%)	318 (35.8%)	570 (64.2%)
Being pessimistic and worried about the future	1,259 (32.1%)	2,662 (67.9%)	497 (56%)	391 (44%)
Becoming more irritable	675 (17.2%)	3,246 (82.8%)	277 (31.2%)	611 (68.8%)
Feeling more fatigued	744 (19%)	3,177 (81%)	27 (3%)	861 (97%)
Feeling anxious or overwhelmed	974 (24.8%)	2,947 (75.2%)	519 (58.4%)	369 (41.6%)
Feeling lonely	990 (25.2%)	2,931 (74.8%)<	529 (59.6%)	359 (40.4%)
Feeling depressed	1,252 (31.9%)	2,669 (68.1%)	597 (67.2%)	291 (32.8%)
Coping Strategies	Coping		Not Coping	
	Reported "Yes"	Reported "No"	Reported "Yes"	Reported "No"
Using alcohol, tobacco, or marijuana more frequently	1,412 (36%)	2,509 (64%)	705 (79.4%)	183 (20.6%)
Eating much more than usual, or much less than usual	854 (21.8%)	3,067 (78.2%)	516 (58.1%)	372 (41.9%)
Spending less time talking to family and friends	635 (16.2%)	3,286 (83.8%)	525 (59.1%)	363 (40.9%)

Table 5. Self-reported strategies and tools for coping (total n = 3,220; gender diverse n = 26).

Qualitative Category	Prevalence	Prevalence among gender diverse	Examples quotes
Communicating with friends and family	1461 (45.37%)	3 (11.54%)	"My husband and I took our 3 year old granddaughter for 4 h a day to help our family. The 2 h that I spent with her, and wouldn't have had under normal circumstances, provided me with a deeper relationship with her and gave me playtime that I found refreshing."
Physical activity	812 (25.22%)	5 (19.23%)	"I love working from home. We have started working out at home to help with stress."
Engaging in hobbies	398 (12.36%)	3 (11.54%)	"I keep meaning to get outside and walk more but I get busy and forget. I really like listening to podcasts so try to remember to take a break during the day and listen to an interesting podcast. My friend's mother passed away and I've been writing her these long kind of chatty emails that are a bit funny and ironic to give her a break from grief now and then. I very much enjoy writing those. I am taking a socially distanced class in painting and writing a text book for my class - the writing and painting I find I really really like. But the exercise is an issue- I need to get that under control. I've gained probably 10 pounds since lockdown."
Staying in a routine	129 (4.01%)	1 (3.85%)	"Trying to follow a similar schedule to when I was in the office. Timing my breaks, alternating standing and sitting, really looking away from the screen on my breaks."
No effective strategies	115 (3.57%)	1 (3.85%)	"[Nothing] has helped really. Pretty much sure nothing really will short of a vaccine in my arm."
			"None, really. It's been impossible for me to consistently sustain any productive work habits. My executive functions seem to be on sabbatical these days. I alternate between periods of depressive/anxious numbness with occasional frantic bursts of productivity at the eleventh hour. Basically: Me-Maybe I should try to accomplish this simple thing that needs doing. Brain-*PANIC! commence meltdown sequence in 3...2...* Me-okay, okay, we can accomplish the thing later. (Except later, the same thing will happen then too.)"
Practicing mindfulness and self-care	115 (3.57%)	4 (15.38%)	"I started seeking professional treatment for depression and anxiety and started taking antidepressants which have helped substantially. Our family has gotten better at talking with each other directly and helping each other to better communicate our struggles so we can better support each other. I take more time for myself every week to concentrate on my own self-care and not just everyone else's. I have begun guided meditation practices to help relieve anxiety and stress."

Note: Survey question was *"What strategies or tools have you found for coping or self-care?"*

analyzed as dichotomous variable, rather than as an ordinal one (in addition to confounding variables like education and LGTBQ/2S + status). This limits our ability to interpret coping on a spectrum rather than as an all-or-nothing response and has the potential to introduce residual confounding. Future studies could further increase sample sizes, particularly among historically marginalized communities to better our understanding of their ability to cope, in addition to supports needed for ongoing and future pandemics.

4.2. Implications

The uncertainty of the continuing pandemic, multiple waves of SARS-CoV-2 infection and the possibility of new variants, or a future pandemic, are all sources of distress that require existing and new coping strategies. Our findings illustrate which communities need support and which strategies could be the focus of public health professionals. We must build better infrastructure and policies to take a gender-specific (and inclusive) approach to support those suffering from mental health sequelae. These could include better access (and funding) for universal mental healthcare, discouraging policies that limit low risk social gatherings, and providing culturally tailored resources to marginalized communities on how they can practice mindfulness and self-care. We urge governments and policymakers to be better prepared to support the mental health of the people they serve for future pandemics, or we risk repeating history, resulting in further exacerbation of health inequities.

Declarations

Author Contribution Statement

Lori A. Brotto, Amy Booth; Angela Kaida; Laurie W. Smith; C. Sarai Racey; Anna Gottschlich; Melanie C.M. Murray; Manish Sadarangani; Gina S. Ogilvie; Liisa A.M. Galeab: Conceived and designed the experiments; Performed the experiments; Wrote the paper.

Kyle Chankasingh: Analyzed and interpreted the data; Wrote the paper.

Data availability statement

The authors do not have permission to share data.

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The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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