

# Pandemic-related PTSD symptoms and substance use among community-based adults

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## Research Article

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# Abstract

**Objectives:** To examine: (1) the role of gender and socioeconomic status in pandemic-related post-traumatic stress disorder (PTSD) symptoms and substance use; (2) associations between probable PTSD and substance use, and (3) the supports needed to address these problems.

**Methods:** Data were collected in June 2020 from 933 community-based adults in Alberta without a previous diagnosis of PTSD. The Primary Care PTSD Screen was adapted to assess pandemic-related PTSD symptoms. Participants were asked if alcohol or cannabis use had increased in the past month. Adjusted logistic regression models examined associations between probable PTSD and substance use.

**Results:** Significantly more women (19%) than men (13%) met criteria for probable pandemic-related PTSD, while a similar percentage (13.5% of women, 13.0% of men) reported increased substance use during the pandemic. Adults with lower income, education, or pandemic-related job loss were more vulnerable to PTSD and substance use increases. Probable pandemic-related PTSD was associated with increased substance use for both women (OR = 2.2) and men (OR = 2.3) in adjusted models. Many adults (50% of women, 40% of men) indicated they needed support to address mental health or substance use during the pandemic, particularly from friends, a physician, and/or a counsellor.

**Conclusions:** This study examined adults who had just experienced two months of increasing COVID-19 cases and containment measures. Findings suggest women and socioeconomically vulnerable adults may be in greater need of mental health supports, and that pandemic-related PTSD is an important consideration for interventions to reduce substance use among both women and men.

## Background

The mental health and wellbeing of societies has been severely affected by the coronavirus disease 2019 (COVID-19) pandemic (United Nations, 2020). In Canada, approximately one quarter of adults reported poor to fair mental health in May 2020 compared to 8% in 2018, with similar changes reported in other countries (Codagnone et al., 2020; Statistics Canada, 2020a; Xiang et al., 2020). Given the global impact of COVID-19, these impacts likely go beyond increased symptomology to include clinically significant changes in mental health status for some adults.

Posttraumatic stress disorder (PTSD) has been reported in response to epidemics and may be of particular concern (Boyras & Legros, 2020; Lau et al., 2005; Liu et al., 2020). PTSD symptoms include intrusive recollection of a traumatic event, efforts to avoid stimuli associated with it, negative alterations in cognition or mood, and marked changes in arousal and reactivity (American Psychiatric Association,

2013). A review of emerging evidence found risk factors for PTSD due to COVID-19 include female gender, levels of exposure, hospitalization, loss of a loved one, social isolation, and older age (Boyras & Legros, 2020). A *key rationale* for this study was to address a gap in the literature by examining whether adults who were more vulnerable to the socioeconomic impacts of the pandemic were more likely to have pandemic-related PTSD symptoms. These associations have been theorized but not carefully examined and would provide important information about vulnerable or at-risk groups for targeted mental health interventions (Blumenshine et al., 2008; Boyras & Legros, 2020; Quinn & Kumar, 2014).

The *second rationale* was to examine associations between pandemic-related PTSD and substance use by gender. It is well documented that persons who are isolated and stressed often turn to substances to alleviate negative feelings (Cooper, Frone, Russell, & Mudar, 1995; Volkow, 2020). This is a concern during a pandemic given alcohol and drugs weaken the body's immune system and ability to cope with infectious disease (Eisenstein, Kaminsky, Rahim, & Rogers, 2008; Friedman, Pross, & Klein, 2006). Early reports suggest substance use has increased more among women than men during the pandemic, suggesting that gender-stratified analyses are needed (Biddle, Edwards, Gray, & Sollis, 2020; Lu et al., 2020). In Australia, 23% of women and 18% of men who consume alcohol have reported increased use during the pandemic (Biddle et al., 2020). To provide a population estimate of these changes in Australia, Biddle and colleagues (2020) recorded those who did not drink in the denominator as not having changed their alcohol use.

When they did so, the gender pattern remained, with 18% and 15% of women and men reporting increased alcohol use during the pandemic, respectively. Common reasons for increased alcohol use among Australian adults were spending more time at home and boredom. However, women were more likely than men to cite stress, anxiety, and worry about COVID-19 as reasons why their alcohol use had increased during the pandemic (Biddle et al., 2020). Building on these findings, a key objective of the present study was to examine whether pandemic-related PTSD symptoms were statistically associated with increased substance use separately among Canadian women and men during the pandemic. Finally, to inform the resourcing of interventions, this study sought to understand the proportion of population-based adults in Alberta who believed they personally needed support to address their alcohol use, their stress levels, and their mental health during the pandemic.

In summary, this study had three objectives: (1) to examine gender and socioeconomic differences in pandemic-related PTSD symptoms and substance use increases among adults; (2) to examine associations between pandemic-related PTSD symptoms and substance use among adults using gender-stratified models; and (3) to understand the supports community-based adults were seeking to address their substance use, mental health, or stress levels during the pandemic.

## Methods

### 2.1 Study Design and Eligibility Criteria

This cross-sectional study was derived from Canada's largest online panel with 400,000 members (Leger Opinion, 2019). The panel is demographically representative of the Canadian adult population as measured by the most recent census. Data collection was limited to a single province to promote consistency in exposure to COVID-19 and containment measures. Eligible participants were adults living in non-institutionalized private dwellings in Alberta in June 2020 who had not been diagnosed with PTSD before the pandemic. The study was approved by the University of Lethbridge Human Research Ethics Committee (ID 2020-054). Informed consent was obtained from all participants.

## 2.2 Sample and Procedure

On June 1, 2020, Leger Opinion emailed a study invitation to adults who had previously volunteered for its online panel. The 15-minute survey was open until approximately 1,000 adults completed it on June 7, 2020 ( $N = 1,025$ ). The final sample was  $N = 933$  after those with previous PTSD ( $n = 49$ , 5.0%) or missing data ( $n = 43$ , 4.2% of sample) were removed.

## 2.3 COVID-19 Context

Participants answered questions about PTSD symptoms and substance use in the past 4 weeks (i.e., May 1 to June 7, 2020 depending on the date of survey completion). Societal restrictions to prevent COVID-19 had been in place for six weeks by May 1 in Alberta. Stores that sold alcohol and cannabis were deemed essential services and remained open throughout the pandemic without interruption. In mid-May, Phase 1 of a staged relaunch brought gradual reopening of businesses deemed nonessential, as well as restaurants, daycares, and playgrounds (Government of Alberta, 2020b). Most adults continued to work from home between May 1 - June 7, K to 12, and post-secondary education took place online across the province, and the US border remained closed.

New COVID-19 infections climbed through March-April, peaking on April 30, 2020 at 2,992 cases, or 68 active cases per 100,000 population in Alberta (Government of Alberta, 2020a). During this time, the COVID-19 hospitalization rate was 4.5%, and the case fatality ratio was 2.0% (Government of Alberta, 2020a). A precipitous decline in new infections followed, with less than 400 active cases by the first week of Jun or  $< 9$  active cases per 100,000 population (Government of Alberta, 2020a). While many Canadians lost jobs due to the pandemic, in April 2020, the federal government provided those unemployed for any reason with \$2,000 per month for four months to ease the financial impacts of the pandemic (Government of Canada, 2020).

## 2.4 Measures

**PTSD.** The 5-item Primary Care PTSD Screen for DSM-5 was adapted to assess five pandemic-related symptoms of PTSD occurring in the past month by substituting the words “the event” with “COVID-19” in the six places it occurred in the original scale (Prins et al., 2016). For example, the first question was modified to: “*In the past month, have you had nightmares about COVID-19 or thought about COVID-19 when you did not want to?*” Response options were consistent with the original scale (1 = yes, 0 = no). Internal consistency was good (Cronbach’s  $\alpha = 0.73$ ). Validation research suggests that a cut-off point of 3 is optimally sensitive for probable PTSD ( $r = 0.78$ ) and was used to differentiate those with probable pandemic-related PTSD (Prins et al., 2016).

**Substance use.** Two questions asked adults if they had used alcohol or cannabis in the past month (yes or no). Those who had were asked if past-month alcohol and cannabis use had increased very much, decreased very much, or stayed about the same. Participants who indicated their use of alcohol or cannabis had increased very much were coded as  $1 = \text{substance use increased very much in the past month}$ . Those who reported no change in use, a decrease in use, or that they did not consume alcohol or use cannabis in that timeframe were coded as  $0 = \text{substance use did not increase in the past month}$ . Substance use changes were examined with abstainers included given cross-sectional studies examining prevalence, and the defined population in a prevalence estimate includes those at risk and those not at risk for the target behaviour (Szklo & Nieto, 2019). Calculations that exclude abstainers produce inflated estimates, do not represent the true frequency of behaviours in a population and have limited generalizability (Lange, Probst, Rehm, & Popova, 2017).

**Supports needed.** Three questions asked participants if they wanted to make changes in their stress levels (yes or no), mental health (yes or no) or substance use (yes or no) in preparation for possible COVID-19 infection. Adults who indicated they wanted to make one or more of these changes ( $n = 462$ ) were asked: “*What supports do you need to make this change?*” Participants were presented with a list of options (select all that apply) including support from friends, a family doctor, a psychological counsellor, a health coach, a spiritual or religious mentor, other, and no support/do not know.

**Covariates.** Age categories, gender, education, marital status, and income group were collected. Income group was collected as the cost of living varies widely across Alberta, making income in dollar amounts less useful. Participants were asked if they had lost their job/been laid off due to COVID-19 (yes or no), if they had contracted COVID-19, and if they believed they would contract COVID-19 in the next year (yes, unsure, no).

## 2.5 Sample Size Calculation

The required sample size was calculated based on data that found 29% of adults who met criteria for probable PTSD after the 2004 Florida hurricane reported increased alcohol use compared to 6% exposed to the hurricane who did not develop probable PTSD (Fullerton et al., 2013). Using this information, the present sample size was estimated assuming 25% of adults with probable pandemic-related PTSD would report increased substance use compared to 5% of adults exposed to the pandemic who did not develop probable PTSD. Using a chi-squared statistic and assuming a gender-stratified analysis, 59 women and 59 men with probable PTSD and 59 women and 59 men with increased substance use were needed to achieve 80% power at  $\alpha$  (two-sided) =

0.05 (Browner, W. S., Newman, T. B., Hulley, 2013). In the present study, 89 women and 60 men had probable PTSD, while 63 women and 61 men increased their substance use. Given that 11% of adults experienced mental health problems and/or substance use increases after the hurricane, a sample of 1,000 adults was deemed sufficient to achieve adequate power (Fullerton et al., 2013). In the present study, 25% of adults experienced probable PTSD and/or had increased their substance use very much during the pandemic.

## 2.6 Statistical Approach

Crosstabs and chi-square tests examined differences in PTSD and increased substance use by gender and socioeconomic variables (income group, education, job loss). Gender-stratified logistic regression models and 95% confidence intervals assessed the odds of increased substance use among adults with probable PTSD, adjusting for demographic and socioeconomic variables (age, marital status, education, income group, and job loss due to COVID-19). The p-value was set at 0.05, missing data were handled using listwise deletion, and analyses were run using SPSS 27.0.

## Results

### 3.1 Sample Characteristics

Participants ranged in age from 18 to 85 years. Two-thirds were married or living common law and had completed postsecondary training (Table 1). The proportion of female participants (51%) matched population estimates (Statistics Canada, 2017). Almost 17% had lost their job/been laid off due to the pandemic. The percentage unemployed was high (13.3%) but consistent with an elevated Canadian unemployment rate of 13.7% during this time period due to the pandemic (Statistics Canada, 2020b). No participants had been diagnosed with COVID-19 in this study. Six in ten adults believed, or were unsure, if they would contract COVID-19 in the next 12 months.

Adults who believed they would become infected were more likely to meet criteria for probable PTSD (Table 1), and reported that their substance use had increased very much in the past month (23% compared to 12% of other adults, *Chi-Square test* = 10.19, *df* = 2, *p* = 0.006).

## 3.2 Socioeconomic Status, PTSD, and Substance Use

The average pandemic-related PTSD score was 1.0 (SD = 1.4, range 0 to 5), with 47.8% of adults reporting at least one of five PTSD symptoms in the past month. Overall, 15.5% of the sample ( $n = 145$  adults) met criteria for probable pandemic-related PTSD, defined by scores of 3 or more. The prevalence of probable pandemic-related PTSD was significantly higher among those without a post-secondary qualification, those in lower income groups, and those who had lost their job due to COVID-19. Additionally, 22% of adults who had lost their job due to COVID-19 reported that their substance use increased very much compared to 12% who had not (*Chi-Square test* = 11.73, *df* = 1,  $p = 0.001$ ).

## 3.3 Gender, PTSD, and Substance Use

Women were more likely than men to report four of the five PTSD symptoms examined and had a pandemic-related PTSD score that was significantly higher than men (Table 2). Overall, 12.8% of women and 10.7% of men had increased their alcohol use very much in the past month, while 2.0% of women and 4.1% of men had increased their cannabis use very much in that time period. Taken together, 13.5% of women and 13.0% of men had increased their substance use very much in the past month. Women who increased their substance use were significantly more likely than men to report COVID-19 nightmares and intrusive thoughts, as well as feelings of guilt or blame toward themselves or others due to COVID-19. Approximately 25% of adults with probable pandemic-related PTSD reported increased substance use compared to 11% of those without probable PTSD (Table 3). There was a significant and moderately strong association between probable pandemic-related PTSD and increased substance use for both women and men before and after adjustment for confounders.

**Table 1.** Sample characteristics

Sample Characteristics	Probably PTSD prevalence by		<i>p</i> value
	<i>N</i> (%)	sample characteristic, <i>n</i> (%)	
Total sample	933 (100)	145 (100)	
Gender			
Women	469 (50.3)	87 (18.6)	0.01
Men	464 (49.7)	58 (12.5)	
Age			
18-34	229 (24.6)	62 (27.1)	0.001
35-54	460 (42.6)	53 (11.5)	
55+	307 (32.9)	30 (20.7)	
Education			
≤University of college degree	324 (34.7)	61 (18.8)	0.04
University/college degree	609 (65.3)	84 (13.8)	
Marital status			
Single and never married	188 (20.2)	46 (24.5)	0.01
Single and previously married	127 (13.6)	20 (15.7)	
Married/living common law	617 (66.2)	79 (12.8)	
Household income			
Low or low-middle income	274 (29.5)	58 (21.2)	0.008
Middle income	439 (47.3)	59 (13.4)	
Upper-middle or upper income	216 (23.3)	27 (12.5)	
Job loss due to COVID-19			
Yes	155 (16.7)	33 (21.3)	0.03
No	775 (83.3)	112 (14.5)	
Have you had COVID-19			
Unsure (had symptoms, but not tested)	125 (13.3)	28 (23.9)	0.05
No	807 (86.7)	117 (14.5)	
Will you contract COVID-19 in next year?			
Yes	108 (11.6)	32 (29.6)	0.001
Unsure	452 (48.5)	70 (15.5)	
No	372 (39.9)	42 (11.3)	

**Table 2.** Gender-stratified frequency of PTSD symptoms in the full sample and among those who reported increased substance use in the past month

	Full sample			Increased substance use subsample		
	Women	Men	<i>p</i>	Women	Men	<i>p</i>
In the past month:	<i>n</i> = 469	<i>n</i> = 464	value	<i>n</i> = 63	<i>n</i> = 61	value
1. Have you had nightmares about COVID-19 or thought about COVID-19 when you did not want to?	17.8%*	8.8%	0.001	33.3%*	14.8%	0.001
2. Have you tried hard not to think about COVID-19, or went out of your way to avoid being reminded of COVID-19?	32.4%*	24.2%	0.001	42.9%	43.3%	0.92
3. Have you been constantly on guard, watchful, or easily startled?	24.8%	23.4%	0.32	39.7%	36.1%	0.41
4. Have you felt numb or detached from people, activities or your surroundings?	30.5%*	23.3%	0.001	46.8%	49.2%	0.65
5. Have you felt guilty or been unable to stop blaming yourself or others for COVID-19 or problems created by COVID-19?	10.9%*	6.0%	0.001	20.6%*	11.5%	0.005
Mean PTSD score (SD)	1.2* (1.4)	0.9 (1.2)	0.001	1.9 (1.7)	1.6 (1.4)	0.10

\*Statistically significant chi-square test.

**Table 3.** Gender-stratified unadjusted and adjusted odds ratios (ORs) for increased substance use among adults with and without probable pandemic-related PTSD

Probable pandemic-related PTSD	Increased Substance Use in Past Month		Unadjusted ORs for Increased Substance Use		Adjusted ORs for Increased Substance Use <sup>a</sup>	
	Women <i>n</i> = 63	Men <i>n</i> = 61	Women (95% CI)	Men (95% CI)	Women (95% CI)	Men (95% CI)
Yes	24.1%	25.9%	2.58 (1.43, 4.63)	2.73 (1.41, 5.30)	2.18 (1.18, 4.05)	2.33 (1.15, 4.71)
No	11.0%	11.3%	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)	1.0 (Reference)

<sup>a</sup>ORs adjusted for age, marital status, education, income, and job loss due to COVID-19.

### 3.4 Needed Supports

Significantly more women (52.0%) than men (41.1%) wanted to make changes in their stress levels, mental health or substance use in preparation for possible COVID-19 infection (*Chi-Square test* = 9.60, *df* = 3, *p* = 0.02). Approximately one-third of all adults (34.3%) wanted to reduce stress, about one-quarter (27.3%) wanted to improve their mental health, and about one in ten (8.9%) wanted to reduce substance use. Adults who indicated they wanted to make one or more of these changes (*n* = 462) were asked about the supports they needed to make the changes and were presented with a list of options.

As shown in Figure 1, few who wanted to make changes believed they did not need support or were unsure of the supports they needed. The most common support needed to improve stress, mental health, or reduce substance use during the pandemic was support from friends, followed by support from a family physician, a psychological counsellor, and a health coach. A third of the sample (33.3%) selected more than one support. There were no statistically significant gender differences in the support that adults needed to address their stress, mental health, or substance use in this study.

### Discussion

Data collected for this study represent a one-month period when the burden that the COVID-19 pandemic had placed on a community-based sample of adults was lifting for the first time after two months of increasing infections and containment measures. A significant proportion of women (19%) and men (13%) experienced pandemic-related PTSD symptoms during this easing period, despite having no previous diagnostic history of the disorder. In contrast to a recent review, older age was not a risk factor for pandemic-related PTSD in this study (Boyras & Legros, 2020). The results contribute to the literature by demonstrating that those who were socioeconomically disadvantaged due to low income, lack of a post-secondary qualification, or pandemic-related job loss were more vulnerable to probable pandemic-

related PTSD, despite an enhanced monthly benefit provided to all unemployed Canadians during this time. While no participants in this study had been diagnosed with COVID-19, belief that one had been infected and belief that one would become infected were each associated with probable pandemic-related PTSD.

In contrast to Australian data, the present findings do not suggest that increases in substance use during the pandemic were a greater concern among women than men (Biddle et al., 2020).

Probable pandemic-related PTSD was moderately associated with increased substance use for both women and men during this period of COVID-19 easing. Approximately 50% of women and 40% of men wanted to make changes in stress, mental health, or substance use in preparation for possible COVID-19 infection. Almost all indicated they needed support to do so, particularly from friends, family physicians, psychological counsellors, and health coaches.

Study limitations include the use of a cross-sectional design which precludes inferences about temporal sequence and causation. It is possible that some PTSD symptoms were unrelated to the pandemic despite adapting the screen to refer to COVID-19 and removal of those with a pre-pandemic diagnosis of PTSD. Recall bias and underreporting are possible given that substance use is not a socially desirable behaviour. Data were collected from a volunteer panel. While sample sociodemographics matched population estimates, healthy volunteer bias and residual confounding remain concerns.

## Conclusions

This study examined adults who had just experienced two months of increasing COVID-19 cases and containment measures that were now easing. The findings suggest women and socioeconomically vulnerable adults may be in greater need of support for pandemic-related PTSD, that pandemic-related PTSD is an important consideration for interventions to reduce substance use across gender and that a significant proportion of community-based women and men may be in need of mental health and substance use support during the COVID-19 pandemic.

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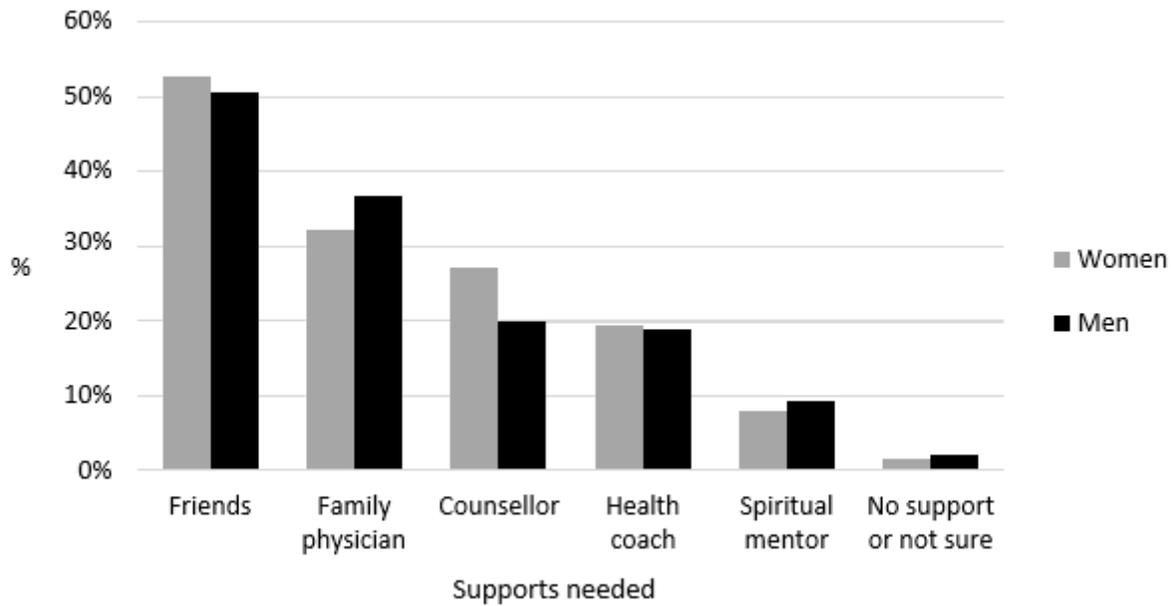
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# Declarations

**Author Disclosure:** The author reports no conflict of interest.

## Figures



**Figure 1**

Supports needed by community-based adults who want to make changes in their stress, mental health, or substance use during the COVID-19 pandemic (N = 462).