IMPORTANT: The data reported below are preliminary. At the time that these data were analyzed, COVID-19 RESPPONSE was still enrolling participants. The data should be interpreted with caution and findings will evolve as the investigation continues.

For more information about COVID-19 RESPPONSE, please visit the study website at https://whri.org/covid-19-respponse-study/, or contact us by email at covid19study@cw.bc.ca.

**Report #1: Released February 18, 2021**

# Early Release: Impact of COVID-19 Pandemic Controls on Mental Health Outcomes for a Provincial Population-Based Cohort Through a Sex- and Gender Lens

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## INTRODUCTION

On March 11, 2020, the World Health Organization declared Coronavirus Disease 19 (COVID-19), the respiratory illness caused by SARS-CoV-2 infection, an official global pandemic.[1] While there were over 65,000 cases of COVID-19 and over 1,100 deaths in British Columbia (BC) as of January 23rd, 2021,[2] there has been less focus on the mental health impacts of associated pandemic controls. This report will focus on the mental health outcomes of the COVID-19 pandemic and associated control measures until January 4th, 2021.

Evidence from previous pandemics indicates that women and other marginalized and vulnerable groups experience inequitable short- and longer-term health and psychosocial outcomes.[3,4] However, population-level data are often analyzed without adequate attention to sex and gender, and there is a scarcity of data on how the impact of the COVID-19 pandemic and associated public health measures intersect with sex and gender. Understanding the influence of sex and gender is critical in order to mitigate the impact of future pandemic management on existing inequalities in British Columbia and Canada, and also to inform evidence-based policies and the allocation of mental health resources in the wake of the COVID-19 pandemic.

With the support of the BC Women's Health Foundation and the Michael Smith Foundation for Health Research, the study: COVID-19 RESPPONSE (COVID-19 Rapid Evidence Study of a Provincial Population Based Cohort for Gender and Sex) is providing comprehensive, population-level data to determine the impact of COVID-19 and associated public health measures on British Columbians, grounded in a Sex- and Gender-based analysis. This study is being led by investigators at Women's Health Research Institute, in partnership with BC Children's Hospital Research Institute, the Vaccine Evaluation Center, the University of British Columbia, and Simon Fraser University. This report highlights preliminary findings on the mental health outcomes for British Columbians, stratified by sex, gender, and age.

## METHODS

Residents of British Columbia aged 25-69 of all genders were eligible to participate in this study through an online survey. Starting August 20th, 2020 prospective participants were invited from established health research cohorts of individuals who represented general and priority populations of BC. To diversify sex and gender representation, respondents were asked to invite a household member who identified as a gender different from the participant's to participate in the study. Recruitment later expanded to include patients from BC Women's Hospital and the public.

Participants were asked to answer questions based on validated clinical scales used to assess depression (PHQ-9), anxiety (GAD-7), and stress/worry/loneliness (Coronavirus Health and Impact Survey; CRISIS). Participants surveyed before November 30th, 2020 were asked to respond based on different phases of the pandemic: pre-COVID (before mid-March 2020), Phase 1 (mid-March 2020 to May 20, 2020), and Phase 2-3 (May 21, 2020 to November 30, 2020). On November 30th, 2020, phase dates were amended and additional phases were added: pre-COVID (before mid-March 2020), Phase 1 (mid-March 2020 to May 20, 2020) Phase 2-3 (May 21, 2020 to August 31, 2020), Phase 4 (September 1, 2020 to October 31, 2020), and Phase 5 (November 1, 2020 to the date of this report). While enrolment remained open for all individuals invited from established health research cohorts, on November 18th, 2020, public enrolment closed for individuals aged 45 years and older, after targets were reached for these ages. On December 15th, 2020, public enrolment also closed for individuals aged 40-44 years.

We also asked women who reported being in a relationship (n= 4,786) whether they experienced Intimate Partner Violence (IPV) by a household partner, in the retrospective, phase-based manner described above. All participants were asked about changes in their substance use since COVID-19 and about their ability to cope in Phase 1 of the pandemic.

## RESULTS

As of January 4th, 2021, 6,302 people responded to the study. Respondents had a mean age of 49.3 (SD ±11.6) years. Overall, 5,184/6,302 (87.3%) respondents identified with a female birth assignment, and 5,132/6,302 (86.5%) identified as women (Table 1).

| Table 1: Demographic Summary | | Total (N = 6,302) Mean (SD) or n (%) |
|---|---|---|
| **Age** | | |
| | Mean (SD) | 49.3 (±11.6) |
| **Sex** | | |
| | Female | 5,184 (87.3%) |
| | Male | 744 (12.5%) |
| **Gender** | | |
| | Woman | 5,132 (86.5%) |
| | Man | 733 (12.4%) |
| | Non-Binary, GenderQueer, Agender, Two-spirit, or other | 67 (1.1%) |
| **Indigenous** | | |
| | Indigenous | 177 (3.0%) |
| **Racial/Cultural Background*** | | |
| | Asian | 470 (7.9%) |
| | South Asian | 139 (2.3%) |
| | Black | 33 (0.6%) |
| | White | 4,977 (83.9%) |
| **In a relationship** | | |
| | Yes | 4,786 (80.6%) |
| **Education** | | |
| | More than High School | 5,157 (86.9%) |
| | High School or less | 764 (12.9%) |
| **Essential Worker Status** | | |
| | Yes, health worker | 844 (14.2%) |
| | Yes, other essential worker | 1,099 (18.5%) |
| | No | 3,984 (67.1%) |
| **Chronic Health Conditions** | | |
| | One or more | 3,004 (50.6%) |

***Separate variables**

*Table 1. Demographic summary of respondents (January 4, 2021).*

From pre-COVID to Phase 1 of the pandemic, when pandemic controls were highest (Table 2), average depression scores increased for all sexes, genders, and ages by at least 1 PHQ-9 point and up to 3 PHQ-9 points (Figures 1-3). When pandemic control measures relaxed in Phases 2-3, depression scores either plateaued or showed shallow declines, but remained elevated above pre-COVID levels. Depression scores for non-binary individuals and for young adults, aged 25-39 years old, remained the most stable between Phase 1 and Phase 2-3. As pandemic control measures tightened again in Phases 4 and 5, PHQ-9 scores increased to levels that met or exceeded those experienced in Phase 1 for nearly all groups. (Important: As stated earlier in this report, public enrolment into this study closed for older age groups on November 18th, 2020 and on December 15th, 2020. Therefore, Phases 4 and 5 do not necessarily represent the same age-based sample that was captured in earlier Phases of this report.)

| COVID-19 Phases in BC | COVID-19 Control Measures in BC[5,6] |
|---|---|
| Phase 1 (mid-Mar. 2020 to mid-May 2020) | Only essential services (i.e., essential health services, law enforcement, first responders, food and agriculture service providers, vulnerable population service providers, transportation, manufacturing, sanitation, financial institutions, communications and information technology, critical infrastructure, non-health essential service providers). |
| Phase 2 (mid-May 2020 to June 2020) | Re-opening of select services under enhanced protocols (i.e., restoration of health services such as re-scheduling elective surgery and medically related services such as dentistry, retail sector, personal service establishments such as hair salons, in-person counselling, restaurants, museums, office-based worksites, recreation/sports, parks and outdoor spaces, childcare). |

| | |
|---|---|
| Phase 3 (June 2020 to Aug. 31, 2020) | Continued re-opening of select services under enhanced protocols (i.e., hotels and resorts, parks including overnight camping, domestic film industry, select entertainment such as movie theaters, post-secondary education with mix of online and in-person learning, K-12 education). |
| Phase 4 (Sept. 1, 2020 to Oct. 31, 2020) | Restrictions implemented on gatherings and for select services (i.e., prohibited events in banquet halls, maximum 50-person gatherings, liquor service to stop at 10:00pm). |
| Phase 5 (Nov. 1, 2020 to the date of this report) | Increased restrictions on gatherings and services (i.e., prohibited gatherings at private residences for those who are not occupants of that residence, restrictions on gatherings outside of a private residence, restrictions on sport and indoor fitness facilities, restrictions on buses and vehicles, requirements to wear face coverings). |

*Table 2. COVID-19 phases and associated control measures in BC. Note: this table is not exhaustive. This table is only intended to provide a general understanding of COVID-19 control measures in BC.*

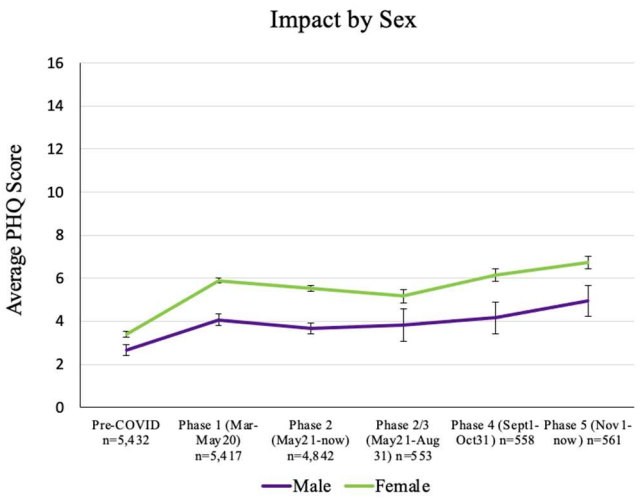


*Figure 1. Impact of pandemic controls on depression by sex. Bars represent 95% confidence intervals.*

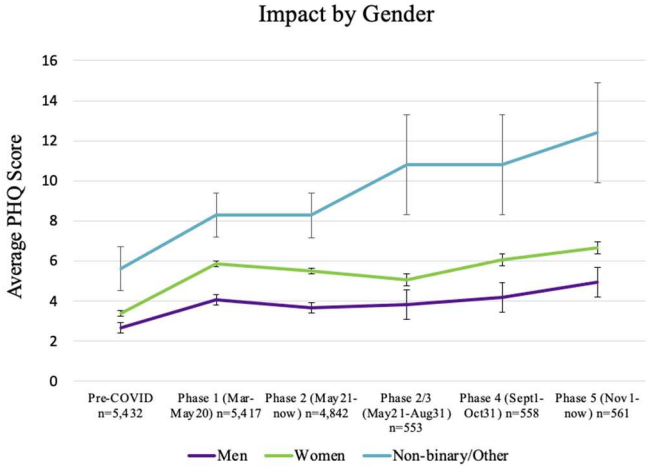


*Figure 2. Impact of pandemic controls on depression by gender. Bars represent 95% confidence intervals.*

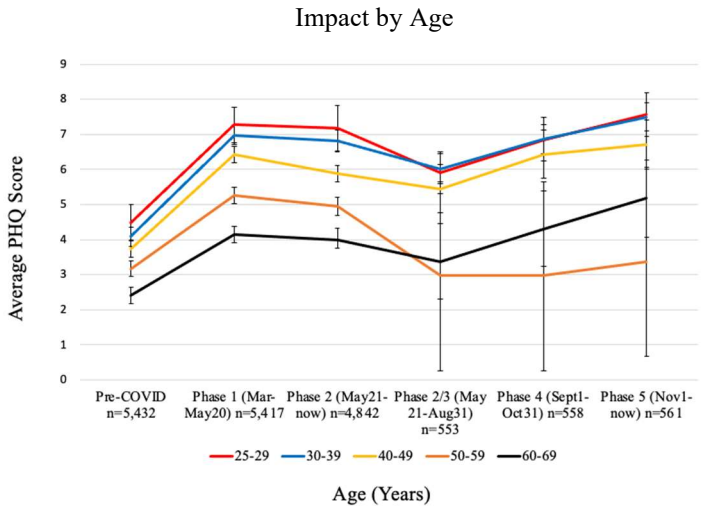


*Figure 3. Impact of pandemic controls on depression by age. Bars represent 95% confidence intervals.*

Of note, throughout all phases, females had consistently higher PHQ-9 scores than males, and women had consistently higher PHQ-9 scores than men. Individuals who identified as non-binary/trans/other had consistently higher PHQ-9 scores than other sex and genders. As well, depression scores remained the highest for individuals aged 25-39, with lower scores for older ages.

The impact of pandemic controls on depression outcomes were mirrored for measures of anxiety (Figures 4-6), loneliness (Figures 7-9), and stress/worry (Figures 10-12). Average GAD scores spiked in Phase 1 of the pandemic, plateauing or relaxing slightly as pandemic controls loosened in Phase 2-3, and increasing again as controls tightened in Phases 4 and 5. As was observed for PHQ-9 scores, GAD scores remained consistently higher for female sex, for women as compared to men, and for non-binary individuals as compared to both men and women. Again, the youngest age groups experienced the most adverse outcomes. These trends were replicated for loneliness and CRISIS scores.

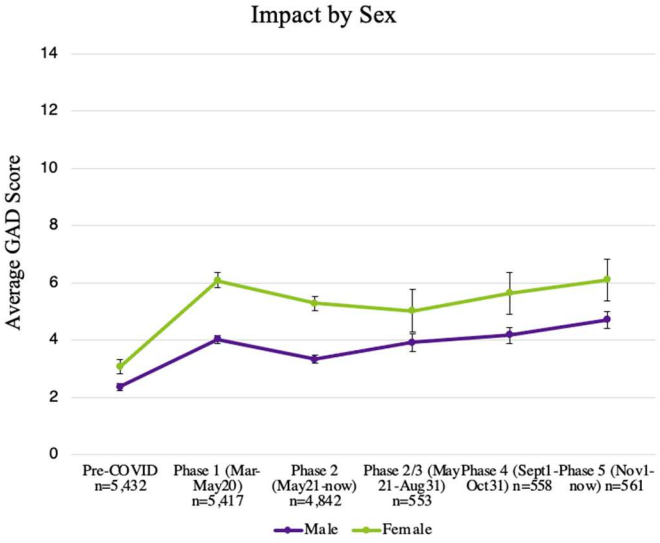


*Figure 4. Impact of pandemic controls on anxiety by sex. Bars represent 95% confidence intervals.*

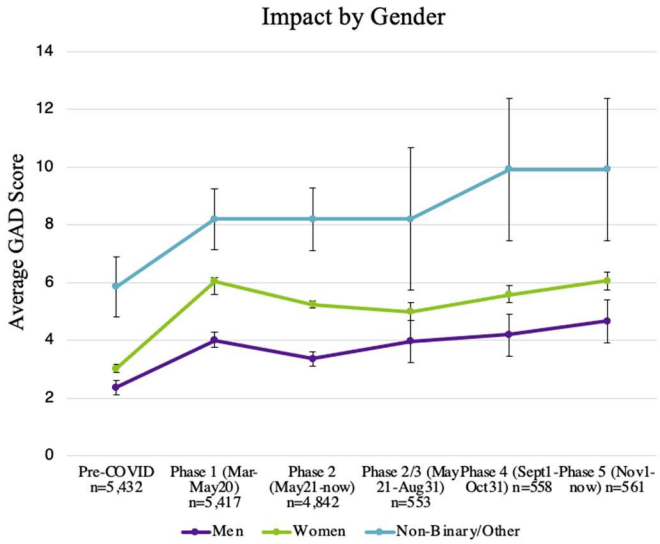


*Figure 5. Impact of pandemic controls on anxiety by gender. Bars represent 95% confidence intervals.*

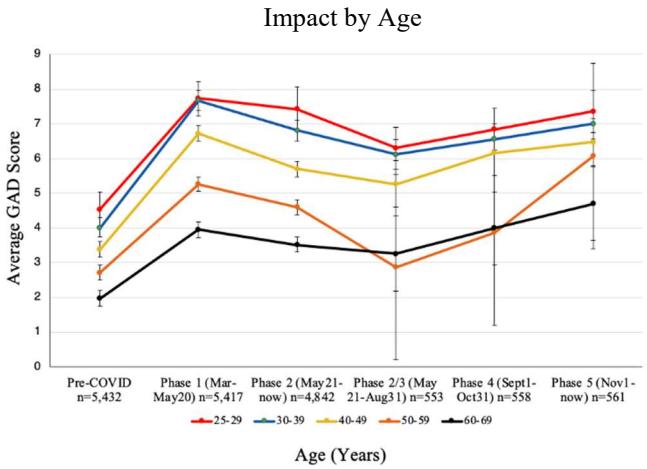


*Figure 6. Impact of pandemic controls on anxiety by age. Bars represent 95% confidence intervals.*

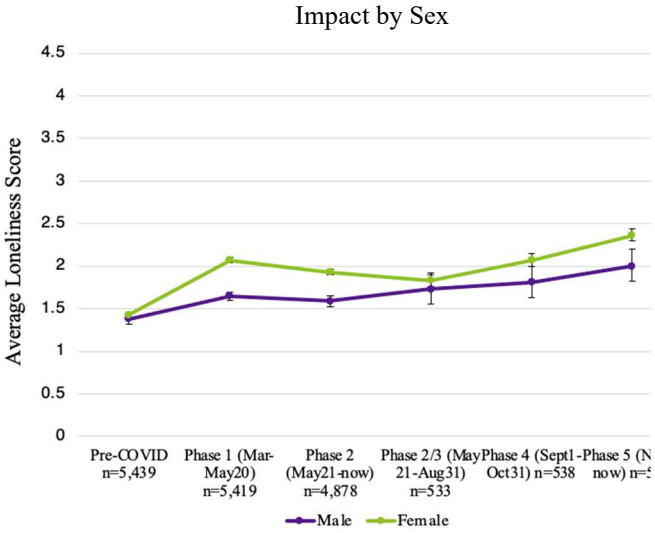


*Figure 7. Impact of pandemic controls on loneliness by sex. Bars represent 95% confidence intervals.*

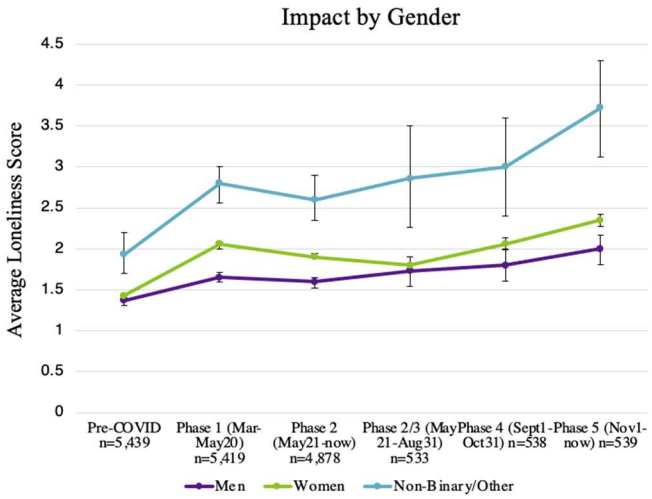


*Figure 8. Impact of pandemic controls on loneliness by gender. Bars represent 95% confidence intervals.*

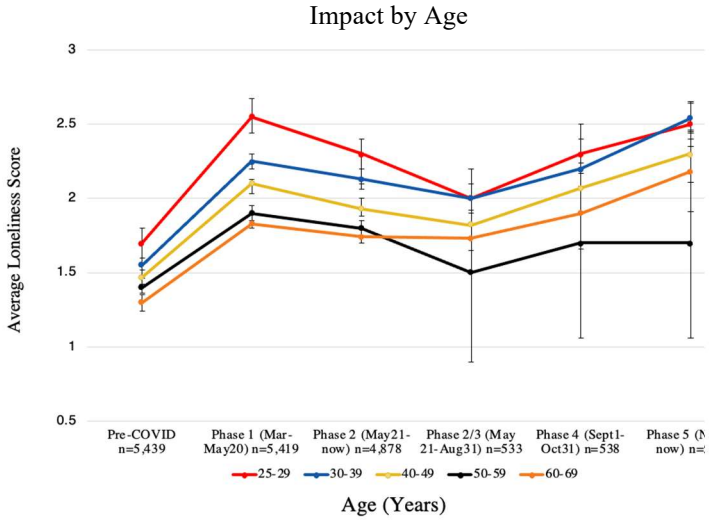


*Figure 9. Impact of pandemic controls on loneliness by age. Bars represent 95% confidence intervals.*

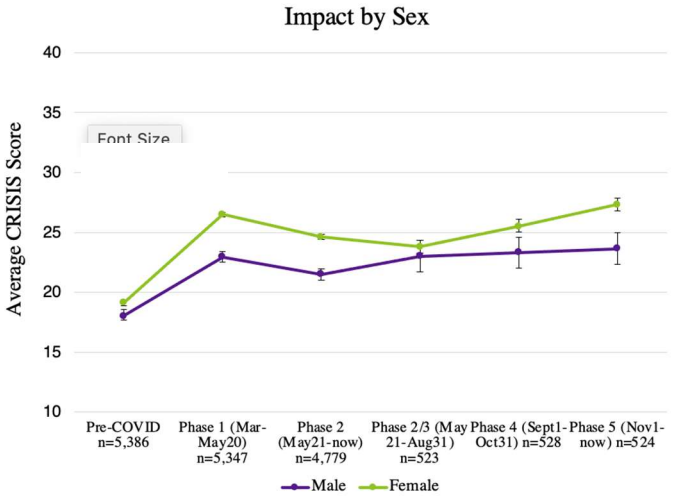


*Figure 10. Impact of pandemic controls on stress/worry by sex. Bars represent 95% confidence intervals.*

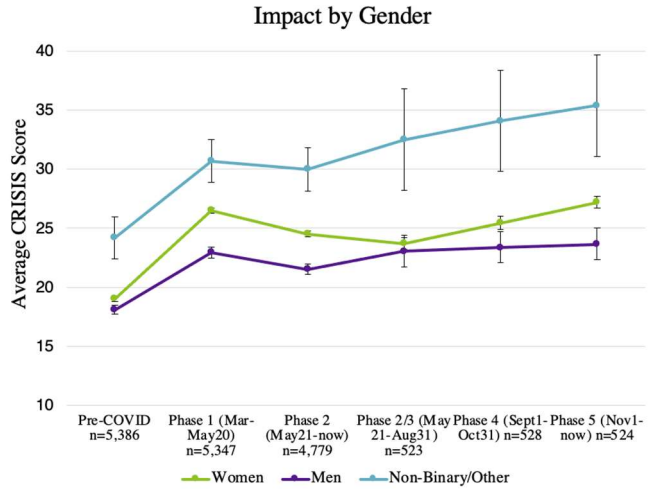


*Figure 11. Impact of pandemic controls on stress/worry by gender. Bars represent 95% confidence intervals.*

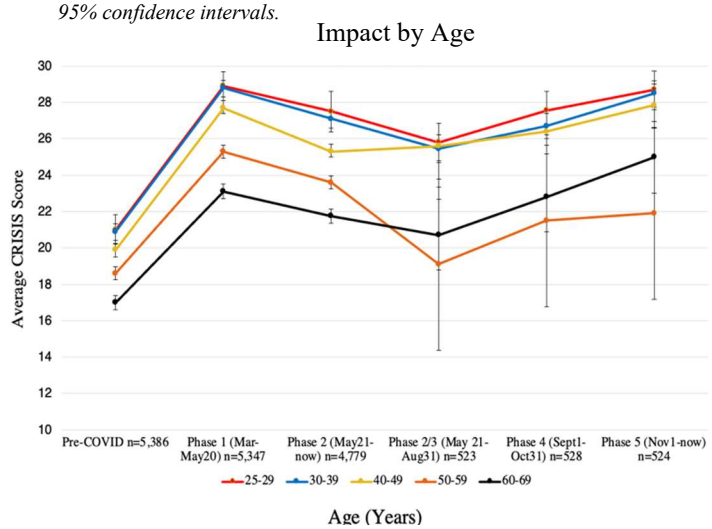


*Figure 12. Impact of pandemic controls on stress/worry by age. Bars represent 95% confidence intervals.*

For people who were in a relationship (n=4,786), nearly twice as many respondents said that they experienced IPV in Phase 1 (n=27) than before COVID-19 (n=15). These numbers remained elevated from pre-COVID levels in Phase 2-3 (n=21) (Table 3).

| COVID-19 Phases in BC | Respondents (n) who experienced IPV / total respondents | Percent (%) of respondents who experienced IPV |
|---|---|---|
| Pre-COVID-19 (mid Dec. 2019 to mid Mar. 2020) | 15/4,786 | 0.31 |
| Phase 1 (mid Mar. 2020 to May 20, 2020) | 27/4,786 | 0.56 |
| Phase 2-3 (May 21, 2020 to Aug. 31, 2020) | 21/4,786 | 0.44 |

*Table 3. People in a relationship that reported experiencing IPV for pre-COVID-19 and COVID-19 phases 1 and 2-3 in BC.*

Participants were asked whether their consumption of alcohol and/or cannabis changed from before March 2020. There were 20-40% of individuals aged 25-59 years who reported that their alcohol and cannabis use had changed and had increased. While there was no sex-based difference in the proportion of individuals who increased alcohol use, more females (26.9%) reported increasing their cannabis use from before March 2020 than males (16.4%) (Figures 13-16).

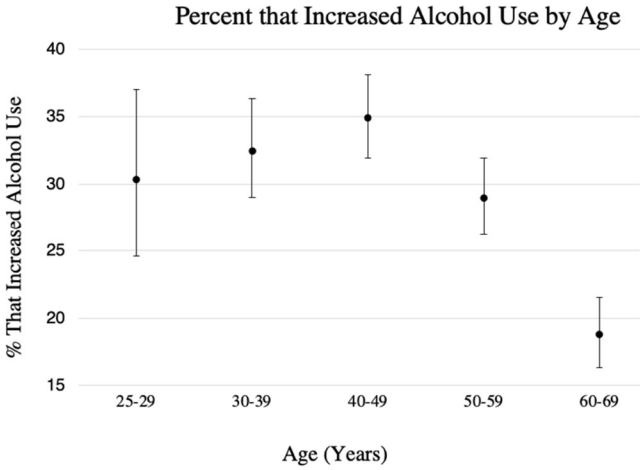


*Figure 13. Percent of respondents that increased alcohol use since March 2020 by age. Bars represent 95% confidence intervals.*

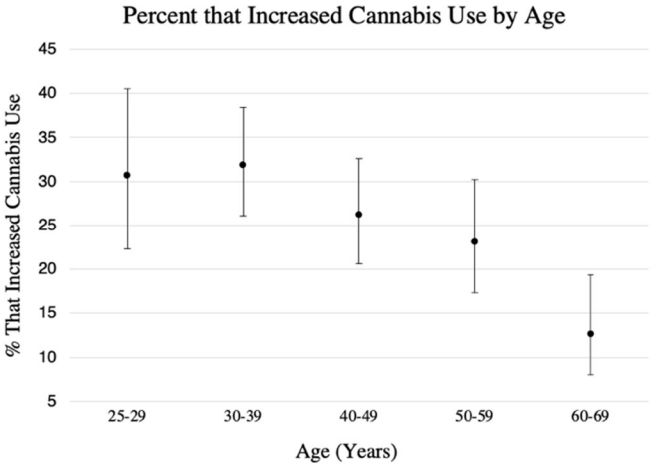


*Figure 14. Percent of respondents that increased cannabis use since March 2020 by age. Bars represent 95% confidence intervals.*

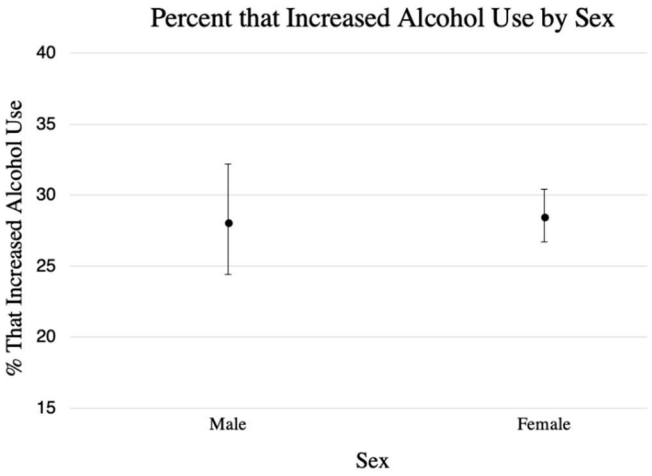


*Figure 15. Percent of respondents that increase alcohol use since March 2020 by sex. Bars represent 95% confidence intervals.*

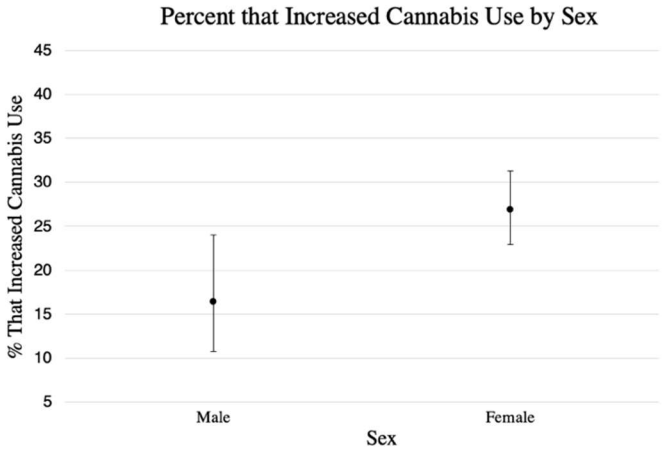


*Figure 16. Percent of respondents that increased cannabis use since March 2020 by sex. Bars represent 95% confidence intervals.*

In Phase 1 of the pandemic, just under 60% of males as compared to approximately 40% of females reported that they were "coping very successfully." Further, while approximately 10% of males reported finding it challenging to cope during Phase 1, nearly 20% of females reported the same (Figure 17). Gender-based analysis demonstrated that a smaller percentage of women reported successful coping than men, and an even smaller percentage of non-binary/trans individuals reported that they were able to cope during Phase 1 of the pandemic than men and women (Figure 18). When analyzed by age, a higher percentage of 60–69-year-olds said that they were able to cope during Phase 1 of the pandemic than any other age group. The percentage of people successfully coping declined for younger age brackets (Figure 19).

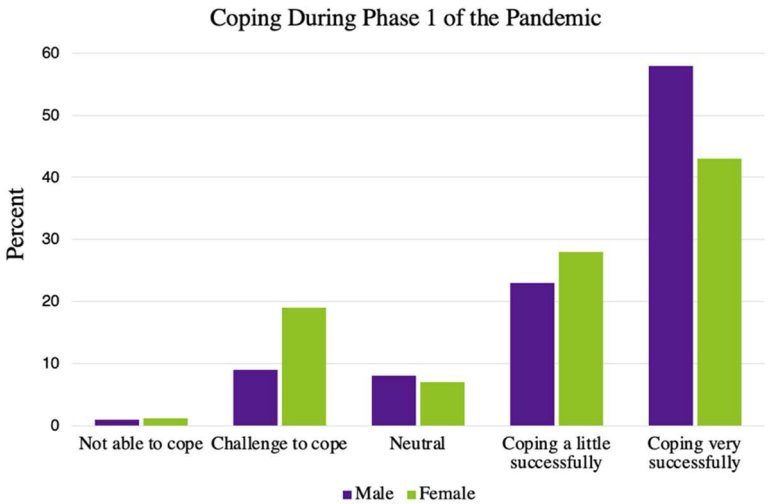


*Figure 17. Ability to cope during Phase 1 by sex.*

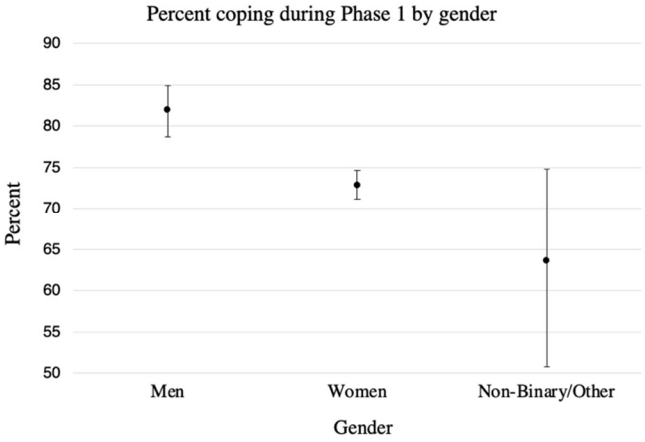


*Figure 18. Percent coping during Phase 1 by gender. Bars represent 95% confidence intervals.*

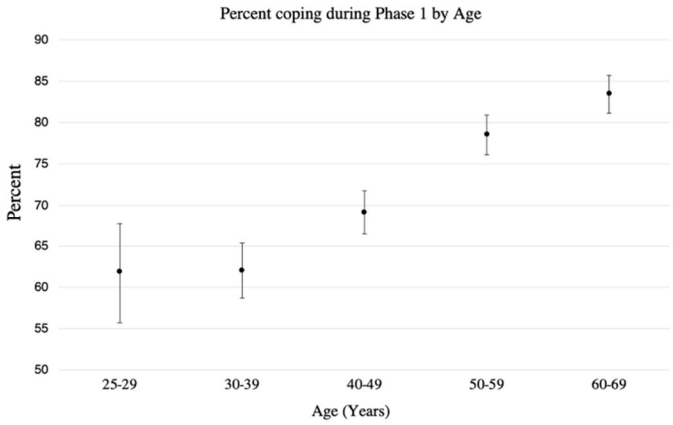


*Figure 19. Percent coping during Phase 1 by age. Bars represent 95% confidence intervals.*

## DISCUSSION

This preliminary COVID-19 RESPPONSE report highlights the impacts of COVID-19 pandemic control measures on mental health outcomes, IPV, substance use, and ability to cope for British Columbians, and facilitates early understanding of and support for the most severely affected. The findings suggest that women, non-binary/trans identified individuals, and young adults may be experiencing inequitable psychosocial outcomes and may require additional mental health supports now and possibly after the pandemic.

Staggeringly, individuals aged 25-49 consistently displayed scores of mild depression (PHQ-9 score 5-9) throughout all phases of the pandemic. As well, for females and women, depression scores increased from minimal depression (PHQ-9 score 0-4) before COVID-19, to mild depression in Phase 1 of the pandemic and remained elevated at this level throughout all phases. For non-binary/trans individuals, who already displayed scores of mild depression before COVID-19, PHQ-9 scores increased to those representative of moderate depression (PHQ-9 score 10-14) in Phase 2-3, Phase 4, and Phase 5. Clinical scores for anxiety, loneliness, and stress/worry followed similar patterns. These findings show that understanding the impacts of the COVID-19 pandemic through an age-, sex- and gender- based lens is critical.

This report also demonstrates that adverse mental health outcomes are closely tied to the level of pandemic control measures for British Columbian adults. When public health orders were the strictest, clinically validated measures of depression, anxiety, loneliness, and stress/worry pointed to elevated scores for all sexes, genders, and ages. Although, females, women, non-binary individuals, and young adults experienced disproportionate impacts at nearly every phase. Similarly, although the overall numbers of people who experienced IPV were low (< 1%; Table 3), experiences of IPV almost doubled in Phase 1 of the pandemic for our sample of partnered individuals, when control measures were highest.

Importantly, these preliminary findings show that the public health benefits of strict pandemic control measures come at a cost for the mental health of British Columbians. Now and in the

future, these preliminary findings can be utilized by public health leaders to continue a pandemic response that considers the psychosocial impacts for British Columbians; as we all navigate a challenging and rapidly evolving pandemic.

Furthermore, more females reported that they have been coping less successfully and increased their use of cannabis throughout the pandemic compared to males. Considered together, these associated trends may implicate the use of cannabis as a coping mechanism for females during COVID-19. A similar association is seen for the 20-40% of respondents aged 25-59 years old who increased their alcohol and cannabis use, and who report they have been coping less successfully that those who aged 60 years old or over.

This preliminary analysis is subject to a number of limitations. First, the number of respondents was significantly lower for Phases 2-3 (post-November 30th, 2020 change), Phase 4, and Phase 5. These phases were added to the survey after several months of data collection, when it was apparent that we would extend recruitment as the public health measures began to tighten. These data must be interpreted with caution and may evolve as we continue to recruit to our target sample size in each age strata. Second, Phase 2-3 (pre-November 30th, 2020 change) captures respondents up to November 30th, and thus includes data reflective of varied pandemic control measures that were in place from May 21 to November 30, 2020. Third, the survey became closed to the public for individuals aged 45-69 years on November 18th, 2020 and for individuals aged 40-44 years on December 15th, 2020. While the survey remained open to individuals invited from established health research cohorts of all ages, this altered public recruitment criteria means that findings for Phases 4 and 5 are taken from a sample with a higher proportion of respondents in younger age groups (i.e., 25-44 or 25-39) than the findings for earlier phases. This may misrepresent sex- and gender- based analyses of outcomes in later phases. Finally, while not an inherent limitation of this study, it is of note that this sample had a higher representation of those assigned female sex at birth (87.3%) than male (12.5%), and a higher proportion of those who identified as women (86.5%) than those who identified as men (12.4%) or non-binary (1.1%). These sample demographics make the application of age-based findings – that do not specifically delineate by sex and gender – limited for the overall British Columbian population. Despite these limitations, this preliminary report can help inform public policy and urgently needed evidence-based guidelines for mental health support during a rapidly evolving global pandemic.

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