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Widening mental health and substance use inequities among sexual and gender minority populations: Findings from a repeated cross-sectional monitoring survey during the COVID-19 pandemic in Canada

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ABSTRACT

This paper examines the mental health and substance use impacts of the COVID-19 pandemic among sexual and gender minority (SGM) populations as compared to non-SGM populations, and identifies risk factors for mental health and substance use impacts among SGM groups. Data were drawn from two rounds of a repeated cross-sectional monitoring survey of 6027 Canadian adults, with Round 1 conducted May 14–19, 2020 and Round 2 conducted September 14–21, 2020. Bivariate cross-tabulations with chi-square tests were utilized to identify differences in mental health and substance use outcomes between SGM and non-SGM groups. Separate multi-variable logistic regression models were used to identify risk factors for mental health and substance use outcomes for all SGM respondents. Compared to non-SGM respondents, a greater proportion of SGM participants reported mental health and substance use impacts of the COVID-19 pandemic, including deterioration in mental health, poor coping, suicidal thoughts, self-harm, alcohol and cannabis use, and use of substances to cope. Among SGM respondents, various risk factors, including having a pre-existing mental health condition, were identified as associated with mental health and substance use impacts. These widening inequities demonstrate the need for tailored public mental health actions during and beyond the pandemic.

1. Introduction

The negative mental health and substance use impacts associated with the COVID-19 pandemic have been widely documented and include increased stress, anxiety, depression and substance use (Salari et al., 2020; Twenge and Joiner, 2020; Xiong et al., 2020). These impacts have been disproportionately experienced by key sub-populations (Jenkins et al., 2020), including sexual and gender minority (SGM) people – those who identify as lesbian, gay, bisexual, transgender,

Two-Spirit, and queer (Brennan et al., 2020; Moore et al., 2021; Phillips et al., 2020). The mental health consequences of COVID-19 on SGM people may amplify longstanding mental health inequities (Pakula et al., 2016; Plöderl and Tremblay, 2015), including increased prevalence of depression (Borgogna et al., 2019; Ross et al., 2018;), self-harm (King et al., 2008; Liu et al., 2019), and suicide (Hottes et al., 2016; Mongelli et al., 2019; Salway et al., 2019;). Further, SGM people experience higher rates of substance use in early life and adulthood (Boyd et al., 2020; Demant et al., 2016; Krueger et al., 2020) along with drug

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dependence and substance use disorders (Girouard et al., 2019; Mereish and Bradford, 2014).

Mental health and substance use inequities among SGM people are driven by structural vulnerabilities – risk for negative health outcomes stemming from hierarchical power structures that create and maintain disparities in access to determinants of health (Bourgeois et al., 2017). For SGM populations, structural vulnerabilities that undermine opportunities for good mental health include discrimination in employment, housing, healthcare, and other aspects of daily life (Hatzenbuehler et al., 2013; Kattari et al., 2016; Valdiserri et al., 2019), as well as barriers to community and family acceptance (Kibrik et al., 2019). Together, Brooks (1981) and Meyer (2003) have conceptualized this spectrum of structural vulnerabilities impacting SGM people through the minority stress model. This model posits that SGMs experience distinct stressors of discrimination, violence, identity concealment, and internalized homophobia, which jeopardize mental health (Meyer, 2003). This explanatory framework draws attention to the connections between discrete stressors and associated experiences of adverse mental health and substance use outcomes (Lee et al., 2016; McConnell et al., 2016; Mongelli et al., 2019; Rehman et al., 2020).

The pre-existing mental health and substance use challenges experienced by SGM people are likely exacerbated by COVID-19 conditions, which emerging evidence is illustrating (Goodyear et al., 2021; Moore et al., 2021). SGM people are more likely to work in precarious, low-paying jobs and be susceptible to the economic impacts of the pandemic, such as cuts to work hours and job loss (Gibb et al., 2020; Goldberg, 2020). In addition, physical distancing mandates and closures of businesses and gathering places have contributed to SGM communities experiencing a “sudden and significant loss” of safe spaces, including support groups and leisure and entertainment spaces, that facilitate individuals expressing their authentic selves and identities and building social connections (Anderson and Knee, 2020; Banerjee and Nair, 2020; Konnoth, 2020). The ‘shutting down’ of these spaces and resultant loss of social support has led to many SGM individuals expressing lower connection to and pride in SGM communities, eroding important protective factors for mental health (Scroggs et al., 2020; Suen et al., 2020). Public health restrictions, such as physical distancing and quarantine measures, have further led to SGM individuals’ disconnection from supportive environments, resources, and social connections, resulting in negative mental health impacts, including lower levels of hope for the future and increased alcohol consumption (Scroggs et al., 2020).

Literature prior to COVID-19 demonstrates disparities in mental health between SGM groups and non-SGM counterparts and recent literature within the pandemic context illustrates concerning mental health outcomes among SGM populations; however, there is limited research that directly compares SGM and non-SGM populations (Moore et al., 2021). Yet, there is increasing concern that SGM populations may be overlooked in public policy and research responses to COVID-19 (Gorczyński and Fasoli, 2020; Salerno et al., 2020a). To ensure that public policy and mental health resources and supports appropriately respond to the needs of SGM people, it is crucial to build an evidence base monitoring the relative mental health status of this priority population. Further, research reporting mental health experiences and outcomes among SGMs over time is critically important for informing the development of responsive policy and program interventions. Accordingly, the purpose of this paper is to compare SGM mental health and substance use impacts of the COVID-19 pandemic to non-SGM peers to identify risk factors for adverse mental health and substance use outcomes among SGMs. To do so, we draw on two rounds of data from a large repeated cross-sectional Canadian survey investigating the mental health impacts of the COVID-19 pandemic.

2. Methods

Data are drawn from a larger repeated cross-sectional monitoring

survey, *Assessing the Impacts of COVID-19 on Mental Health*, which is being led through a collaboration between academic researchers from the University of British Columbia (UBC) and the Canadian Mental Health Association. The study additionally includes a partnership with the Mental Health Foundation in the United Kingdom. Our research team is strengthened by diversity in identities and lived experiences, and includes people who are queer and also who are living with mental health challenges. The full survey can be found in the supplementary material of Jenkins et al., (2020).

2.1. Survey development

Survey items were informed by a monitoring survey first commissioned by the Mental Health Foundation in March 2020. Original item development was guided by research evidence on mental health impacts of past pandemics. The survey was further refined through a citizens’ jury participatory methodology process involving people with lived experience of mental health conditions (Mental Health Foundation, 2020). Items were modified and questions added to reflect the Canadian context, and the survey was made available to participants in English and French.

2.2. Sample and procedure

Data are drawn from two survey rounds, with Round 1 conducted May 14–19, 2020 and Round 2 conducted September 14–21, 2020. Round 1 data collection occurred during what was a ‘re-opening’ phase in many Canadian provinces following the initial identification of COVID-19 and approximately two months of associated restrictions (Vogel, 2020). Round 2 data collection occurred at the end of the summer months, a period of relatively reduced virus transmission and greater easing of public health restrictions. It also marked the beginning of an upward trend in daily cases in Canada (John Hopkins Coronavirus Resource Center, 2021).

For each round, the online anonymous survey was distributed by Maru/Matchbox, a national polling agency that maintains a panel of 125,000 individuals across Canada. Maru/Matchbox provides access to this panel for researchers, distributing the survey among a sample of panel members. Maru/Matchbox utilized randomly sampled from their panel of individuals 18 years or older living in Canada, according to Canadian census-informed socioeconomic stratifications of age, binary male/female strata, household income, and province to generate a nationally representative sample according to these characteristics. Response rates were 32% at Round 1 and 36% at Round 2. Survey participants provided online consent and were provided a small honorarium for completing the survey, according to Maru/Matchbox standard policies and procedures. Ethical approval was obtained from the Behavioural Research Ethics Board at UBC (H20–01273).

2.3. Measures

Socio-demographic characteristics were collected, including SGM identity, gender identity, age, household income, education, ethnicity, pre-existing mental health condition, rural/urban living environment, and household composition. In Round 1, gender was assessed by asking participants “Which gender do you most identify with?” with the following response options: “Man”, “Woman”, “Transgender woman/trans woman”, “Transgender man/trans man”, “Non-binary”, “Two-Spirit”, “Not listed” and “Prefer not to answer”. Based on feedback from members of the research team, this measure was updated to better reflect current best practices (Bauer et al., 2017), and in Round 2, gender was assessed by asking participants which gender they most identify with followed by the options “Female”, “Male”, “Non-binary”, “Two-Spirit”, “Not listed” and “Prefer not to answer”. Round 2 participants were also asked “What sex were you assigned at birth?” with the options “Male” and “Female”. Transgender identities of Round 2 participants

Table 1
Description of repeated cross-sectional samples for Round 1 and Round 2.

	Round 1			Round 2		
	Non-SGM ^{a,b,c}	SGM ^{a,b,c}	Total	Non-SGM ^{a,b,c}	SGM ^{a,b,c}	Total
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Age group**						
18–34 years	445 (16.2)	84 (35.3)	529 (17.7)	241 (8.6)	51 (23.8)	292 (9.7)
35–54 years	1049 (38.2)	101 (42.4)	1150 (38.5)	1173 (42.0)	103 (48.1)	1276 (42.4)
55 + years	1252 (45.6)	53 (22.3)	1305 (43.7)	1381 (49.4)	60 (28.0)	1441 (47.9)
Gender Identity^{a, **}						
Cisgender man	1324 (48.2)	124 (52.1)	1448 (48.5)	1254 (44.9)	113 (52.8)	1367 (45.4)
Cisgender woman	1418 (51.6)	98 (41.2)	1516 (50.8)	1516 (54.2)	82 (38.3)	1598 (53.1)
Trans man	0 (0.0)	3 (1.3)	3 (0.1)	3 (0.1)	1 (0.5)	4 (0.1)
Trans woman	0 (0.0)	1 (0.4)	1 (0.0)	11 (0.4)	6 (2.8)	17 (0.6)
Non-binary	1 (0.0)	9 (3.8)	10 (0.3)	3 (0.1)	6 (2.8)	9 (0.3)
Two-Spirit	1 (0.0)	2 (0.8)	3 (0.1)	2 (0.1)	4 (1.9)	6 (0.2)
Household income, CAD**						
Under \$25k	200 (7.3)	32 (13.4)	232 (7.8)	169 (6.1)	25 (11.9)	194 (6.5)
\$25k-<\$50k	439 (16.0)	58 (24.4)	497 (16.7)	531 (19.3)	42 (20.0)	573 (19.3)
\$50k-<\$100k	912 (33.2)	76 (31.9)	988 (33.1)	991 (36.0)	85 (40.5)	1076 (36.3)
\$100k +	1195 (43.5)	72 (30.3)	1267 (42.5)	1061 (38.6)	58 (27.6)	1119 (37.8)
Education completed **Round 2 only						
High school or less	389 (4.2)	40 (16.8)	429 (14.4)	488 (17.5)	24 (11.2)	512 (17.0)
Some college or university	478 (17.4)	39 (16.4)	517 (17.3)	489 (17.5)	55 (25.7)	544 (18.1)
College or university graduate	1879 (68.4)	159 (66.8)	2038 (68.3)	1818 (65.0)	135 (63.1)	1953 (64.9)
Race/ethnicity^{a,c *}						
Non-racialized	1858 (69.9)	149 (65.4)	2007 (69.5)	1992 (74.1)	150 (73.2)	2142 (74.1)
Racialized	727 (27.4)	66 (28.9)	793 (27.5)	618 (23.0)	42 (20.5)	660 (22.8)
Indigenous	73 (2.7)	13 (5.7)	86 (3.0)	77 (2.9)	13 (6.3)	90 (3.1)
Urban/rural*						
Urban	2288 (83.3)	213 (89.5)	2501 (83.8)	2230 (79.8)	184 (86.0)	2414 (80.2)
Rural	458 (16.7)	25 (10.5)	483 (16.2)	565 (20.2)	30 (14.0)	595 (19.8)
Pre-existing mental health condition^{a, **}						
Yes	440 (16.2)	102 (43.0)	542 (18.3)	452 (16.3)	95 (44.8)	547 (18.3)
No	2278 (83.8)	135 (57.0)	2413 (81.7)	2323 (83.7)	117 (55.2)	2440 (81.7)
Live alone**						
Yes	541 (19.7)	67 (28.2)	608 (20.4)	525 (18.8)	60 (28.0)	585 (19.4)
No	2205 (80.3)	171 (1.8)	2376 (79.6)	2270 (81.2)	154 (72.0)	2424 (80.6)
Total	2746 (92.0)	238 (8.0)	2984 (100)	2795 (92.9)	214 (7.1)	3009 (100)

* $p < 0.05$ based on Chi-square or Fisher's Exact Test

** $p < 0.01$ based on Chi-square or Fisher's Exact Test

^a A small number of respondents chose not to answer some questions which reduced the total counts for these variables.

^b Participants who responded yes or unsure to the question "Do you identify as being LGBT2Q+ (lesbian, gay, bisexual, trans, two-spirit, queer, etc.)?" were classified as SGM (sexual and gender minorities).

^c Ethnicity was determined by grouping participants who reported Indigenous family origin as Indigenous; those who reported only European family origins were classified as non-racialized; and those who reported one or more non-European origins as being racialized.

SGM: sexual and gender minority; CAD: Canadian dollar.

were then determined by comparing current gender identity with sex assignment at birth. Participants who responded yes or unsure to the question "Do you identify as being LGBT2Q+ (lesbian, gay, bisexual, trans, Two-Spirit, queer, etc.)?" were classified as SGM. To classify racialized persons within the sample, participants were asked to identify their "ethnic origin". Any participant who identified Indigenous family origin was classified as Indigenous, reflecting the Canadian context in which Indigenous peoples are considered a distinct sub-population with unique experiences of health, well-being, and structural vulnerability compared to non-Indigenous racialized groups. Those who identified only European family origins were classified as being non-racialized, and those who identified one or more non-European origins were classified as being racialized. Having a pre-existing mental health condition as assessed through the question, "Do you identify as a person who has a pre-existing (prior to COVID-19) mental health condition?", with response options "Yes", "No", and "Prefer not to say".

Self-reported deterioration in mental health was assessed by asking "Compared to before the COVID-19 pandemic and related restrictions in Canada, how would you say your mental health is now?" with responses "Slightly worse now" and "Significantly worse now" classified as experiencing a "Deterioration in mental health". Responses "Significantly better now", "Slightly better now", and "About the same" were classified as not experiencing deterioration in mental health. Coping with stress

was assessed by asking participants, "Overall, how well do you think you are coping with stress related to the COVID-19 pandemic?" with responses "Not very well" and "Not well at all" classified as "Poor coping" and responses "Very well" and "Fairly well" considered to not reflect "Poor coping". Experiencing suicidal thoughts and feelings and self-harm were assessed by asking participants, "Have you done or experienced any of the following as a result of the COVID-19 pandemic in the past 2 weeks?" with separate responses for "Experienced suicidal thoughts/feelings" and "Deliberately hurt myself." Participants were also asked to report impact of the COVID-19 pandemic on substance use, including alcohol and cannabis, with responses including "more", "less", "no change" and "not applicable" – responses "less" and "no change" were combined into a single "no increase" category. An additional measure, "Has your use of substances increased as a way to cope at any point during the pandemic?" with responses "yes" and "no", was added in Round 2.

2.4. Analyses

Descriptive statistics were used to characterize socio-demographics characteristics of the Round 1 and Round 2 samples with cross-tabulations included to compare SGM and non-SGM respondents on these characteristics. Bivariate cross-tabulations with chi-square tests

Table 2

Comparing the prevalence of mental health and substance use outcomes between SGM and non-SGM groups for Round 1 and Round 2.

	Round 1 (n = 2984)		Round 2 (n = 3009)	
	SGM Identity		SGM Identity	
	Yes(8.0%, n = 238)	No(92.0%, n = 2746)	Yes(7.1%, n = 214)	No(92.9%, n = 2795)
Deterioration in mental health% (n)	46.2 (110)**	36.7 (1005)	52.8 (113)**	37.9 (1057)
Poor coping % (n)	21.6 (49)**	13.4 (348)	28.1 (57)**	13.5 (354)
Suicidal thoughts % (n)	14.9 (35)**	5.2 (141)	23.4 (49)**	6.3 (175)
Self-harm % (n)	5.5 (13)**	1.3 (35)	8.5 (18)**	1.1 (31)
Alcohol use % (n)	23.7 (56)*	18.2 (498)	27.1 (58)**	15.6 (435)
Cannabis % (n)	17.4 (41)**	5.4 (148)	21.1 (45)**	6.4 (177)
Using substances to cope% (n)	-	-	30.5 (65)**	12.9 (358)

Note that some variation exists across the number of respondents included in the calculation of percentages due to some participants choosing not to answer some outcome assessments.

* $p < 0.05$ based on chi-squared test.

** $p < 0.01$ based on chi-squared test.

SGM: sexual and gender minority.

were utilized to identify differences in mental health and substance use outcomes between SGM and non-SGM identity groups. Separate multivariable logistic regression models were then used to identify socio-demographic risk factors associated with the experience of each mental health and substance use outcome for all SGM respondents (Round 1 and 2 respondents combined) with round number included in the models as a covariate. The pooling of data from Rounds 1 and 2 was carried out to increase sample size for the SGM-specific analyses. If a respondent participated in both Round 1 and Round 2 surveys, then only their data from the Round 1 survey was retained in the pooled dataset for the regression analyses. This ensured that the survey rounds contained independent and non-overlapping samples. We further interpreted the associations within the pooled analyses as representing effects across the Spring-Fall 2020 time period (cumulative from the start of pandemic recall period to the time of second survey). Associations with $p < 0.05$ were interpreted as statistically significant. All analyses were conducted using SPSS Version 27 (IBM Corp, 2020).

3. Results

Sociodemographic characteristics of the Round 1 ($n = 2984$) and Round 2 ($n = 3009$) samples are provided in Table 1. Considering both rounds together ($N = 6027$), 7.5% of the sample identified as having SGM identity, 47.0% identified as male, and 18.2% of respondents reported having a pre-existing mental health condition.

The results of the bivariate cross-tabulations comparing SGM groups on mental health and substance outcomes for Round 1 and Round 2 samples are presented in Table 2. A greater proportion of SGM participants reported impacts on their mental health and substance use across all outcomes for both rounds, as compared with non-SGM respondents.

Of the 452 SGM participants in the pooled data, 49 (10.8%) participated in both rounds and had their Round 2 data removed from the pooled dataset which resulted in a final sample size of 403 unique respondents for the regression analyses. A comparison of those who had versus had not completed multiple rounds on core socio-demographics (age, gender, household income, and reporting a pre-existing mental health condition) indicated significant differences in age with those aged 35 to 54 years slightly more likely to participate in multiple survey rounds compared to other age groups (Chi-square=6.209, $p < 0.05$).

The results of the multivariable logistic regression models identifying socio-demographic risk factors associated with the experience of each mental health outcome are presented in Table 3. Several sociodemographic factors (e.g., being under 25 years of age, being Indigenous, and having a household income less than \$25k) were associated with increased odds of reporting an adverse mental health impact, however, having a pre-existing mental health condition was more consistently associated with greater odds of experiencing an adverse mental health outcome (see Table 3 for details).

As shown in Table 4, only two sociodemographic factors (household income and living in a rural setting) were associated with increased odds for specific substance use outcomes, while having a pre-existing mental health condition was more consistently associated with increased use of cannabis and increased use of substances to cope.

4. Discussion

This repeated cross-sectional monitoring survey drew on two rounds of Canadian national survey data and is among the first studies to examine the disparate mental health impacts of COVID-19 between SGM and non-SGM groups. Findings from this analysis indicate that SGM adults are significantly more likely than their non-SGM counterparts to experience wide-ranging mental health challenges amid the pandemic, including suicidal ideation, self-harm, poor coping, and using substances to cope. These findings are cause for immediate and ongoing public health attention, as they substantiate growing concerns that the COVID-19 pandemic will worsen mental health and substance use inequities experienced by SGM populations (Gorczyński and Fasoli, 2020; Salerno et al., 2020a).

This analysis identified that across all measures, SGM adults were significantly more likely to experience adverse mental health outcomes in the context of COVID-19, relative to non-SGM adults. In particular, 23.4% of SGM adults surveyed reported suicidal thoughts at Round 2, and over half (52.8%) reported experiencing a deterioration in mental health. Within our study sample, the SGM sub-group differed significantly from the non-SGM group on pre-existing mental health conditions, household income, education, and other measures; these findings are expected, as they highlight the underlying structural inequities experienced by this population that perpetuate mental health inequities within the pandemic context (Gil et al., 2021; Lee et al., 2016). Study findings extend emerging evidence demonstrating the adverse mental health impacts of COVID-19 among the general population (Jenkins et al., 2020; Pierce et al., 2020), and in identifying high prevalence of suicidal thoughts among SGM adults, contribute to the growing global concern that the pandemic may contribute to rising suicide attempts and deaths (Moser et al., 2020; Sher, 2020). These findings further contribute to the literature by presenting empirical evidence of the inequitable mental health burden of COVID-19 for SGM populations, an observation which, at this juncture, has tended to be limited to *projections* and *calls to action* related to this population's mental health in the pandemic context (Gorczyński and Fasoli, 2020; Salerno et al., 2020b). Hypothesized drivers of these mental health inequities include pre-existing structural determinants (e.g., queerphobia, minority stress), as well as COVID-19-specific factors, such as worsening unemployment and public health restrictions which constrain access to SGM community spaces and social supports (Gato et al., 2021; Jen et al., 2020; Phillips et al., 2020; Scroggs et al., 2020). Given that community connection is a known protective factor for the mental health of SGM people (Formby, 2017; Meyer, 2015; Nogueira de Lira and Araujo de Moraes, 2018), innovative strategies are needed to preserve and promote this sense of community in the pandemic context, where access to many 'traditional' supports (e.g., community gatherings, Pride events, SGM recreational groups) is now restricted.

Our findings also indicate that many SGM adults are using substances to cope with the stress of the pandemic, at significantly higher rates than non-SGM adults. Research prior to the pandemic suggests that higher

Table 3
Associations between sociodemographic and mental health risk factors and adverse mental health impacts of the COVID-19 pandemic among SGM respondents.

	Deterioration in Mental health (n = 362)			Poor Overall Coping (n = 343)			Suicidal thoughts (n = 357)			Self-harm (n = 360)		
	OR	95% CI for OR		OR	95% CI for OR		OR	95% CI for OR		OR	95% CI for OR	
Round												
Round 1 (Reference)	1.0			1.0			1.0			1.0		
Round 2	1.33	.84	2.10	1.64	.91	2.94	3.66**	1.76	7.62	3.12*	1.18	8.29
Age												
18–34 years (Reference)	1.0			1.0			1.0			1.0		
35–54 years	1.32	.76	2.31	.77	.40	1.47	.79	.38	1.65	.61	.22	1.70
55+ plus years	1.03	.53	1.98	.43	.18	1.01	.11**	.03	.42			
Gender^a												
Female (Reference)	1.0			1.0			1.0			1.0		
Male	.64	.39	1.03	.90	.49	1.66	1.05	.50	2.21	.96	.36	2.59
Household Income												
\$100k + (Reference)	1.0			1.0			1.0			1.0		
<\$25k	1.20	.53	2.71	3.46**	1.38	8.70	1.40	.49	4.03	.26	.05	1.27
\$25k-\$50k	.78	.41	1.49	.62	.26	1.48	.56	.20	1.57	.41	.11	1.54
\$50k-\$100k	.80	.45	1.42	1.18	.57	2.45	.70	.29	1.72	.54	.18	1.63
Education												
College/university (Reference)	1.0			1.0			1.0			1.0		
High school or less	1.17	.58	2.37	2.04	.86	4.81	1.53	.57	4.14	3.04	.85	10.86
Some college/university	1.25	.71	2.22	2.53**	1.30	4.93	.77	.33	1.81	.88	.26	3.00
Race/ethnicity												
Non-racialized (Reference)	1.0			1.0			1.0			1.0		
Racialized	.74	.44	1.24	1.09	.56	2.13	1.41	.64	3.13	2.36	.86	6.52
Indigenous	1.17	.45	3.08	1.71	.57	5.16	4.21**	1.31	13.57	.49	.06	4.31
Rural / Urban												
Urban (Reference)	1.0			1.0			1.0			1.0		
Rural	.83	.44	1.59	.81	.34	1.94	.94	.33	2.62	.77	.18	3.23
Live Alone												
No (Reference)	1.0			1.0			1.0			1.0		
Yes	.60	.36	1.01	.60	.30	1.21	1.26	.58	2.72	1.27	.44	3.64
Pre-Existing Mental Health Condition												
No (Reference)	1.0			1.0			1.0			1.0		
Yes	2.03**	1.25	3.28	1.72	.94	3.14	11.99**	5.12	28.09	10.55**	3.21	34.70

Note: OR=odds ratio estimated by logistic regression, fully adjusted for all covariates shown. Variation across number of respondents included in the regression model for each mental health outcome varies due to some participants choosing not to answer some mental health outcome questions. Adults aged 35–54 years and 55+ years were combined into one group in the self-harm model to support model convergence.

* p<0.05.

** p<0.01.

^a Non-binary and Two-Spirit respondents were excluded from the regression analyses due to low numbers and trans participants were included in their self-identified gender category.

SGM: sexual and gender minority.

rates of substance use among SGM populations can be explained as “maladaptive” coping mechanisms in response to various stressors, including minority stress and mental health challenges (Hatzenbuehler et al., 2009; Morgan et al., 2020). Predictably, the health and socio-economic impacts of COVID-19 are adding to this population’s (and others’) burden of stress; however, we are concerned for the continuation of these pronounced increases in substance use among SGM adults, particularly as a coping strategy for mental distress throughout the pandemic and its aftermath. Immediate research and policy attention is needed to redress existing – and potentially widening – substance use inequities experienced by SGM adults, including patterns of use that may coincide with increased rates of drug dependence and substance use disorder (Czeisler et al., 2020; Lachowsky et al., 2017; Lee et al., 2016).

This study further identified key risk factors for adverse mental health and substance use impacts of COVID-19 among SGM adults. Having a prior mental health condition(s) was strongly associated with experiencing mental health and substance use impacts, raising concerns that pre-existing structural vulnerabilities impacting mental health among this population are being exacerbated within the pandemic context (Salerno et al., 2020b). Having a lower household income was associated with increased odds of poor overall coping, corresponding to earlier research suggesting that SGM adults who are under-employed/unemployed and living in poverty may be particularly affected by the interrelated socio-economic and mental health

consequences of COVID-19 (Gonzales et al., 2020). Further, younger adults were more likely to experience suicidal thoughts aligning with research suggesting that younger SGM adults may have mental health challenges related to living in unsupportive households following shifts to online schooling and widespread unemployment (Salerno et al., 2020a, 2020c). Considering these exemplars, our findings highlight the need for continued research to delineate not only mental health disparities between SGM and non-SGM adults amid the pandemic, but also disparities *within* populations of SGM adults.

These analyses underscore that public health responses to the pandemic must take action to support the mental health of SGM (and non-SGM) adults. Given the interconnected nature of mental health and substance use outcomes identified in this study and elsewhere in our team’s research (Goodyear et al., 2021), we join others in calls for synergistic approaches to mental health and drug policy and practice with SGM adults (Czeisler et al., 2020; Lachowsky et al., 2017; Morgan et al., 2020). Integral to COVID-19 approaches is the implementation and scale-up of online peer support groups and resources related to mental health and substance use, including those that foster mental health literacy, positive coping mechanisms, and/or harm reduction (Goodyear et al., 2021; Liu et al., 2019; Zhou et al., 2020). As we have previously argued, it is paramount that supports such as these be offered proactively, rather than reactively or “as needed” (Daly et al., 2021; Richardson et al., 2020). Like others (Fish et al., 2020; Salerno et al., 2020b), we also appeal for these supports to be designed and

Table 4
Associations between sociodemographic and substance use risk factors and adverse substance use impacts of COVID-19 among SGM respondents.

	Increased alcohol (n = 279)			Increased cannabis (n = 177)			Use of substances to cope (n = 146)		
	OR	95% CI for OR		OR	95% CI for OR		OR	95% CI for OR	
Round									
Round 1 (Reference)	1.0			1.0			–		
Round 2	1.46	.84	2.54	1.28	.66	2.48	–	–	–
Age									
18–34 years (Reference)	1.0			1.0			1.0		
35–54 years	1.88	.95	3.71	1.90	.88	4.08	2.21	.67	7.27
55+ plus years	.54	.23	1.29	.64	.24	1.74	.29	.07	1.24
Gender^a									
Female (Reference)	1.0			1.0			1.0		
Male	.61	.33	1.12	.91	.44	1.88	1.60	.56	4.60
Household Income									
\$100k + (Reference)	1.0			1.0			1.0		
<\$25k	.42	.14	1.23	.78	.24	2.59	.23	.05	1.11
\$25k–\$50k	.51	.23	1.16	.93	.37	2.36	.31	.09	1.10
\$50k–\$100k	.66	.34	1.28	.98	.43	2.21	.20**	.07	.62
Education									
College/university (Reference)	1.0			1.0			1.0		
High school or less	.70	.26	1.87	.99	.34	2.94	1.59	.34	7.47
Some college/university	.99	.49	2.00	.87	.38	1.99	1.18	.40	3.47
Race/ethnicity									
Non-racialized (Reference)	1.0			1.0			1.0		
Racialized	.78	.40	1.50	.63	.28	1.41	1.66	.55	5.00
Indigenous	1.05	.34	3.27	1.02	.27	3.82	.79	.17	3.70
Rural / Urban									
Urban (Reference)	1.0			1.0			1.0		
Rural	.69	.28	1.69	1.13	.44	2.90	3.24*	1.05	10.02
Live Alone									
No (Reference)	1.0			1.0			1.0		
Yes	1.02	.54	1.93	.80	.36	1.74	1.12	.39	3.20
Pre-Existing Mental Health									
No (Reference)	1.0			1.0			1.0		
Yes	1.82	1.0	3.33	3.11**	1.49	6.48	7.12**	2.62	19.34

Note: There is variation in the number of respondents included in the regression model for each substance use outcome, as some participants opted not to answer certain substance use questions (i.e., they selected “Not applicable” or “Prefer not to answer”). The alcohol and cannabis use outcome was dichotomized as “Increased use” and “No increase”. Round was not included in the model examining use of substances to cope because this outcome was only included in the Round 2 survey.

* $p < 0.05$.

** $p < 0.01$.

^a Non-binary and Two-Spirit respondents were excluded from the regression analyses due to low numbers and trans participants were included in their self-identified gender category.

SGM: sexual and gender minority.

implemented in ways that are safe and accessible (i.e., queer-friendly, gender-affirming) for SGM people, and responsive to this population’s distinct needs – which may include, for example, the scale-up of SGM-exclusive and community-led supports. Also needed are structural policy interventions to address the root drivers of mental health inequities facing SGM populations (Morgan et al., 2020; Phillips et al., 2020), including targeted educational supports to foster family and community acceptance of SGM people, anti-stigma and -violence efforts, and broader transformations in (cisheteronormative) societal laws and discourses related to SGM communities.

4.1. Limitations

Although this comparative analysis offers important evidence for disproportionate mental health burdens of the pandemic for SGM adults, there are limitations to consider. Firstly, the use of a single item to capture SGM identity may lead to misclassification, particularly of individuals with same-sex/gender attraction who do not identify as “LGBT2Q+”. However, a significant proportion of respondents (7.5%) identified as SGM, which is comparable to population estimates (Government of Canada, 2015). Additionally, while Two-Spirit and gender-queer respondents were included in descriptive results, logistic regression analyses necessitated a binary gender division, and we were unable to include these respondents in this model. Lastly, this study intentionally focused on self-reported experiences of mental health and substance use challenges; as such, survey measures did not include

screening or clinical assessment tools, which limits some comparisons to other population data. Many items were adapted from previous surveys, though measures were not previously validated and psychometric analyses have not yet been conducted. Due to the nature of this study, participants were asked to self-report changes in mental health from prior to the pandemic. While self-report research may be affected by recall bias, we considered six months an appropriate recall period for population-based studies, given the widespread use of past-year measures.

4.2. Conclusion

This article identifies that while both SGM and non-SGM adult populations in Canada are self-reporting deteriorations in mental health amid the pandemic, SGM adults are facing mental health challenges at rates over and above those of their non-SGM peers. Evidence of this increase in mental health disparities is compelling, and important for transforming health-system responses to COVID-19 in ways that more fulsomely promote population-level mental health. Given the existing and widening inequities faced, decisive and tailored public mental health actions are needed to safeguard the mental health and well-being of SGM people over the remainder of the pandemic and beyond.

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CRediT authorship contribution statement

Allie Slemmon: Conceptualization, Writing – original draft. **Chris Richardson:** Formal analysis, Visualization, Writing – original draft. **Trevor Goodyear:** Writing – original draft, Writing – review & editing. **Travis Salway:** Methodology, Writing – review & editing. **Anne Gadermann:** Conceptualization, Methodology, Writing – review & editing. **John L. Oliffe:** Writing – review & editing. **Rod Knight:** Methodology, Writing – review & editing. **Shivinder Dhari:** Writing – review & editing. **Emily K. Jenkins:** Conceptualization, Supervision, Methodology, Funding acquisition, Writing – review & editing.

Declaration of Competing Interest

The authors have no conflicts of interest to report.

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References

- Anderson, A.R., Knee, E., 2020. Queer isolation or queering isolation? Reflecting upon the ramifications of COVID-19 on the future of queer leisure spaces. *Leis. Sci.* 1–7. <https://doi.org/10.1080/01490400.2020.1773992>.
- Banerjee, D., Nair, V.S., 2020. The untold side of COVID-19: struggle and perspectives of the sexual minorities. *J. Psychosexual Health* 2, 113–120. <https://doi.org/10.1177/2631831820939017>.
- Bauer, G.R., Braimoh, J., Scheim, A.I., Dharmar, C., 2017. Transgender-inclusive measures of sex/gender for population surveys: mixed-methods evaluation and recommendations. *PLoS ONE* 12, e0178043. <https://doi.org/10.1371/journal.pone.0178043>.
- Borgogna, N.C., McDermott, R.C., Aita, S.L., Kridel, M.M., 2019. Anxiety and depression across gender and sexual minorities: implications for transgender, gender nonconforming, pansexual, demisexual, asexual, queer, and questioning individuals. *Psychol. Sex. Orientat. Gen. Divers.* 6, 54–63. <https://doi.org/10.1037/sgd0000306>.
- Bourgeois, P., Holmes, S.M., Sue, K., Quesada, J., 2017. Structural vulnerability: operationalizing the concept to address health disparities in clinical care. *Acad. Med.* 92, 299–307. <https://doi.org/10.1097/ACM.0000000000001294>.
- Boyd, C.J., Veliz, P.T., McCabe, S.E., 2020. Severity of DSM-5 cannabis use disorders in a nationally representative sample of sexual minorities. *Subst. Abuse* 41, 191–195. <https://doi.org/10.1080/08897077.2019.1621242>.
- Brennan, D.J., Card, K.G., Collicot, D., Jollimore, J., Lachowsky, N.J., 2020. How might social distancing impact gay, bisexual, queer, trans and two-spirit men in Canada? *AIDS Behav.* 24, 2480–2482. <https://doi.org/10.1007/s10461-020-02891-5>.
- Brooks, V.R., 1981. *Minority Stress and Lesbian Women*. Lexington Books, Lexington, Mass.
- Czeisler, M.É., Lane, R.I., Petrosky, E., Wiley, J.F., Christensen, A., Njai, R., Weaver, M. D., Robbins, R., Facer-Childs, E.R., Barger, L.K., Czeisler, C.A., Howard, M.E., Rajaratnam, S.M.W., 2020. Mental health, substance use, and suicidal ideation during the COVID-19 pandemic — United States, June 24–30, 2020. *Morb. Mortal. Wkly. Rep.* 69, 1049–1057. <https://doi.org/10.15585/mmwr.mm6932a1>.
- Daly, Z., Slemmon, A., Richardson, C.G., McAuliffe, C., Gadermann, A.M., Thomson, K.C., Hirani, S., Jenkins, E.K., 2021. Associations between periods of COVID-19 quarantine and mental health in Canada. *Psychiatry Res.* 295, 113631. <https://doi.org/10.1016/j.psychres.2020.113631>.
- Demant, D., Hides, L., Kavanagh, D.J., White, K.M., Winstock, A.R., Ferris, J., 2016. Differences in substance use between sexual orientations in a multi-country sample: findings from the Global Drug Survey 2015. *J. Public Health* 39, 532–541. <https://doi.org/10.1093/pubmed/fdw069>.
- Fish, J.N., McInroy, L.B., Pacey, M.S., Williams, N.D., Henderson, S., Levine, D.S., Edsall, R.N., 2020. I'm kinda stuck at home with unsupportive parents right now: LGBTQ youths' experiences with COVID-19 and the importance of online support. *J. Adolesc. Health* 67, 450–452. <https://doi.org/10.1016/j.jadohealth.2020.06.002>.
- Formby, E., 2017. *Exploring LGBT Spaces and Communities: Contrasting Identities, Belongings and Wellbeing*. Taylor & Francis, New York.
- Gato, J., Barrientos, J., Tasker, F., Miscioscia, M., Cerqueira-Santos, E., Malmquist, A., Seabra, D., Leal, D., Houghton, M., Poli, M., Gubello, A., Ramos, M.de M., Guzmán, M., Urzúa, A., Ulloa, F., Wurm, M., 2021. Psychosocial effects of the COVID-19 pandemic and mental health among LGBTQ+ young adults: a cross-cultural comparison across six nations. *J. Homosex* 68, 612–630. <https://doi.org/10.1080/00918369.2020.1868186>.
- Gibb, J.K., DuBois, L.Z., Williams, S., McKerracher, L., Juster, R., Fields, J., 2020. Sexual and gender minority health vulnerabilities during the COVID-19 health crisis. *Am. J. Hum. Biol.* 32. <https://doi.org/10.1002/ajhb.23499>.
- Gil, R.M., Freeman, T.L., Mathew, T., Kullar, R., Fekete, T., Ovalle, A., Nguyen, D., Kottkamp, A., Poon, J., Marcellin, J.R., Swartz, T.H., Inclusion, D., 2021. Lesbian, gay, bisexual, transgender, and queer (LGBTQ+) communities and the coronavirus disease 2019 pandemic: a call to break the cycle of structural barriers. *J. Infect. Dis.* <https://doi.org/10.1093/infdis/jiab392>.
- Girouard, M.P., Goldhammer, H., Keuroghlian, A.S., 2019. Understanding and treating opioid use disorders in lesbian, gay, bisexual, transgender, and queer populations. *Subst. Abuse* 40, 335–339. <https://doi.org/10.1080/08897077.2018.1544963>.
- Goldberg, S.B., 2020. *COVID-19 and LGBT Rights*. Columbia Law Sch., p. 11.
- Gonzales, G., Loret de Mola, E., Gavulic, K.A., McKay, T., Purcell, C., 2020. Mental health needs among lesbian, gay, bisexual, and transgender college students during the COVID-19 pandemic. *J. Adolesc. Health* 67, 645–648. <https://doi.org/10.1016/j.jadohealth.2020.08.006>.
- Goodyear, T., Slemmon, A., Richardson, C., Gadermann, A., Salway, T., Dhari, S., Knight, R., Jenkins, E., 2021. Increases in alcohol and cannabis use associated with deteriorating mental health among LGBTQ2+ adults in the context of COVID-19: Findings from a repeated cross-sectional study in Canada, 2020–2021. *J. Environ. Res. Public Health* 18 (12155), 1–14. <https://doi.org/10.3390/ijerph182212155>.
- Gorzynski, P., Fasoli, F., 2020. LGBTQ+ focused mental health research strategy in response to COVID-19. *Lancet Psychiat.* 7, e56. [https://doi.org/10.1016/S2215-0366\(20\)30300-X](https://doi.org/10.1016/S2215-0366(20)30300-X).
- Government of Canada, 2015. Same-sex couples and sexual orientation... by the numbers. https://www.statcan.gc.ca/eng/dai/smr08/2015/smr08_203_2015 (accessed 12 March 2021).
- Hatzenbuehler, M.L., Nolen-Hoeksema, S., Dovidio, J., 2009. How does stigma “get under the skin”? The mediating role of emotion regulation. *Psychol. Sci.* 20, 1282–1289. <https://doi.org/10.1111/j.1467-9280.2009.02441.x>.
- Hatzenbuehler, M.L., Phelan, J.C., Link, B.G., 2013. Stigma as a fundamental cause of population health inequalities. *Am. J. Public Health* 103, 813–821. <https://doi.org/10.2105/AJPH.2012.301069>.
- Hottes, T.S., Bogaert, L., Rhodes, A.E., Brennan, D.J., Gesink, D., 2016. Lifetime prevalence of suicide attempts among sexual minority adults by study sampling strategies: a systematic review and meta-analysis. *Am. J. Public Health* 106, e1–e12. <https://doi.org/10.2105/AJPH.2016.303088>.
- IBM Corp., 2020. *IBM SPSS Statistics for Windows, Version 27.0*. IBM Corp., Armonk, NY.
- Jen, S., Stewart, D., Woody, I., 2020. Serving LGBTQ+/SGL elders during the novel corona virus (COVID-19) pandemic: striving for justice, recognizing resilience. *J. Gerontol. Soc. Work* 63, 607–612. <https://doi.org/10.1080/01634372.2020.1793255>.
- John Hopkins Coronavirus Resource Center, 2021. *New cases of COVID-19 in world countries*. <https://coronavirus.jhu.edu/data/new-cases> (accessed 12 March 2021).
- Jenkins, E.K., McAuliffe, C., Hirani, S., Richardson, C., Thomson, K., Kousoulis, A., Morris, J., Gadermann, A., 2020. A portrait of the early and differential mental health impacts of the COVID-19 pandemic in Canada: Findings from the first wave of a nationally representative cross-sectional survey. *Prev. Med.* 145, 106333. <https://doi.org/10.1016/j.ypmed.2020.106333>.
- Kattari, S.K., Whitfield, D.L., Walls, N.E., Langenderfer-Magruder, L., Ramos, D., 2016. P Policing gender through housing and employment discrimination: comparison of discrimination experiences of transgender and cisgender LGBQ individuals. *J. Soc. Soc. Work Res.* 7, 427–447. <https://doi.org/10.1086/686920>.
- Kibrik, E.L., Cohen, N., Stolorowicz-Melman, D., Levy, A., Boruchovitz-Zamir, R., Diamond, G.M., 2019. Measuring adult children's perceptions of their parents' acceptance and rejection of their sexual orientation: initial development of the Parental Acceptance and Rejection of Sexual Orientation Scale (PARSOS). *J. Homosex.* 66, 1513–1534. <https://doi.org/10.1080/00918369.2018.1503460>.
- King, M., Semlyen, J., Tai, S.S., Killaspy, H., Osborn, D., Popelyuk, D., Nazareth, I., 2008. A systematic review of mental disorder, suicide, and deliberate self-harm in lesbian, gay and bisexual people. *BMC Psychiatry* 8, 70. <https://doi.org/10.1186/1471-244X-8-70>.
- Konnoth, C.J., 2020. *Supporting LGBT Communities in the COVID-19 pandemic, in: Assessing Legal Responses to COVID-19*. Public Health Law Watch, Boston.
- Krueger, E.A., Fish, J.N., Upchurch, D.M., 2020. Sexual orientation disparities in substance use: investigating social stress mechanisms in a national sample. *Am. J. Prev. Med.* 58, 59–68. <https://doi.org/10.1016/j.amepre.2019.08.034>.

- Lachowsky, N.J., Dulai, J.J.S., Cui, Z., Sereda, P., Rich, A., Patterson, T.L., Corneil, T.T., Montaner, J.S.G., Roth, E.A., Hogg, R.S., Moore, D.M., 2017. Lifetime doctor-diagnosed mental health conditions and current substance use among gay and bisexual men living in Vancouver, Canada. *Subst. Use Misuse* 52, 785–797. <https://doi.org/10.1080/10826084.2016.1264965>.
- Lee, J.H., Gamarel, K.E., Bryant, K.J., Zaller, N.D., Operario, D., 2016. Discrimination, mental health, and substance use disorders among sexual minority populations. *LGBT Health* 3, 258–265. <https://doi.org/10.1089/lgbt.2015.0135>.
- Liu, R.T., Sheehan, A.E., Walsh, R.F.L., Sanzari, C.M., Cheek, S.M., Hernandez, E.M., 2019. Prevalence and correlates of non-suicidal self-injury among lesbian, gay, bisexual, and transgender individuals: a systematic review and meta-analysis. *Clin. Psychol. Rev.* 74, 101783. <https://doi.org/10.1016/j.cpr.2019.101783>.
- McConnell, E.A., Birkett, M., Mustanski, B., 2016. Families matter: social support and mental health trajectories among lesbian, gay, bisexual, and transgender youth. *J. Adolesc. Health* 59, 674–680. <https://doi.org/10.1016/j.jadohealth.2016.07.026>.
- Mental Health Foundation, 2020. Coronavirus: the divergence of mental health experiences during the pandemic. <https://www.mentalhealth.org.uk/coronavirus/divergence-mental-health-experiences-during-pandemic> (accessed 12 March 2021).
- Mereish, E.H., Bradford, J.B., 2014. Intersecting identities and substance use problems: sexual orientation, gender, race, and lifetime substance use problems. *J. Stud. Alcohol Drugs* 75, 179–188. <https://doi.org/10.15288/jsad.2014.75.179>.
- Meyer, I.H., 2015. Resilience in the study of minority stress and health of sexual and gender minorities. *Psychol. Sex. Orientat. Gen. Divers* 2, 209–213. <https://doi.org/10.1037/sgd0000132>.
- Meyer, I.H., 2003. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol. Bull.* 129, 674–697. <https://doi.org/10.1037/0033-2909.129.5.674>.
- Mongelli, F., Perrone, D., Balducci, J., Sacchetti, A., Ferrari, S., Mattei, G., Galeazzi, G. M., 2019. Minority stress and mental health among LGBT populations: an update on the evidence. *Minerva Psichiatr.* 60. <https://doi.org/10.23736/S0391-1772.18.01995-7>.
- Moore, S.E., Wierenga, K.L., Prince, D.M., Gillani, B., Mintz, L.J., 2021. Disproportionate impact of the COVID-19 pandemic on perceived social support, mental health and somatic symptoms in sexual and gender minority populations. *J. Homosex.* 68, 577–591. <https://doi.org/10.1080/00918369.2020.1868184>.
- Morgan, E., Feinstein, B.A., Dyar, C., 2020. Disparities in prescription opioid misuse affecting sexual minority adults are attenuated by depression and suicidal ideation. *LGBT Health* 7, 431–438. <https://doi.org/10.1089/lgbt.2020.0220>.
- Moser, D.A., Glaus, J., Frangou, S., Schechter, D.S., 2020. Years of life lost due to the psychosocial consequences of COVID-19 mitigation strategies based on Swiss data. *Eur. Psychiatry* 63, e58. <https://doi.org/10.1192/j.eurpsy.2020.56>.
- Nogueira de Lira, A., Araujo de Moraes, N., 2018. Resilience in lesbian, gay, and bisexual (LGB) populations: an integrative literature review. *Sex. Res. Soc. Policy* 15, 272–282. <https://doi.org/10.1007/s13178-017-0285-x>.
- Pakula, B., Carpiano, R., Ratner, P., Pamela A., Shoveller, J., 2016. Life stress as a mediator and community belonging as a moderator of mood and anxiety disorders and co-occurring disorders with heavy drinking of gay, lesbian, bisexual, and heterosexual Canadians. *Soc. Psychiatry Psychiatr. Epidemiol.* 51, 1181–1192. <https://doi.org/10.1007/s00127-016-1236-1>.
- Phillips, G., Felt, D., Ruprecht, M.M., Wang, X., Xu, J., Pérez-Bill, E., Bagnarol, R.M., Roth, J., Curry, C.W., Beach, L.B., 2020. Addressing the disproportionate impacts of the COVID-19 pandemic on sexual and gender minority populations in the United States: actions toward equity. *LGBT Health* 7, 279–282. <https://doi.org/10.1089/lgbt.2020.0187>.
- Pierce, M., Hope, H., Ford, T., Hatch, S., Hotopf, M., John, A., Kontopantelis, E., Webb, R., Wessely, S., McManus, S., Abel, K.M., 2020. Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population. *Lancet Psychiat.* 7, 883–892. [https://doi.org/10.1016/S2215-0366\(20\)30308-4](https://doi.org/10.1016/S2215-0366(20)30308-4).
- Plöderl, M., Tremblay, P., 2015. Mental health of sexual minorities. A systematic review. *Int. Rev. Psychiatry* 27, 367–385. <https://doi.org/10.3109/09540261.2015.1083949>.
- Rehman, Z., Lopes, B., Jaspal, R., 2020. Predicting self-harm in an ethnically diverse sample of lesbian, gay and bisexual people in the United Kingdom. *Int. J. Soc. Psychiatry* 66, 349–360. <https://doi.org/10.1177/0020764020908889>.
- Richardson, C.G., Slemmon, A., Gadermann, A., McAuliffe, C., Thomson, K., Daly, Z., Salway, T., Currie, L.M., David, A., Jenkins, E., 2020. Use of asynchronous virtual mental health resources for COVID-19 pandemic-related stress among the general population in Canada: Cross-sectional survey study. *J. Med. Internet Res.* 22, e24868. <https://doi.org/10.2196/24868>.
- Ross, L.E., Salway, T., Tarasoff, L.A., MacKay, J.M., Hawkins, B.W., Fehr, C.P., 2018. Prevalence of depression and anxiety among bisexual people compared to gay, lesbian, and heterosexual individuals: A systematic review and meta-analysis. *J. Sex Res.* 55, 425–456. <https://doi.org/10.1080/00224499.2017.1387755>.
- Salari, N., Hosseini-Far, A., Jalali, R., Vaisi-Raygani, A., Rasoulpoor, S., Mohammadi, M., Rasoulpoor, S., Shabnam, K., Khaledi-Paveh, B., 2020. Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Glob. Health* 16, 57. <https://doi.org/10.1186/s12992-020-00589-w>.
- Salerno, J.P., Devadas, J., Pease, M., Nketia, B., Fish, J.N., 2020a. Sexual and gender minority stress amid the COVID-19 pandemic: implications for LGBTQ young persons' mental health and well-being. *Public Health Rep.* 135, 721–727. <https://doi.org/10.1177/0033354920954511>.
- Salerno, J.P., Williams, N.D., Gattamorta, K.A., 2020b. LGBTQ populations: psychologically vulnerable communities in the COVID-19 pandemic. *Psychol. Trauma Theory Res. Pract. Policy* 12, S239–S242. <https://doi.org/10.1037/tra0000837>.
- Salerno, J.P., Pease, M., Devadas, J., Nketia, B., Fish, J.N., 2020c. Covid-19-related stress among LGBTQ+ university students: results of a U.S. national survey. <https://doi.org/10.13016/ZUG9-XTMI>.
- Salway, T., Ross, L.E., Fehr, C.P., Burley, J., Asadi, S., Hawkins, B., Tarasoff, L.A., 2019. A systematic review and meta-analysis of disparities in the prevalence of suicide ideation and attempt among bisexual populations. *Arch. Sex. Behav.* 48, 89–111. <https://doi.org/10.1007/s10508-018-1150-6>.
- Scroggs, B., Love, H.A., Torgerson, C., 2020. COVID-19 and LGBTQ emerging adults: risk in the face of social distancing. *Emerg. Adulthood* 216769682096869. <https://doi.org/10.1177/2167696820968699>.
- Sher, L., 2020. The impact of the COVID-19 pandemic on suicide rates. *QJM Int. J. Med.* 113, 707–712. <https://doi.org/10.1093/qjmed/hcaa202>.
- Suen, Y.T., Chan, R.C.H., Wong, E.M.Y., 2020. Effects of general and sexual minority-specific COVID-19-related stressors on the mental health of lesbian, gay, and bisexual people in Hong Kong. *Psychiatry Res.* 292, 113365. <https://doi.org/10.1016/j.psychres.2020.113365>.
- Twenge, J.M., Joiner, T.E., 2020. U.S. Census Bureau-assessed prevalence of anxiety and depressive symptoms in 2019 and during the 2020 COVID-19 pandemic. *Depress. Anxiety* 37, 954–956. <https://doi.org/10.1002/da.23077>.
- Valdiserri, R.O., Holtgrave, D.R., Poteat, T.C., Beyrer, C., 2019. Unraveling health disparities among sexual and gender minorities: a commentary on the persistent impact of stigma. *J. Homosex.* 66, 571–589. <https://doi.org/10.1080/00918369.2017.1422944>.
- Vogel, L., 2020. COVID-19: a timeline of Canada's first-wave response. *CMAJ News* <https://cmajnews.com/2020/06/12/coronavirus-1095847/> (accessed 12 March 2021).
- Xiong, J., Lipsitz, O., Nasri, F., Lui, L.M.W., Gill, H., Phan, L., Chen-Li, D., Iacobucci, M., Ho, R., Majeed, A., McIntyre, R.S., 2020. Impact of COVID-19 pandemic on mental health in the general population: a systematic review. *J. Affect. Disord.* 277, 55–64. <https://doi.org/10.1016/j.jad.2020.08.001>.
- Zhou, X., Snoswell, C.L., Harding, L.E., Bambling, M., Edirippulige, S., Bai, X., Smith, A. C., 2020. The role of telehealth in reducing the mental health burden from COVID-19. *Telemed. E-Health* 26, 377–379. <https://doi.org/10.1089/tmj.2020.0068>.