

RESEARCH

Open Access



The impact of COVID-19 on the mental health of older sexual minority Canadians in the CLSA

Alexandra Grady¹ and Arne Stinchcombe^{1,2*}

Abstract

Purpose Limited research has examined the mental health impacts of the COVID-19 pandemic on sexual minority (i.e., lesbian, gay, bisexual; LGB) older adults using a longitudinal approach. This study aimed to compare the mental health trajectories (i.e., reported symptoms of depression and loneliness) of LGB and heterosexual participants across four time points.

Methods Data were drawn from the Canadian Longitudinal Study on Aging (CLSA), an ongoing study on the experiences of adults between 45 to 85 at Baseline. Data included for analysis were collected at Baseline (2011-2015), Follow-up 1 (2015-2018), and two time points during the COVID-19 pandemic (April-December 2020). We used General Estimating Equations (GEE) to model changes in depression symptoms (CESD-10; $n=47,728$) and loneliness (UCLA 3-item loneliness scale; $n=41,698$), adjusting for covariates (i.e., age, sex, race/ethnicity, education, and income).

Results Results indicated that LGB participants reported more symptoms of depression ($B=.595, p<.001$) and loneliness ($B=.313, p<.001$) in comparison to heterosexual peers across the four time points. Mean depression and loneliness scores increased regardless of sexual orientation.

Conclusion This study highlighted the detrimental effects of the pandemic on the mental health of older adults regardless of sexual orientation. It also showed that LGB older adults experienced more loneliness and depression symptoms than heterosexual older adults both before and during the pandemic. Understanding diverse identities, needs, and disparities in mental health is critical to promoting equitable aging experiences for everyone.

Keywords LGB, Aging, Depression, Loneliness, COVID-19 pandemic, CLSA

Introduction

In addition to mortality and morbidity caused by COVID-19 infections, the pandemic has also resulted in poor mental health outcomes worldwide. In a systematic review, Vindegaard and Benros (2020) found greater levels of depression and anxiety in the general population during the pandemic compared to

pre-pandemic periods [1]. One meta-analysis estimated the prevalence of depression and anxiety to be 33.75% and 31.9%, respectively [2]. These findings hold true for older adults. A survey of older adults in San Francisco found that 54% experienced worsened loneliness during the pandemic, which was associated with greater depression and anxiety symptoms [3]. A large longitudinal study in England also found that reported depression symptoms and loneliness, measured using a version of the Center for Epidemiological Studies Depression (CESD) scale and the UCLA loneliness scale, increased substantially in older adults during the

*Correspondence:

Arne Stinchcombe
astinchc@uottawa.ca

¹ School of Psychology, University of Ottawa, Ottawa, ON, Canada

² Bruyère Research Institute (BRI), Ottawa, ON, Canada



© The Author(s) 2023. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

pandemic [4]. A survey of older Canadians during the pandemic found moderate or clinically high depressive symptoms in over 43% of participants, with greater loneliness predicting worse depression trajectories [5].

In Canada, the COVID-19 pandemic spurred restrictions on travel, businesses, and gatherings. Between March and May 2020, most provinces and territories had closed businesses deemed “non-essential” (e.g., restaurants, retail stores) and restricted the number of people allowed at social gatherings [6]. In some parts of Canada, social gatherings of all sizes were prohibited while other areas permitted small gatherings. Recreation centres and worship services were also limited during this time. Between September and December 2020, provincial and territorial restrictions continued with many provinces implementing a region-based approach, allowing gatherings and businesses to open based on local infection rates [6]. This meant that people living in larger urban centres with higher rates of infection (e.g., Toronto) were often subject to tighter restrictions in comparison to people residing in smaller towns. In December 2020, a second wave of COVID-19 led provinces and territories to reinstate strict gathering limits and business closures that had gradually loosened up until that point. While everyone was affected by the pandemic, it had a greater negative impact on particular groups.

There is evidence that sexual minorities (i.e., people who identify as lesbian, gay, or bisexual; LGB) experienced worse mental health outcomes during the pandemic compared to non-LGB people. For example, a study of heterosexual and LGB adults aged 18 to 74 in Portugal and Brazil found that LGB participants reported more depression symptoms than heterosexual participants [7]. A survey in the U.S. during the first wave of the pandemic found that LGB participants reported significantly more symptoms of depression and anxiety than heterosexual participants; in comparison to heterosexual participants, a significantly higher proportion of LGB participants' scores met or exceeded the threshold for clinical concern [8]. Further, a large study of heterosexual and LGB adults in the U.S. found that sexual minority men and bisexual women reported poorer mental health both before and during the pandemic [9]. An online survey during the first two waves of the COVID-19 pandemic found that LGB people reported more loneliness and depression symptoms than their heterosexual counterparts [10]. These mental health disparities have also been found in Canada; a repeated cross-sectional monitoring survey of Canadians during the pandemic found that a greater proportion of LGB respondents reported a deterioration in mental health than heterosexual respondents [11, 12].

LGB older adults face unique challenges that can impact mental well-being. In research conducted

pre-pandemic, LGB older adults in Canada reported more depression symptoms on the CESD compared to heterosexual peers [13]. They were also more likely to report having a mood or anxiety disorder [14]. Literature on the mental health of older LGB people during the COVID-19 pandemic continues to grow. For example, LGB older adults in the Health and Retirement Study in the United States reported more emotional stress, less in-person social contact, and more loneliness than heterosexual older adults [15]. A study of older LGB women in the UK found that 54% reported worsened mental health during mandatory social isolation [16]. A recent systematic review of the mental and physical health of older LGB adults during the pandemic found negative impacts to psychological health in the majority of research reviewed [17].

These mental health disparities stem from minority stress experiences associated with LGB identities. Minority stress theory holds that individuals who identify as LGB face stigma, discrimination, and other stressors that negatively impact health [18, 19]. These chronic, socially-based stressors accumulate across the lifespan and result in poorer health outcomes for LGB people [18, 20]. LGB older adults have previously been found to have a higher prevalence of living alone than heterosexual older adults [21]; living alone has been associated with loneliness in LGB older adults [22]. Among older adults in general, there is a strong association between UCLA loneliness scores and CESD-measured symptoms of depression [23]. The restrictions imposed during the COVID-19 pandemic, including the closure of programs and services for social support (e.g., senior centres), may have exacerbated feelings of loneliness and symptoms of depression in LGB older adults.

Understanding the impact of the COVID-19 pandemic on older LGB people in Canada is a critical step in responding to the needs of a diverse aging population. The present study aimed to contribute to our knowledge on the mental well-being of LGB older adults during the pandemic. Specifically, we asked two questions: (1) How did depression scores change over the course of the pandemic, and was there a disparity among LGB people? and (2) How did loneliness scores change over the course of the pandemic, and was there a disparity among LGB people? It was hypothesized that: (1) depression and loneliness would increase from before the pandemic (i.e., Baseline/Follow-up 1) to during the pandemic (i.e., COVID Baseline/Exit) across all participants, regardless of sexual orientation; (2) given minority stress experiences [18, 19], LGB participants will report greater depression and loneliness over time compared to heterosexual participants; and (3) given predisposing factors (e.g., living alone) and restrictions to in-person

LGB-inclusive programming in combination with minority stress experiences, there will be a significant difference between the depression and loneliness trajectories of older LGB people in comparison to heterosexual people, such that LGB participants' slope will be steeper from before the pandemic to during the pandemic (i.e., an interaction effect).

Methods

Data source

Data were drawn from the Canadian Longitudinal Study on Aging (CLSA), a study documenting age-related changes of approximately 50,000 adults aged 45 to 85 at Baseline every three years for 20 years. The sampling frame and strategy has been described in-depth elsewhere [24]. Baseline data were collected between 2011–2015, and Follow-up 1 data were collected between 2014–2018. At the outset of the pandemic, all CLSA participants were contacted by email to take part in the COVID-19 data collection cycle; COVID-19 Baseline data were collected between April 15th and May 20th, 2020, and COVID-19 Exit data were collected between September 29th and December 29th, 2020. The term “Exit” in this context denotes the final wave of COVID-specific surveys, not an exit interview. The COVID-19 surveys were administered through online questionnaires or telephone interviews based on participant preference. Written informed consent was obtained from each participant prior to data collection. The CLSA received ethics approval by research ethics boards (REBs) at each of the national collection sites, and the analyses described here were approved by the University of Ottawa's REB (H-04–22-8051).

Measures

Outcomes

Depressive symptoms Depression symptoms were measured using the Center for Epidemiologic Studies Depression Scale short-form (CESD-10) [25]. The scale consists of ten statements, each ranked on a scale from zero (“rarely or none of the time”) to three (“all of the time”). The statements are summed to provide a total score ranging from zero to 30; higher scores indicate greater severity of depression, with a value of ten or greater indicating significant depressive symptoms [25]. The CESD-10 is considered a reliable and valid measure of depression symptoms in community-dwelling older adults ($\alpha=0.70$) [26]. The CESD-10 was administered during each of the four time points.

Loneliness Loneliness was measured using the UCLA 3-item Loneliness Scale. This scale consists of three

questions, each rated on a three-point scale from one (“hardly ever”) to three (“often”). Items are summed to give a total score ranging from three to nine; higher scores indicate greater loneliness. The UCLA 3-item Loneliness Scale is considered a reliable and valid measure of loneliness in community-dwelling older adults ($\alpha=0.72$) [27]. The UCLA 3-item Loneliness Scale was administered at two time points, Follow-up 1 and COVID-19 Exit.

Explanatory variables

Given the research questions, sexual orientation was treated as a primary predictor. In the selection of covariates we drew from the Commission on Social Determinants of Health (CSDH) conceptual diagram which highlights the role of socioeconomic position (e.g., gender, race/ethnicity, education, income) on health outcomes [28].

Sexual orientation

Sexual orientation was the focal variable of interest. Sexual orientation was ascertained by asking the question: “Do you consider yourself to be: Heterosexual? Homosexual? Bisexual?”. In order to maximize cell sizes representing LGB participants, participants who identified as homosexual or bisexual were grouped together to form an “LGB” variable. Participants were included if they reported their sexual orientation at Baseline or Follow-up 1; participants who refused to answer or who responded with “don't know” or “none of the above” were excluded from the analysis ($n=76$).

Covariates

Covariates included age (years) at Baseline, sex, income, education, and race/ethnicity. Sex was determined at Baseline by asking the question: “Are you male or female?”. Income was determined by asking, “What is your best estimate of the total household income received by all household members, from all sources, before taxes and deductions, in the past 12 months?” We treated income as a categorical variable with five levels (in Canadian dollars): < \$20,000, \$20,000–49,999, \$50,000–99,999, \$100,000–149,999, and \geq \$150,000. Participants' highest level of education was grouped into four categories: “less than secondary school graduate”, “secondary school graduate”, “some post-secondary” and “post-secondary graduate”. In Canada, secondary school is equivalent to high school in other regions, and post-secondary school is equivalent to college or university. Race/ethnicity was collected by asking “People living in Canada come from many different cultural and racial backgrounds. Are you...[list of cultural/racial backgrounds]?” We classified

participants as either “white” or “non-white” to maintain adequate cell sizes.

Statistical analysis

All statistical analyses were conducted in Stata/SE Version 15.1 [29]. Means and standard deviations of basic demographic variables are listed in Table 1. To determine differences between heterosexual and LGB groups, independent *t*-tests were used for continuous variables and chi-square tests (χ^2) were computed for categorical variables.

We used Generalized Estimating Equations (GEE) for the main analyses using the `xtgee` command in Stata. GEE allowed observations to be grouped by individual and by LGB status. We generated separate GEEs for depression symptoms and loneliness, with sexual orientation considered a primary predictor. Given the possibility

that the relationship between sexual orientation and mental health depended on time point, a sexual orientation \times time interaction was entered. The analytic sample for the model treating depression symptoms as the outcome was $n=47,728$. The analytic sample for the model treating loneliness as the outcome was $n=41,698$. We handled missing data through listwise deletion. Alpha was set to 0.05.

Results

Study population characteristics

Sample characteristics are shown in Table 1. The sample was largely white ($n=45,414$; 95.2%) and reported completing post-secondary education ($n=35,594$; 74.6%). Approximately 2% of participants identified as LGB ($n=1,019$). LGB participants were younger ($M=59.3$) than heterosexual participants ($M=62.8$; $p < 0.001$). LGB

Table 1 Demographic and mental health variables by sexual orientation

	Total $n=47,728^a$ n (%) or M (SD)	Heterosexual $n=46,709^a$ n (%) or M (SD)	LGB $n=1,019^a$ n (%) or M (SD)	Test statistic and p -value
Characteristics				
Demographic variables				
Age at Baseline (Range: 45–85)	62.7 (10.4)	62.8 (10.4)	59.3 (9.1)	$t=10.64, p < .001$
Sex				$\chi^2=65.40, p < .001$
Male	23,855 (50.0)	23,218 (49.7)	637 (62.5)	
Female	23,873 (50.0)	23,491 (50.3)	382 (37.5)	
Income				$\chi^2=17.04, p=.002$
< \$20 K	2,854 (6.0)	2,764 (5.9)	90 (8.8)	
\$20–49,999	12,085 (25.3)	11,832 (25.3)	253 (24.8)	
\$50–99,999	17,046 (35.7)	16,686 (35.7)	360 (35.3)	
\$100–149,999	8,716 (18.3)	8,530 (18.3)	186 (18.3)	
\geq \$150 K	7,027 (14.7)	6,897 (14.8)	130 (12.8)	
Education				$\chi^2=29.57, p < .001$
< Secondary school	3,292 (6.9)	3,258 (7.0)	34 (3.3)	
Secondary school	5,249 (11.0)	5,162 (11.1)	87 (8.5)	
Some post-secondary	3,593 (7.5)	3,508 (7.5)	85 (8.3)	
Post-secondary	35,594 (74.6)	34,781 (74.5)	813 (79.8)	
Race				$\chi^2=0.13, p=.72$
Non-white	2,314 (4.8)	2,267 (4.9)	47 (4.6)	
White	45,414 (95.2)	44,442 (95.1)	927 (95.4)	
Mental health variables				
Depression symptoms				
Baseline	5.3 (4.7)	5.3 (4.6)	6.0 (5.3)	$t=-4.63, p < .001$
Follow-up 1	5.1 (4.6)	5.1 (4.6)	6.0 (5.1)	$t=-5.60, p < .001$
COVID-19 Baseline	6.0 (5.2)	6.0 (5.1)	7.0 (5.9)	$t=-4.95, p < .001$
COVID-19 Exit	6.1 (5.2)	6.1 (5.2)	6.9 (6.0)	$t=-3.64, p < .001$
Loneliness symptoms				
Follow-up 1	3.8 (1.3)	3.8 (1.3)	4.2 (1.5)	$t=-7.73, p < .001$
COVID-19 Exit	4.3 (1.6)	4.3 (1.5)	4.6 (1.7)	$t=-4.36, p < .001$

Note. ^aDepression analytic sample reported. Analytic sample for loneliness is 41,698

participants reported higher levels of education in comparison to heterosexual participants (79.8% of LGB participants completed post-secondary school education; 74.5% of heterosexual participants completed post-secondary school; $p < 0.001$). More LGB participants were male ($n = 637$; 62.5%) than female ($n = 382$; 37.5%).

Depression symptoms

The model treating depression symptoms as the outcome reached statistical significance (Wald $\chi^2 = 6112.41$, $p < 0.001$). The results are summarized in Table 2. Results showed that LGB participants reported more symptoms of depression overall in comparison to heterosexual participants, after controlling for age, sex, race/ethnicity, income, and education ($B = 0.595$, $p < 0.001$). In addition, female participants reported more symptoms of depression than male participants ($B = 0.8$,

$p < 0.001$). Participants with an income over \$150,000 reported less symptoms of depression in comparison to those with an income under \$20,000 ($B = -3.7$, $p < 0.001$). White participants reported fewer symptoms of depression than non-white participants ($B = -0.2$, $p = 0.006$). Overall, participants reported more depression symptoms both at COVID-19 Baseline ($B = 1.0$, $p < 0.001$) and COVID-19 Exit ($B = 1.2$, $p < 0.001$) in comparison to the first Baseline time point. The overall interaction between time and LGB status was not statistically significant ($\chi^2 = 6.58$, $p = 0.086$). Figure 1 shows the predicted values of depression symptoms over the four time points by sexual orientation.

Loneliness

The model treating loneliness as the outcome reached statistical significance (Wald $\chi^2 = 4983.02$, $p < 0.001$).

Table 2 GEE models of demographic and time variables in relation to mental health measures

Characteristics	Depression (n = 47,728)			Loneliness (n = 41,698)		
	B (SE)	CI	p	B (SE)	CI	p
Demographic variables						
Age	-0.03 (0.002)	(-0.04, -0.03)	<.001	-0.008 (0.001)	(-0.009, -0.006)	<.001
Sex						
Male	Referent	-	-	Referent	-	-
Female	0.8 (.04)	(0.8, 0.9)	<.001	0.2 (0.01)	(0.1, 0.2)	<.001
Sexual orientation						
Heterosexual	Referent	-	-	Referent	-	-
LGB	0.6 (0.2)	(0.3, 0.9)	<.001	0.3 (0.05)	(0.2, 0.4)	<.001
Income						
< \$20 K	Referent	-	-	Referent	-	-
\$20–49,999	-1.8 (0.09)	(-1.9, -1.6)	<.001	-0.5 (0.03)	(-0.6, -0.5)	<.001
\$50–99,999	-2.7 (0.08)	(-2.9, -2.6)	<.001	-0.8 (0.03)	(-0.9, -0.8)	<.001
\$100–149,999	-3.2 (0.09)	(-3.4, -3.1)	<.001	-1.03 (0.03)	(-1.2, -1.0)	<.001
≥ \$150 K	-3.7 (0.09)	(-3.8, -3.5)	<.001	-1.1 (0.03)	(-1.2, -1.1)	<.001
Education						
< Secondary school	Referent	-	-	Referent	-	-
Secondary school	-0.4 (0.09)	(-0.6, -0.3)	<.001	-0.1 (0.03)	(-0.2, -0.03)	.003
Some post-secondary	-0.2 (0.1)	(-0.3, -0.04)	0.124	0.02 (0.04)	(-0.05, 0.09)	.575
Post-secondary	-0.5 (0.08)	(-0.6, -0.3)	<.001	0.004 (0.03)	(-0.05, 0.06)	.876
Race						
Non-white	Referent	-	-	Referent	-	-
White	-0.2 (0.09)	(-0.4, -0.07)	.006	-0.1 (0.03)	(-0.2, -0.05)	<.001
Time period						
Baseline	Referent	-	-	-	-	-
Follow-up 1	-0.06 (0.02)	(-0.1, -0.02)	.008	Referent	-	-
COVID-19 Baseline	1.0 (0.03)	(0.9, 1.0)	<.001	-	-	-
COVID-19 Exit	1.2 (0.03)	(1.1, 1.2)	<.001	0.5 (0.009)	(0.5, 0.5)	<.001
Interaction						
Time x LGB (Overall)	$\chi^2 = 6.58$, $p = .086$			$\chi^2 = 0.48$, $p = .490$		
Model Fit						
	$\chi^2 = 6112.41$, $p < .001$			$\chi^2 = 4983.02$, $p < .001$		

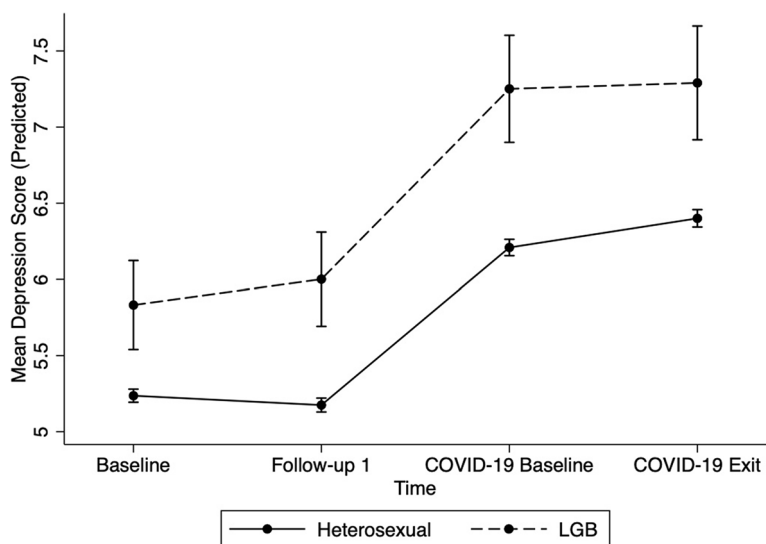


Fig. 1 Predicted depression scores at each time point by sexual orientation

The results are summarized in Table 2. The results showed that LGB participants reported more loneliness overall in comparison to heterosexual participants, after controlling for age, sex, race/ethnicity, income, and education ($B=0.3, p<0.001$). Female participants reported more loneliness than male participants ($B=0.2, p<0.001$). Higher income was associated with less loneliness; the greatest difference was between participants with an income over \$150,000 in comparison to participants with an income under \$20,000 ($B=-1.1, p<0.001$). White participants reported less loneliness than non-white participants ($B=-0.1, p<0.001$).

Overall, participants reported more loneliness at COVID-19 Exit than Follow-up 1 ($B=0.5, p<0.001$). The overall interaction between time and LGB status was not statistically significant ($\chi^2=0.48, p=0.490$). Figure 2 shows the predicted values of loneliness symptoms over the two time points by sexual orientation.

Discussion

In addition to the effects of the virus itself, the COVID-19 pandemic had impacts on mental health. The purpose of this study was to examine the mental health trajectories of older LGB and heterosexual Canadians during

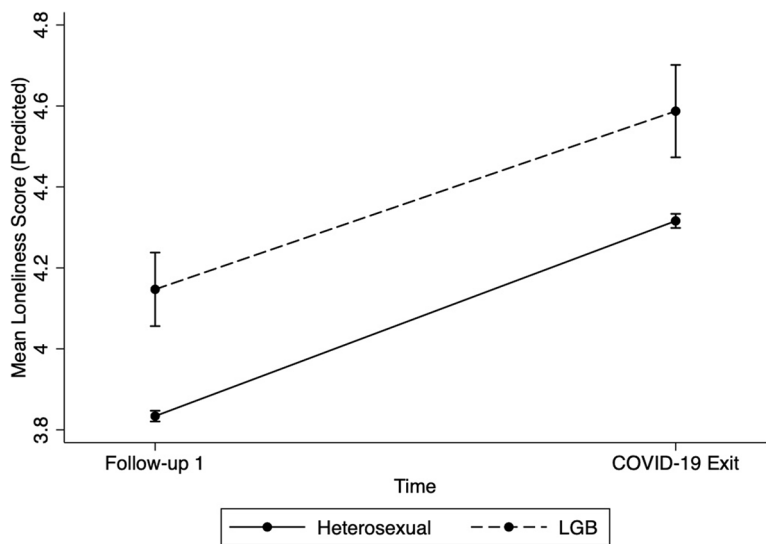


Fig. 2 Predicted loneliness scores at each time point by sexual orientation

the COVID-19 pandemic. We hypothesized that, given the potential for minority stress experiences and their impact on health outcomes,^{18,19} LGB older people would fare poorer (i.e., have higher depression and loneliness scores) than heterosexual participants over the course of the pandemic. Our study yielded several noteworthy findings.

First, consistent with our hypothesis, LGB participants reported more depression symptoms and loneliness across all time points in comparison to heterosexual participants. This aligns with previous work on LGB older adults' mental health [13, 14] and the mental health of LGB people during the pandemic [7, 16]. Specifically, these results corroborate Fish et al.'s (2021) findings that LGB adults in the U.S. experienced poorer mental health both prior to and during the pandemic [9]. They are also in line with Westwood et al.'s (2021) finding that the majority of older lesbian and gay women reported worsening mental health during shelter-in-place orders in the UK [16].

These disparities stem from the lifetime accumulation of stigma, discrimination, and stressors that are unique to LGB people (i.e., minority stress experiences) [18, 19]. In the Minority Stress Model, Meyer (2003) postulates that distal (e.g., discrimination, violence) and proximal processes (e.g., identity concealment) interact to impact the mental health of LGB people [18]. In this case, the accumulation of stigma and discrimination across the lifespan resulted in higher scores on measures of depression symptoms and loneliness in older LGB Canadians in comparison to heterosexual Canadians across the four time points.

Second, while depression and loneliness scores were higher for LGB participants than heterosexual participants, there was an overall trend of worsening mental health, regardless of sexual orientation. Overall, participants reported greater depression symptoms and loneliness during the pandemic compared to pre-pandemic periods. This echoes other research findings of the declining mental health of the general population [1, 2], LGB people [8, 9], and older adults [4, 5, 30, 31] during the pandemic.

Third, the interaction between sexual orientation and time was not statistically significant, suggesting that the LGB participants' mental health trajectory did not differ significantly from heterosexual participants. It is possible that aspects of the pandemic, such as mandatory shelter-in-place orders, may have limited experiences of discrimination typically encountered outside of the home. Qualitative work has described how some older LGB women felt that their mental health stayed the same or improved during the pandemic due to adaptation to new technologies (e.g., connecting with friends over

video call instead of in person) and more time alone [16]. This highlights the adaptability and resiliency of LGB communities.

Additionally, our findings suggest differential mental health trajectories based on social determinants beyond sexual orientation. Younger, lower income, non-white, and female participants reported more depression symptoms and loneliness than older, higher income, white, and male participants. Other work has highlighted the role of social determinants of health as predictors of poorer outcomes during the pandemic. For example, in their evidence brief on the role of social determinants on health equity during the pandemic, the World Health Organization (WHO) highlighted the unequal burden of COVID-19 infection and death on poorer populations, disadvantaged ethnic groups, and older people, among others [32].

This study had a number of strengths, including a large population-based sample, multiple time points before and during the pandemic, and the use of validated measures of mental health (i.e., CESD-10 and UCLA 3-Item Loneliness Scale). The time points of the CLSA's COVID-19 surveys overlapped with enhanced public health restrictions in Canada. Even as restrictions were lifting (during the COVID-Exit survey), depression scores remained elevated. The loneliness scores reported at this time may reflect a hesitation to gather with family and friends with a second wave of COVID-19 looming. The timing of these surveys provided insight into the experiences of older Canadians under those circumstances.

The present study also carried several limitations. The majority of participants reported being white, completing post-secondary education, and earning a moderate-to-high income. Despite a large sample, the small proportion of LGB people precluded separate analyses of lesbian, gay, and bisexual groups, potentially ignoring the diverse experiences of each group. Our analysis was further limited by the CLSA's question on sexual orientation. While sexuality is multidimensional (e.g., encompassing identity, attraction, and behaviour [33]), the CLSA's question centred around sexual identity. Participants may have reported a heterosexual identity, which may not exactly capture their sexual attraction and/or behaviour. Though the literature suggests that minority stress experiences underly the discrepancy in depression and loneliness scores in LGB participants, these experiences were not directly captured in CLSA data collection and therefore sexual orientation was used as a proxy measure of minority stress. While this study was focused on reporting disparities in mental health throughout the pandemic, there is a robust and growing body of work highlighting the strengths exhibited by members of these communities, including strong social networks and adaptability [16, 34,

35]. Future work should take a strengths-based approach, examining the resilience exhibited by members of these communities in times of crisis.

Conclusion

Older adults were disproportionately impacted by COVID-19 infections and mortalities. This study highlighted the detrimental effects of the pandemic on the mental health of older adults regardless of sexual orientation. It also showed that LGB older adults experienced more loneliness and depression symptoms than heterosexual older adults both before and during the pandemic. Understanding diverse identities, needs, and disparities in mental health is critical to promoting equitable aging experiences for everyone. Further research, development, and testing of interventions aimed at improving mental health in older LGB people is needed.

Acknowledgements

This research was made possible using the data collected by the Canadian Longitudinal Study on Aging (CLSA). Funding for the Canadian Longitudinal Study on Aging (CLSA) is provided by the Government of Canada through the Canadian Institutes of Health Research (CIHR) under grant reference: LSA 94473 and the Canada Foundation for Innovation, as well as the following provinces, Newfoundland, Nova Scotia, Quebec, Ontario, Manitoba, Alberta, and British Columbia. This research has been conducted using the CLSA Baseline Comprehensive Dataset version 7.0, Baseline Tracking Dataset version 4.0, Follow-up 1 Comprehensive Dataset version 3.2, Follow-up 1 Tracking Dataset version 2.3, and COVID-19 questionnaire data under Application Number 2109030. The CLSA is led by Drs. Parminder Raina, Christina Wolfson and Susan Kirkland. The opinions expressed in this manuscript are the author's own and do not reflect the views of the Canadian Longitudinal Study on Aging.

Authors' contributions

A.G. conducted the analyses, prepared the figures, wrote the first draft, and contributed to revisions. A.S. contributed to the writing/revisions and oversaw the research. All authors reviewed the manuscript.

Funding

Alexandra Grady is funded through a Master's scholarship from the Social Sciences and Humanities Research Council of Canada.

Availability of data and materials

The data and materials are available to approved data users. More information about data access can be found at the following link: <https://www.clsa-elcv.ca/data-access>.

Declarations

Ethics approval and consent to participate

The CLSA received ethics approval by research ethics boards (REBs) at each of the national collection sites, and the analyses described here were approved by the University of Ottawa's REB (H-04-22-8051). The study was conducted in accordance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, the official human research ethics policy in Canada.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Received: 28 March 2023 Accepted: 23 November 2023
Published online: 07 December 2023

References

- Vindegaard N, Benros ME. COVID-19 pandemic and mental health consequences: systematic review of the current evidence. *Brain Behav Immun*. 2020;89:531–42. <https://doi.org/10.1016/j.bbi.2020.05.048>.
- Salari N, Hosseini-Far A, Jalali R, et al. Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Glob Health*. 2020;16(1):57. <https://doi.org/10.1186/s12992-020-00589-w>.
- Kotwal AA, Holt-Lunstad J, Newmark RL, et al. Social isolation and loneliness among San Francisco Bay Area older adults during the COVID-19 shelter-in-place orders. *J Am Geriatr Soc*. 2021;69(1):20–9. <https://doi.org/10.1111/jgs.16865>.
- Zaninotto P, Iob E, Demakakos P, et al. Immediate and longer-term changes in the mental health and well-being of older adults in England during the COVID-19 pandemic. *JAMA Psychiat*. 2022;79(2):151. <https://doi.org/10.1001/jamapsychiatry.2021.3749>.
- Raina P, Wolfson C, Griffith L, et al. A longitudinal analysis of the impact of the COVID-19 pandemic on the mental health of middle-aged and older adults from the Canadian Longitudinal Study on Aging. *Nat Aging*. 2021;1(12):1137–47. <https://doi.org/10.1038/s43587-021-00128-1>.
- Canadian Institute for Health Information. COVID-19 Intervention Scan - Data Tables. 2022.
- Duarte M, Pereira H. The impact of COVID-19 on depressive symptoms through the lens of sexual orientation. *Brain Sci*. 2021;11(4):523. <https://doi.org/10.3390/brainsci11040523>.
- Moore SE, Wierenga KL, Prince DM, et al. Disproportionate impact of the COVID-19 pandemic on perceived social support, mental health and somatic symptoms in sexual and gender minority populations. *J Homosex*. 2021;68(4):577–91. <https://doi.org/10.1080/00918369.2020.1868184>.
- Fish JN, Salerno J, Williams ND, et al. Sexual minority disparities in health and well-being as a consequence of the COVID-19 pandemic differ by sexual identity. *LGBT Health*. 2021;8(4):263–72. <https://doi.org/10.1089/lgbt.2020.0489>.
- Herrmann WJ, Oeser P, Buspavanich P, et al. Loneliness and depressive symptoms differ by sexual orientation and gender identity during physical distancing measures in response to COVID-19 pandemic in Germany. *Appl Psychol Health Well-Being*. 2023;15(1):80–96. <https://doi.org/10.1111/aphw.12376>.
- Slemon A, Richardson C, Goodyear T, et al. 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. *Psychiatry Res*. 2022;307: 114327. <https://doi.org/10.1016/j.psychres.2021.114327>.
- Jenkins EK, Slemon A, Richardson C, et al. Mental health inequities amid the COVID-19 pandemic: findings from three rounds of a cross-sectional monitoring survey of Canadian adults. *Int J Public Health*. 2022;0. <https://doi.org/10.3389/ijph.2022.1604685>.
- Stinchcombe A, Hammond NG, Wilson K. Differential effects of social support by sexual orientation: a study of depression symptoms among older Canadians in the CLSA. *Res Aging*. 2020;42(9–10):251–61. <https://doi.org/10.1177/0164027520923111>.
- Stinchcombe A, Wilson K, Kortess-Miller K, et al. Physical and mental health inequalities among aging lesbian, gay, and bisexual Canadians: cross-sectional results from the Canadian Longitudinal Study on Aging (CLSA). *Can J Public Health*. 2018;109(5):833–44. <https://doi.org/10.17269/s41997-018-0100-3>.
- Chen J-H. Disparities in mental health and well-being between heterosexual and sexual minority older adults during the COVID-19 pandemic. *J Aging Health*. 2022;34(6–8):939–50. <https://doi.org/10.1177/08982643221081965>.
- Westwood S, Hafford-Letchfield T, Toze M. Physical and mental well-being, risk and protective factors among older lesbians/gay women in the United Kingdom during the initial COVID-19 2020 lockdown. *J Women Aging*. 2021;1–22. <https://doi.org/10.1080/08952841.2021.1965456>.

17. Moreno A, Belhouari S, Dussault A. A systematic literature review of the impact of COVID-19 on the health of LGBTQIA+ older adults: identification of risk and protective health factors and development of a model of health and disease. *J Homosex* 2023;1–35. <https://doi.org/10.1080/00918369.2023.2169851>.
18. Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol Bull*. 2003;129(5):674–97. <https://doi.org/10.1037/0033-2909.129.5.674>.
19. Brooks VR. *Minority stress and lesbian women*. Lexington, Mass: Lexington Books; 1981.
20. Ferraro KF, Shippee TP. Aging and cumulative inequality: how does inequality get under the skin? *Gerontologist*. 2009;49(3):333–43. <https://doi.org/10.1093/geront/gnp034>.
21. Fredriksen-Goldsen KI, Kim H-J, Barkan SE, et al. Health disparities among lesbian, gay, and bisexual older adults: results from a population-based study. *Am J Public Health*. 2013;103(10):1802–9. <https://doi.org/10.2105/AJPH.2012.301110>.
22. Kim H-J, Fredriksen-Goldsen KI. Living arrangement and loneliness among lesbian, gay, and bisexual older adults. *Gerontologist*. 2016;56(3):548–58. <https://doi.org/10.1093/geront/gnu083>.
23. Wister A, Li L, Levasseur M, et al. The effects of loneliness on depressive symptoms among older adults during COVID-19: longitudinal analyses of the Canadian Longitudinal Study on Aging. *J Aging Health*. 2022;089826432211296. <https://doi.org/10.1177/08982643221129686>.
24. Raina PS, Wolfson C, Kirkland SA, et al. The Canadian Longitudinal Study on Aging (CLSA). *Can J Aging Rev Can Vieil*. 2009;28(3):221–9. <https://doi.org/10.1017/S0714980809990055>.
25. Andresen E, Malmgren J, Carter W, et al. Screening for depression in well older adults: evaluation of a short form of the CES-D (Center for Epidemiologic Studies Depression Scale). *Am J Prev Med*. 1994;10(2):77–84.
26. Mohebbi M, Nguyen V, McNeil JJ, et al. Psychometric properties of a short form of the Center for Epidemiologic Studies Depression (CES-D-10) scale for screening depressive symptoms in healthy community dwelling older adults. *Gen Hosp Psychiatry*. 2018;51:118–25. <https://doi.org/10.1016/j.genhosppsych.2017.08.002>.
27. Hughes ME, Waite LJ, Hawkey LC, et al. A short scale for measuring loneliness in large surveys: results from two population-based studies. *Res Aging*. 2004;26(6):655–72. <https://doi.org/10.1177/0164027504268574>.
28. Solar O, Irwin A. A conceptual framework for action on the social determinants of health. World Health Organization. 2010. <https://apps.who.int/iris/handle/10665/44489>. Accessed 15 Mar 2023.
29. StataCorp. *Stata Statistical Software*. 2017.
30. van Tilburg TG, Steinmetz S, Stolte E, et al. Loneliness and mental health during the COVID-19 pandemic: a study among Dutch older adults. *J Gerontol Ser B*. 2021;76(7):e249–55. <https://doi.org/10.1093/geronb/gbaa111>.
31. Krendl AC, Perry BL. The impact of sheltering in place during the COVID-19 pandemic on older adults' social and mental well-being. *J Gerontol Ser B*. 2021;76(2):e53–8. <https://doi.org/10.1093/geronb/gbaa110>.
32. World Health Organization. *COVID-19 and the social determinants of health and health equity: evidence brief*. Geneva: World Health Organization; 2021.
33. Wolff M, Wells B, Ventura-DiPersia C, et al. Measuring sexual orientation: a review and critique of U.S. data collection efforts and implications for health policy. *J Sex Res*. 2017;54(4–5):507–31. <https://doi.org/10.1080/00224499.2016.1255872>.
34. Marmo S, Pardasani M, Vincent D. Senior centers and LGBTQ participants: engaging older adults virtually in a pandemic. *J Gerontol Soc Work*. 2021;64(8):864–84. <https://doi.org/10.1080/01634372.2021.1937431>.
35. Jacmin-Park S, Rossi M, Dumont L, et al. Mental health and social support of sexual and gender diverse people from Québec, Canada during the COVID-19 crisis. *LGBT Health*. 2022;9(3):151–60. <https://doi.org/10.1089/lgbt.2021.0255>.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions

