



Effects of general and sexual minority-specific COVID-19-related stressors on the mental health of lesbian, gay, and bisexual people in Hong Kong

Yiu Tung Suen^a, Randolph C. H. Chan^{b,*}, Eliz Miu Yin Wong^c

^a Gender Studies Programme, Chinese University of Hong Kong, Shatin, Hong Kong

^b Department of Special Education and Counselling, The Education University of Hong Kong, Tai Po, Hong Kong

^c Department of Social Policy, London School of Economics and Political Science, London, United Kingdom

ARTICLE INFO

Keywords:

COVID-19
depression
anxiety
sexual minorities
Hong Kong

ABSTRACT

The impact of COVID-19 on mental health has begun to be widely recognized, but there is an absence of studies on how the mental health of lesbian, gay, and bisexual (LGB) people have been affected by the COVID-19 pandemic. A total of 857 LGB people in Hong Kong participated in a community-based survey study. Over one-fourth of them met the criteria for probable clinical depression (31.5%) and generalized anxiety disorder (27.9%). Besides general stressors, we identified sexual minority-specific stressors during the pandemic. 4.2% of the participants indicated that they had frequently experienced family conflict related to sexual orientation. One-third responded that they had largely reduced connection to the lesbian, gay, bisexual, and transgender plus (LGBT+) community (34.7%). The results showed that sexual minority-specific COVID-19-related stressors explained significant variance in depressive and anxiety symptoms, above and beyond the contribution of general COVID-19-related stressors. Since LGB people are particularly vulnerable to poor mental health during the COVID-19 pandemic, LGB people-targeting organizations need to understand more about family, space, and privacy concerns in order to provide better support, and LGB safe spaces and shelters may be needed as a policy response.

1. Introduction

The impact of the COVID-19 pandemic on mental health has begun to be widely recognized. Fear of getting infected with COVID-19 (Tzur Bitan et al., 2020), stay-at-home orders, disruptions to daily routines, financial worries (Tull et al., 2020), disruption of lives and work (Zhang et al., 2020), loneliness and distress (Liu et al., 2020), and disruption to mental health services (Liu et al., 2020) are found to be among the many factors that contribute to poor mental health uniquely in the COVID-19 pandemic.

In addition to the mental health of patients with confirmed COVID-19, the mental health of people around them, such as parents of hospitalized children (Yuan et al., 2020), has also been affected. The mental health of medical doctors, nurses, and other staff (Chen et al., 2020; Elbay et al., 2020; Joob and Wiwanitkit, 2020; Lu et al., 2020; Wu et al., 2020; Xu et al., 2020) has also been quite rightly given a lot of attention. The mental health of particularly vulnerable groups such as the elderly population (Meng et al., 2020), people experiencing homelessness (Lima et al., 2020), and refugees (Júnior et al., 2020) has also been studied.

However, the lives and mental health of lesbian, gay, and bisexual (LGB) people during COVID-19 have not been examined. As a population, LGB people have a higher prevalence of mental disorders than heterosexual people (Meyer, 2003). Minority stress theory proposes that sexual minority health disparities can be explained in large part by stressors induced by a hostile, homophobic social environment, in which LGB people have to live with harassment, maltreatment, discrimination, and victimization (Frost et al., 2015; Meyer, 2013). It is reasonable to expect that during COVID-19, LGB people have been experiencing stressors that are unique to their sexual orientation. An online survey with 1,051 US men who have sex with men (MSM) found that the pandemic brought adverse impacts to their general wellbeing, social interactions, money, food, drug use, and alcohol consumption (Sanchez et al., 2020). Half had fewer sex partners and most had no change in condom access or use. Some reported challenges in accessing HIV testing, prevention and treatment services. Compared to older MSM, those aged 15–24 years were more likely to report economic and service impacts. United Nations Human Rights Office (UN News, 2020) and regional and local non-governmental organizations have also raised the importance of understanding the impact of the pandemic on sexual

* Corresponding author.

E-mail address: rchchan@eduhk.hk (R. C. H. Chan).

<https://doi.org/10.1016/j.psychres.2020.113365>

Received 12 June 2020; Received in revised form 27 July 2020; Accepted 2 August 2020

Available online 03 August 2020

0165-1781/ © 2020 Elsevier B.V. All rights reserved.

and gender minorities (e.g. [ILGA, 2020](#); [LGBT Foundation, 2020](#); [Madrigal-Borloz, 2020](#); [SF LGBT Center, 2020](#)). We thus hypothesize that there are sexual minority-specific COVID-19-related stressors. In this paper, we particularly focus on examining two of them.

First, LGB people may experience family conflict related to their sexual orientation. During the COVID-19 pandemic, social distancing measures and stay-at-home orders may mean LGB people have to stay at home more often than before, and home may not be necessarily a friendly environment for them. This is particularly pertinent as we are studying LGB people in Hong Kong. Previous studies have highlighted that fewer Chinese LGB people have come out of the closet as compared to their North American counterparts ([Kong, 2010](#); [Suen and Wong, 2017](#)). It is possible that they may face intense pressure from family for their non-heterosexuality ([Kong, 2016](#); [Tang, 2011](#)) because of the social distancing guidelines during COVID-19.

Second, LGB people may experience reduced connection to the lesbian, gay, bisexual, and transgender plus (LGBT+) community during the COVID-19 pandemic. Connection to LGBT+ community has been shown as an important resilience resource for sexual minority people ([Frost and Meyer, 2012](#)). LGBT+ community connection can provide them with access to affirming social network and support, which is associated with fewer psychological distress ([McConnell et al., 2018](#)) and better well-being ([Frost and Meyer, 2012](#)). Nevertheless, due to the implementation of social distancing restrictions, sexual minority people may have fewer access to LGBT+ community during the COVID-19 pandemic. Such reduced LGBT+ social support may adversely affect their mental health ([McConnell et al., 2015](#); [Snapp et al., 2015](#)).

1.1. The present study

The present study investigated the mental health of LGB people in Hong Kong during the COVID-19 pandemic. It was estimated in a random telephone survey study ([Yeo and Chu, 2018](#)) that around 4% of the population in Hong Kong identified as homosexual or bisexual. As reported in the Hong Kong Mental Morbidity Survey ([Lam et al., 2015](#)), the one-week prevalence of ICD-10 diagnoses of common mental health disorders in the general Hong Kong population was 13.3%, with mixed anxiety and depressive disorder being the most common disorder (6.9%). In a recent study conducted among LGB people in Hong Kong, [Chan and colleagues \(2020\)](#) found that around one-quarter of the LGB participants met the criteria for probable clinical depression (28.9%) and generalized anxiety disorder (24.1%) during pre-pandemic times. Compared with another local study ([Mental Health Association of Hong Kong, 2017](#)) which showed that 14.6% of the general public met the criteria for probable clinical depression, LGB people in Hong Kong were at greater risk of clinical depression.

Building upon earlier research, this study aimed to (1) examine COVID-19-related stressors and mental health conditions among LGB people in Hong Kong during the pandemic, (2) compare the levels of general and sexual minority-specific COVID-19-related stressors among subgroups of LGB people, and (3) estimate the effects of general and sexual minority-specific COVID-19-related stressors on depressive and anxiety symptoms. We hypothesized that general COVID-19-related stressors would be positively related to depressive and anxiety symptoms. In addition, it was hypothesized that sexual minority-specific COVID-19-related stressors (i.e., family conflict related to sexual orientation and reduced connection to LGBT+ community) would be positively related to depressive and anxiety symptoms above and beyond general COVID-19-related stressors.

2. Methods

2.1. Sampling and procedure

The study was approved by the research ethics committee of the corresponding author's institution. Data collection was conducted in

May 2020. Participants recruited through LGB community organizations, online postings distributed to LGB-related listservs, and LGB social media. Participants were included if they (1) were 16 years of age or above, (2) have a gender identity that is consistent with their sex assigned at birth, (3) identified as gay, lesbian, bisexual, or otherwise non-heterosexual, (4) live in Hong Kong, and (5) are able to read and understand Chinese. Individuals who were interested in the study were directed to an online survey platform. They were asked to provide informed consent prior to study participation. A gift voucher of HK\$50 (about US\$6.4) was provided to each participant in order to compensate for the time they spent on completing the questionnaire.

A total of 857 LGB people participated in the study. Around 56.1% of the participants were female and 43.9% were male. Most of them identified as gay or lesbian (61.1%), 32.2% identified as bisexual or pansexual, and 6.7% identified as others (e.g., queer, asexual, questioning, etc.). More than half of them were aged 16 – 25 (55.0%), whereas 33.6% were aged 26 – 35 and 11.4% were aged 36 or above. The majority of LGB participants completed Bachelor's degree or above (73.7%). Half of them were in employment (54.1%), 39.8% were students, and 6.1% were not in employment. Around 39.1% had a monthly personal income of below HK\$5,000 (around US\$645), followed by those with a monthly personal income of HK\$5,000 – HK\$19,999 (around US\$645 – US\$2,580) (28.0%) and HK\$20,000 (around US\$2,580) or above (32.9%). Half of the participants were single (47.6%), 49.4% were in an exclusive relationship, and 3.0% were in an open relationship. Most of them lived with family members, partners, and/or friends (92.3%) whereas 7.7% lived alone. [Table 1](#) shows the demographic background of the participants.

2.2. Measures

Participants were first required to report their gender, sexual orientation, age, education level, employment status, monthly personal income level, relationship status, and living arrangement. For general COVID-19-related stressors, participants were asked to indicate to what extent they had experienced worries and actual problems with their health and financial status during the COVID-19 pandemic on a 5-point Likert scale from 1 (not at all) to 5 (to a large extent). Specifically, they were asked to respond to the following items: (1) "To what extent are you worried about your health condition during the COVID-19 pandemic?" (health worries), (2) "To what extent are you worried about your financial situation during the COVID-19 pandemic?" (financial worries), (3) "To what extent is your health condition affected by the COVID-19 pandemic?" (actual health problems), and (4) "To what extent is your financial situation affected by the COVID-19 pandemic?" (actual financial strain). Higher scores indicate higher levels of health/financial worries and problems.

In addition, disruption in daily routine and reduced social contact were measured by the following items: "How often have your daily routine been disrupted during the COVID-19 pandemic?" and "How often have you reduced social contact with your friends during the COVID-19 pandemic?" respectively on a 5-point Likert scale from 1 (never) to 5 (always).

For sexual minority-specific COVID-19-related stressors, participants were asked to assess the family conflict they had experienced ("How often have you experienced family conflict related to your sexual orientation during the COVID-19 pandemic?") and LGBT+ community connection ("How often have you reduced connection to the LGBT+ community during the COVID-19 pandemic?") on a 5-point Likert scale from 1 (never) to 5 (always).

Depression was assessed using the 9-item Patient Health Questionnaire (PHQ-9) ([Kroenke et al., 2001](#)). Participants were asked to indicate the frequency they had experienced different depressive symptoms over the previous 2 weeks on a 4-point Likert scale from 0 (not at all) to 3 (nearly every day). A sample item includes "little interest or pleasure in doing things". The Cronbach's alpha of the scale in

Table 1
Demographic background and mental health conditions of LGB people (N = 857)

	n (%)
Demographic background	
Gender	
Male	376 (43.9%)
Female	481 (56.1%)
Sexual orientation	
Gay / Lesbian	524 (61.1%)
Bisexual / Pansexual	276 (32.2%)
Others (e.g., asexual, queer, questioning)	57 (6.7%)
Age	
16 – 25	471 (55.0%)
26 – 35	288 (33.6%)
36 or above	98 (11.4%)
Education level	
Secondary or below	129 (15.1%)
Post-secondary	96 (11.2%)
Bachelor's degree or above	632 (73.7%)
Employment status	
In employment	465 (54.1%)
Not in employment	51 (6.1%)
Student	341 (39.8%)
Monthly personal income	
Below HK\$5,000	335 (39.1%)
HK\$5,001 – HK\$19,999	240 (28.0%)
HK\$20,000 or above	282 (32.9%)
Relationship status	
Single	408 (47.6%)
In an exclusive relationship	423 (49.4%)
In an open relationship	26 (3.0%)
Living arrangement	
Living alone	66 (7.7%)
Living with family members / partners / friends	791 (92.3%)
Mental health conditions	
Depressive symptoms	
Minimal (0 – 4)	316 (36.9%)
Mild (5 – 9)	271 (31.6%)
Moderate (10 – 14)	165 (19.3%)
Moderately severe (15 – 19)	65 (7.6%)
Severe (20 – 27)	40 (4.7%)
Anxiety symptoms	
Minimal (0 – 4)	356 (41.5%)
Mild (5 – 9)	262 (30.6%)
Moderate (10 – 14)	158 (18.4%)
Severe (15 – 21)	81 (9.5%)

this study was 0.90. A probable clinical depression is indicated by a cut-off score of 10 or above on the total score. The PHQ-9 has a sensitivity of 88% and a specificity of 88% for the diagnosis of major depressive disorder when using 10 as the cut-off score (Kroenke et al., 2001)

Anxiety was assessed by the 7-item Generalized Anxiety Disorder (Spitzer et al., 2006). Participants were asked to indicate the frequency they had experienced different anxiety symptoms over the previous 2 weeks on a 4-point Likert scale from 0 (not at all) to 3 (nearly every day). A sample item includes “feeling nervous, anxious or on edge”. The Cronbach's alpha of the scale in this study was 0.94. A probable diagnosis of generalized anxiety disorder is indicated by a total score of 10 or greater. The GAD-7 has a sensitivity of 89% and a specificity of 82% for the diagnosis of generalized anxiety disorder at this cut-off score (Swinson, 2006).

2.3. Data analysis

Frequency statistics were performed to examine the levels of general and sexual minority-specific COVID-19-related stressors among LGB people. Independent sample *t*-test and one-way analysis of variance (ANOVA) with Bonferroni correction for multiple comparisons were conducted to investigate whether or not the levels of general and sexual minority-specific COVID-19-related stressors varied by demographic characteristics (i.e., gender, sexual orientation, age group, and monthly

personal income level). Hierarchical multiple regression was conducted to estimate the effects of general and sexual minority-specific COVID-19-related stressors on depressive and anxiety symptoms. The demographic variables (i.e., gender, sexual orientation, age group, education level, employment status, monthly personal income level, relationship status, and living arrangement) were dummy-coded and entered in block 1. General COVID-19-related stressors were included in block 2 for controlling for demographic variables. Sexual minority-specific COVID-19-related stressors were included in block 3 to examine whether they would predict depressive and anxiety symptoms above and beyond general COVID-19-related stressors. To examine whether or not sexual minority-specific COVID-19-related stressors moderate the effect of general COVID-19-related stressors on mental health, 12 interaction terms (6 general stressors \times 2 sexual minority-specific stressors) were included in the final block of the models. All continuous predictor variables were mean-centered prior to the computation of interaction terms and being entered into the regression (Cohen, Cohen, et al., 2003). If the interaction terms were significant, simple slope analyses were conducted to interpret the relationship between general stressors and mental health at one SD above and one SD below the mean of sexual minority-specific stressors (Aiken and West, 1991). The above analyses were conducted using SPSS 25.0.

3. Results

3.1. COVID-19-related stressors and mental health

More than half of the LGB people reported moderate-to-high levels of worry about their health (63.0%). Around 15.5% of them indicated that their health condition had been affected to a moderate-to-large extent during the COVID-19 pandemic. In addition, 57.9% of the participants reported moderate-to-high levels of worry about their financial situation, whereas 44.2% indicated that their financial situation had been affected by the pandemic to a moderate-to-large extent. Around half of the participants indicated that their daily routine had often or always been disrupted (56.2%) and they had often or always reduced social contact with friends (59.6%) during the COVID-19 pandemic.

As to sexual minority-specific stressors, around 4.2% of the participants indicated that they had often or always experienced family conflict related to sexual orientation during the COVID-19 pandemic. One-third of them responded that they had often or always reduced connection to the LGBT+ community (34.7%).

More than one-fourth of the LGB people met the criteria for probable clinical depression (31.5%) and generalized anxiety disorder (27.9%).

3.2. Comparison of COVID-19-related stressors and mental health among subgroups of LGB people

Independent sample *t*-test and ANOVA were conducted to examine the gender and sexual orientation differences in levels of COVID-19-related stressors and mental health (see Table 2). The results showed that female participants were more likely to reduce social contact with friends ($t = -3.65, p < .001$) during the COVID-19 pandemic than their male counterparts. Gay men and lesbians showed significantly lower levels of depressive symptoms than those who identified as bisexual, pansexual, and other sexual orientations ($F(2, 854) = 6.73, p = .001$).

There were age differences in actual financial strain ($F(2, 854) = 9.07, p < .001$), disruption in daily routine ($F(2, 854) = 7.37, p = .001$), and reduced connection to the LGBT+ community ($F(2, 854) = 6.65, p < .001$). People aged 16 – 25 were more likely to experience financial strain and report disruption in daily routine during the pandemic, whereas those aged 36 or above were most likely to report reduced connection to the LGBT+ community. It was also found that those who were 16 – 25 showed significantly higher levels of

Table 2

Comparison of general and sexual minority-specific COVID-19-related stressors among subgroups of LGB people

	Gender Male	Female	Sexual orientation Gay/ Lesbian		Others	Age			Monthly personal income		
			Gay/ Lesbian	Bisexual/ Pansexual		16 – 25	26 – 35	36 or above	Below HK \$5,000	HK\$5,001 – HK\$19,999	HK\$20,000 or above
	M(SD)	M (SD)	M(SD)	M(SD)	M (SD)	M(SD)	M(SD)	M (SD)	M(SD)	M(SD)	M(SD)
General COVID-19-related stressors											
Health worries	2.88 (1.23)	3.09 (1.20)	2.92 (1.21)	3.13 (1.21)	2.96 (1.25)	3.05 (1.24)	2.91 (1.19)	2.98 (1.18)	3.04 (1.27)	3.10 (1.19)	2.84 (1.15)
Actual health problems	1.63 (0.91)	1.69 (0.89)	2.97 (1.42)	2.88 (1.36)	2.74 (1.40)	1.61 (0.87)	1.68 (0.88)	1.86 (1.05)	1.61 (0.89)	1.72 (0.92)	1.67 (0.88)
Financial worries	2.91 (1.39)	2.93 (1.40)	1.60 (0.86)	1.78 (0.96)	1.65 (0.88)	2.97 (1.41)	2.78 (1.38)	3.09 (1.34)	3.01 (1.41)*	3.23 (1.36)*	2.56 (1.33)*
Actual financial strain	2.51 (1.41)	2.48 (1.40)	2.50 (1.43)	2.49 (1.37)	2.44 (1.40)	2.66 (1.42)*	2.22 (1.36)*	2.53 (1.36)*	2.80 (1.45)*	2.75 (1.43)*	1.91 (1.13)*
Disruption in daily routine	3.47 (1.13)	3.68 (1.07)	3.53 (1.09)	3.68 (1.12)	3.68 (1.09)	3.72 (1.09)*	3.41 (1.13)*	3.51 (0.98)*	3.79 (1.10)*	3.55 (1.14)*	3.40 (1.04)*
Reduced social contact with friends	3.45 (1.09)*	3.72 (1.05)*	3.56 (1.07)	3.66 (1.08)	3.65 (1.09)	3.57 (1.08)	3.61 (1.08)	3.66 (1.02)	3.62 (1.10)	3.59 (1.11)	3.58 (1.02)
Sexual minority-specific COVID-19-related stressors											
Family conflict related to sexual orientation	1.43 (0.83)	1.52 (0.85)	1.44 (0.81)	1.55 (0.92)	1.50 (0.76)	1.57 (0.92)	1.38 (0.72)	1.39 (0.74)	1.47 (0.83)	1.50 (0.87)	1.48 (0.85)
Reduced connection to LGBT+ community	2.92 (1.30)	2.79 (1.36)	2.94 (1.32)	2.66 (1.33)	2.93 (1.45)	2.72 (1.34)*	2.92 (1.33)*	3.23 (1.28)*	2.73 (1.34)	2.92 (1.38)	2.93 (1.28)
Mental health											
Depressive symptoms	6.86 (5.60)	7.93 (6.19)	6.90 (5.91)*	8.15 (5.89)*	9.22 (6.11)*	8.09 (6.17)*	7.02 (5.47)*	5.71 (5.87)*	8.41 (6.12)*	7.53 (5.68)*	6.27 (5.79)*
Anxiety symptoms	6.14 (5.43)	7.22 (5.56)	6.23 (5.61)	7.49 (5.33)	7.81 (5.20)	7.26 (5.62)*	6.44 (5.19)*	5.14 (5.71)*	7.49 (5.60)*	6.85 (5.43)*	5.76 (5.38)*

Note. Significant differences between groups are indicated by asterisks (* $p < .0013$)

depressive symptoms ($F(2, 854) = 7.76, p < .001$) and anxiety symptoms ($F(2, 854) = 6.71, p = .001$), that their older counterparts.

In addition, LGB people from different income groups reported significantly different levels of financial worries ($F(2, 854) = 16.23, p < .001$), actual financial strain ($F(2, 854) = 39.55, p < .001$), and disruption in daily routine ($F(2, 854) = 9.95, p < .001$). Specifically, people with a monthly personal income of below HK\$5,000 showed significantly higher levels of financial worries, actual financial strain, and disruption in daily routine during the COVID-19 pandemic. LGB people who had a monthly personal income of below HK\$5,000 also reported significantly higher levels of depressive symptoms ($F(2, 854) = 10.18, p < .001$) and anxiety symptoms ($F(2, 854) = 7.72, p < .001$), that those from other income groups.

3.3. Effects of general and sexual minority-specific COVID-19-related stressors on depressive and anxiety symptoms

Hierarchical multiple regression was used to determine stressors associated with depressive symptoms. The results showed that LGB people who had a monthly personal income of HK\$20,000 or above showed significantly lower levels of depressive symptoms than those with a monthly personal income of below HK\$5,000 ($\beta = -0.17, p = .008$). Compared with those who were single, LGB people who were in an exclusive relationship showed lower levels of depressive symptoms ($\beta = -0.11, p = .002$). It was found that general COVID-19-related stressors were positively related to depressive symptoms in LGB people, adjusting for demographic characteristics. In particular, financial worries ($\beta = 0.12, p = .01$), actual health problems ($\beta = 0.18, p < .001$), and reduced social contact with friends ($\beta = 0.10, p = .003$) were positively predictive of depressive symptoms. As shown in Table 3, sexual minority-specific COVID-19-related stressors explained significant variance in depressive symptoms above and beyond general COVID-19-related stressors ($\Delta R^2 = .01, \Delta F = 6.25, p = .002$). Family

conflict related to sexual orientation was positively predictive of depressive symptoms ($\beta = 0.11, p = .001$), after controlling for general COVID-19-related stressors. Finally, we examined whether sexual minority-specific COVID-19-related stressors moderated the effects of general COVID-19-related stressors on depressive symptoms. There was a significant interaction effect of actual health problems and family conflict related to sexual orientation ($\beta = 0.14, p = .002$). The results of simple slope analysis indicated that actual health problems were only related to higher levels depressive symptoms among LGB people who were frequently exposed to family conflict related to sexual orientation ($\beta = .26, p < .001$). For those who were rarely involved in family conflict related to sexual orientation, actual health problems were not significantly related to depressive symptoms ($\beta = .05, p = .30$).

In addition, regression analysis was conducted to examine stressors associated with anxiety symptoms. It was shown that LGB people who had a monthly personal income of HK\$20,000 or above reported significantly lower levels of anxiety symptoms than those who had a monthly personal income of below HK\$5,000 ($\beta = -0.17, p = .01$). LGB people who were in an exclusive relationship had lower levels of anxiety symptoms compared with those who were single ($\beta = -0.09, p = .02$). The results also indicated that several general COVID-19-related stressors, including health worries ($\beta = 0.09, p = .02$), financial worries ($\beta = 0.10, p = .04$), actual health problems ($\beta = 0.11, p = .002$), disruption in daily routine ($\beta = 0.10, p = .004$), and reduced social contact with friends ($\beta = 0.12, p = .001$) were positively associated with anxiety symptoms. Consistent with our hypothesis, sexual minority-specific COVID-19-related stressors significantly contributed to the variance explained in anxiety symptoms, beyond the contribution of general COVID-19-related stressors ($\Delta R^2 = .01, \Delta F = 4.62, p = .01$). Family conflict related to sexual orientation was positively related to anxiety symptoms ($\beta = 0.10, p = .003$). No significant interaction effects between general stressors and sexual minority-specific stressors were found ($ps > .05$).

Table 3
Effects of general and sexual minority-specific COVID-19-related stressors on depressive and anxiety symptoms

	Depressive symptoms				Anxiety symptoms			
	B (SE)	β	R ²	ΔF	B (SE)	β	R ²	ΔF
Block 1: Demographics			0.06	3.73***			0.05	2.94***
Gender								
Male	-0.65 (0.45)	-0.05			-0.68 (0.42)	-0.06		
Female	1.00	–			1.00	–		
Sexual orientation								
Gay / Lesbian	1.00	–			1.00	–		
Bisexual / Pansexual	0.76 (0.49)	0.06			0.74 (0.46)	0.06		
Others	1.52 (0.86)	0.06			0.92 (0.80)	0.04		
Age								
16 – 25	1.00	–			1.00	–		
26 – 35	-0.30 (0.57)	-0.02			-0.17 (0.54)	-0.02		
36 or above	-1.35 (0.78)	-0.07			-1.20 (0.73)	-0.07		
Education level								
Secondary or below	1.00	–			1.00	–		
Post-secondary	-0.89 (0.81)	-0.05			-0.72 (0.76)	-0.04		
Bachelor's degree or above	-0.76 (0.59)	-0.06			-0.23 (0.56)	-0.02		
Employment status								
In employment	1.00	–			1.00	–		
Not in employment	-1.34 (0.98)	-0.05			-1.60 (0.92)	-0.07		
Student	-1.20 (0.79)	-0.10			-1.03 (0.73)	-0.09		
Monthly personal income								
Below HK\$5,000	1.00	–			1.00	–		
HK\$5,001 – HK\$19,999	-1.14 (0.70)	-0.09			-0.94 (0.65)	-0.08		
HK\$20,000 or above	-2.19 (0.83)**	-0.17**			-1.95 (0.77)*	-0.17*		
Relationship status								
Single	1.00	–			1.00	–		
In an exclusive relationship	-1.35 (0.43)**	-0.11**			-0.95 (0.40)*	-0.09*		
In an open relationship	0.23 (1.19)	0.01			0.27 (1.11)	0.01		
Living arrangement								
Living alone	1.00	–			1.00	–		
Living with family members / partners / friends	-0.73 (0.77)	-0.03			-0.53 (0.72)	-0.03		
Block 2: General COVID-19-related stressors			0.15	15.54***			0.14	15.61***
Health worries	0.06 (0.18)	0.01			0.40 (0.17)*	0.09*		
Actual health problems	0.51 (0.20)*	0.12*			0.38 (0.19)*	0.10*		
Financial worries	1.21 (0.24)***	0.18***			0.68 (0.22)**	0.11**		
Actual financial strain	0.13 (0.20)	0.03			0.07 (0.19)	0.02		
Disruption in daily routine	0.34 (0.19)	0.06			0.51 (0.18)**	0.10**		
Reduced social contact with friends	0.56 (0.19)	0.10**			0.60 (0.18)**	0.12**		
Block 3: Sexual minority-specific COVID-19-related stressors			0.17	6.25**			0.15	4.62*
Family conflict related to sexual orientation	0.80 (0.24)**	0.11**			0.66 (0.22)**	0.10**		
Reduced connection to LGBT+ community	-0.27 (0.16)	-0.06			-0.18 (0.15)	-0.04		
Block 4: Interaction (General COVID-19-related stressors × Sexual minority-specific COVID-19-related stressors)			0.19	1.77*			0.16	0.88
Health worries × Family conflict related to sexual orientation	-0.16 (0.26)	-0.03			-0.07 (0.25)	-0.01		
Actual health problems × Family conflict related to sexual orientation	-0.08 (0.25)	-0.02			-0.19 (0.24)	-0.04		
Financial worries × Family conflict related to sexual orientation	0.83 (0.26)**	0.14**			0.46 (0.25)	0.09		
Actual financial strain × Family conflict related to sexual orientation	-0.15 (0.25)	-0.03			0.09 (0.23)	0.02		
Disruption in daily routine × Family conflict related to sexual orientation	0.45 (0.24)	0.07			0.13 (0.23)	0.02		
Reduced social contact with friends × Family conflict related to sexual orientation	-0.03 (0.25)	-0.01			0.04 (0.23)	0.01		
Health worries × Reduced connection to LGBT+ community	-0.21 (0.13)	-0.06			-0.18 (0.12)	-0.05		
Actual health problems × Reduced connection to LGBT+ community	0.01 (0.15)	0.003			-0.09 (0.14)	-0.03		
Financial worries × Reduced connection to LGBT+ community	0.04 (0.18)	0.01			-0.11 (0.17)	-0.02		
Actual financial strain × Reduced connection to LGBT+ community	-0.01 (0.15)	-0.003			0.10 (0.14)	0.03		
Disruption in daily routine × Reduced connection to LGBT+ community	0.16 (0.14)	0.04			0.04 (0.13)	0.01		
Reduced social contact with friends × Reduced connection to LGBT+ community	-0.14 (0.14)	-0.04			-0.09 (0.13)	-0.03		

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

4. Discussion

This paper adds to the understanding of mental health of particularly vulnerable social groups during the COVID-19 pandemic. While previous research studied the mental health of the elderly population (Meng et al., 2020), people experiencing homelessness (Lima et al., 2020), and refugees (Júnior et al., 2020), this study expands current understanding by studying the mental health of LGB people in Hong Kong during the COVID-19 pandemic. As shown in the results, more than one-fourth of the LGB people met the criteria for probable clinical depression (31.5%) and generalized anxiety disorder (27.9%) during the pandemic. In a previous study conducted among LGB people using the same measures employed in this study, Chan and colleagues (2020)

found that the prevalence of probable clinical depression and generalized anxiety disorder in LGB people in Hong Kong was 28.9% and 24.1% respectively during pre-pandemic times. The current findings indicated that the depressive and anxiety symptoms of LGB people were even more pronounced during the COVID-19 pandemic, which warrants further attention and targeted intervention.

In addition, the present study showed that LGB people who were younger and with a lower socioeconomic status reported a greater disruption in daily routine and a higher level of actual financial strain. These subgroups within the LGB populations were particularly vulnerable to the negative impact brought by the COVID-19 pandemic. Social and financial support to those LGB people who have been struggling during the pandemic is much needed.

This study also examined the effect of general COVID-19-related stressors on depressive and anxiety symptoms among LGB people in Hong Kong. The findings revealed that actual health problems and reduced social contact with friends were vital factors affecting their mental health. LGB people who had health problems and reduced social contact with friends during the COVID-19 outbreak were likely to show higher levels of depressive and anxiety symptoms.

Most importantly, we identified sexual minority-specific COVID-19-related stressors among LGB people. One-third of the respondents indicated that they had largely reduced connection to the LGBT+ community during the pandemic. It is plausible that the enforcement of social distancing guidelines prevented sexual minority people from socializing in LGBT+ spaces (such as bars and saunas). Surprisingly, only a small proportion of LGB people (4.2%) had frequently experienced family conflict related to sexual orientation. This might be due to the fact that very few of them disclosed their sexual orientation in Chinese families, as revealed in previous studies (Kong, 2010; Suen and Wong, 2017). Family conflict related to sexual orientation appeared to be rare, but when it occurred, it posed a severe threat to the mental health of LGB people. Our results showed that family conflict related to sexual orientation significantly contributed to the variance explained in depressive and anxiety symptoms, beyond the contribution of general COVID-19-related stressors. Family conflict also moderated the association between actual health problems and depressive symptoms, such that the negative effect of actual health problems on depressive symptoms was stronger among those who were frequently exposed to family conflict related to sexual orientation. Not only have they been suffering from health, social, and financial risks posed by the COVID-19 pandemic, they have also been facing additional stressors unique to their sexual orientation, which further exacerbated their mental health problems.

The findings are significant and bear important implications for mental health support and service provision. Organizations that work with LGB people need to understand more about issues of family, space, and privacy concerns in order to better support LGB people during the COVID-19 (Huang et al., 2020). It can be a very challenging issue to deal with as staying at home may be the only option for many LGB people and there may not be a way out. It is likely that either domestic violence against LGB people, especially LGB youth, may increase, or that LGB homelessness (Keuroghlian et al., 2014) may result when such family conflict related to sexual orientation becomes unbearable. LGB safe spaces and shelters may be needed as a policy response as a result of COVID-19 (Gorman-Murray et al., 2014). Organizations that provide support for COVID-19 and mental health also need to understand more about sexual minority-unique stressors in order to provide LGB-culturally competent mental health care support (Burgess et al., 2007; Israel et al., 2011).

4.1. Limitations

While the present study provides a timely understanding of how the mental health of sexual minorities had particularly been impacted by the COVID-19 pandemic, interpretation of the findings must be made with caution. First, the study was conducted among a non-probability sample of LGB people. The sample was disproportionately young and had lower personal income level. Although they might be more vulnerable to the impact of the COVID-19 pandemic, the sample could have biased the prevalence of mental health problems reported and thus the findings might not be generalizable to the entire LGB population in Hong Kong. Second, the study was based on a cross-sectional design which did not allow us to establish causality between the variables examined in the study. Longitudinal work is needed to determine the effects of COVID-19 on sexual minorities in long run. Third, single-item measures were used to assess the COVID-19-related stressors due to the absence of validated scales. Although the items had good face validity, future studies should attempt to develop and utilize

psychometrically sound measures for assessing COVID-19-related stressors.

4.2. Conclusion

To our knowledge, this study is the first published work on the effects of COVID-19 on the mental health of sexual minorities. Our findings help inform how the lives of LGB people in Hong Kong were affected by the COVID-19 outbreak. Compared with previous research, the results apparently revealed that the depressive and anxiety symptoms of LGB people were elevated during the COVID-19 pandemic. Consistent with our hypothesis, the data showed that sexual minority-specific COVID-19-related stressors explained significant variance in depressive and anxiety symptoms above and beyond general COVID-19-related stressors. Timely and appropriate interventions are needed to address the mental health disparities in sexual minority people during and after the COVID-19 pandemic.

CRedit authorship contribution statement

Yiu Tung Suen: Funding acquisition, Conceptualization, Methodology, Formal analysis, Investigation, Resources, Writing - original draft. **Randolph C. H. Chan:** Funding acquisition, Conceptualization, Methodology, Formal analysis, Investigation, Resources, Writing - original draft. **Eliz Miu Yin Wong:** Methodology, Formal analysis, Investigation, Writing - original draft.

Declaration of Competing Interest

The authors declare no conflict of interest.

Acknowledgment

This research is supported by the General Research Fund (14607717) and Early Career Scheme (28609019) of the Research Grants Council of Hong Kong as well as the Social Sciences and Humanities Research Council of Canada (MFARR-Asia).

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.psychres.2020.113365](https://doi.org/10.1016/j.psychres.2020.113365).

References

- Aiken, L.S., West, S.G., 1991. *Multiple Regression: Testing and Interpreting Interactions*. SAGE Publications, Inc., Thousand Oaks, CA.
- Burgess, D., Lee, R., Tran, A., van Ryn, M., 2007. Effects of perceived discrimination on mental health and mental health services utilization among gay, lesbian, bisexual and transgender persons. *J. LGBT Health Res.* 3, 1–14. <https://doi.org/10.1080/15574090802226626>.
- Chan, R.C.H., Operario, D., Mak, W.W.S., 2020. Bisexual individuals are at greater risk of poor mental health than lesbians and gay men: the mediating role of sexual identity stress at multiple levels. *J. Affect. Disord.* 260, 292–301. <https://doi.org/10.1016/j.jad.2019.09.020>.
- Chen, Y., Zhou, H., Zhou, Y., Zhou, F., 2020. Prevalence of self-reported depression and anxiety among pediatric medical staff members during the COVID-19 outbreak in Guiyang, China. *Psychiatry Res.* 288, 113005. <https://doi.org/10.1016/j.psychres.2020.113005>.
- Cohen, J., Cohen, P., West, S.G., Aiken, L.S., 2003. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*, 3rd ed. Lawrence Erlbaum Associates, Mahwah, N.J.
- Elbay, R.Y., Kurtulmuş, A., Arpacioğlu, S., Karadere, E., 2020. Depression, anxiety, stress levels of physicians and associated factors in COVID-19 pandemics. *Psychiatry Res.* 290, 113130. <https://doi.org/10.1016/j.psychres.2020.113130>.
- Frost, D.M., Lehavot, K., Meyer, I.H., 2015. Minority stress and physical health among sexual minority individuals. *J. Behav. Med.* 38, 1–8. <https://doi.org/10.1007/s10865-013-9523-8>.
- Frost, D.M., Meyer, I.H., 2012. Measuring community connectedness among diverse sexual minority populations. *J. Sex Res.* 49, 36–49. <https://doi.org/10.1080/00224499.2011.565427>.

- Gorman-Murray, A., McKinnon, S., Dominey-Howes, D., 2014. Queer domicile: LGBT displacement and home loss in natural disaster impact, response, and recovery. *Home Cult.* 11, 237–261. <https://doi.org/10.2752/175174214X13891916944751>.
- Huang, Y.-T., Chan, R.C.H., Cui, L., 2020. Filial piety, internalized homonegativity, and depressive symptoms among Taiwanese gay and bisexual men: a mediation analysis. *Am. J. Orthopsychiatry* 90, 340–349. <https://doi.org/10.1037/ort0000439>.
- ILGA, 2020. 187 organisations call on States to protect LGBTI persons' human rights in the context of COVID-19 outbreak.
- Israel, T., Walther, W.A., Gortcheva, R., Perry, J.S., 2011. Policies and practices for LGBT clients: perspectives of mental health services administrators. *J. Gay Lesbian Ment. Health* 15, 152–168. <https://doi.org/10.1080/19359705.2010.539090>.
- Joob, B., Wiwanitkit, V., 2020. Medical personnel, COVID-19 and emotional impact. *Psychiatry Res.* 288, 112952. <https://doi.org/10.1016/j.psychres.2020.112952>.
- Júnior, J.G., de Sales, J.P., Moreira, M.M., Pinheiro, W.R., Lima, C.K.T., Neto, M.L.R., 2020. A crisis within the crisis: the mental health situation of refugees in the world during the 2019 coronavirus (2019-nCoV) outbreak. *Psychiatry Res.* 288, 113000. <https://doi.org/10.1016/j.psychres.2020.113000>.
- Keuroghlian, A.S., Shtasel, D., Bassuk, E.L., 2014. Out on the street: a public health and policy agenda for lesbian, gay, bisexual, and transgender youth who are homeless. *Am. J. Orthopsychiatry* 84, 66–72. <https://doi.org/10.1037/h0098852>.
- Kong, T.S.K., 2010. Chinese male homosexualities: memba, tongzhi and golden boy, 1st ed.. Routledge, London, UK. <https://doi.org/10.4324/9780203849200>.
- Kong, T.S.K., 2016. The sexual in chinese sociology: homosexuality studies in contemporary China. *Sociol. Rev.* 64, 495–514. <https://doi.org/10.1111/1467-954X.12372>.
- Kroenke, K., Spitzer, R.L., Williams, J.B.W., 2001. The PHQ-9: validity of a brief depression severity measure. *J. Gen. Intern. Med.* 16, 606–613. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>.
- Lam, L.C.-W., Wong, C.S.-M., Wang, M.-J., Chan, W.-C., Chen, E.Y.-H., Ng, R.M.-K., Hung, S.-F., Cheung, E.F.-C., Sham, P.-C., Chiu, H.F.-K., Lam, M., Chang, W.-C., Lee, E.H.-M., Chiang, T.-P., Lau, J.T.-F., van Os, J., Lewis, G., Bebbington, P., 2015. Prevalence, psychosocial correlates and service utilization of depressive and anxiety disorders in Hong Kong: the Hong Kong mental morbidity survey (HKMMS). *Soc. Psychiatry Psychiatr. Epidemiol.* 50, 1379–1388. <https://doi.org/10.1007/s00127-015-1014-5>.
- LGBT Foundation, 2020. Why LGBT people are disproportionately impacted by coronavirus. LGBT Foundation, Manchester.
- Lima, N.N.R., de Souza, R.L., Feitosa, P.W.G., Moreira, J.L., de, S., da Silva, C.G.L., Neto, M.L.R., 2020. People experiencing homelessness: their potential exposure to COVID-19. *Psychiatry Res.* 288, 112945. <https://doi.org/10.1016/j.psychres.2020.112945>.
- Liu, C.H., Zhang, E., Wong, G.T.F., Hyun, S., Hahm, H.Chris, 2020. Factors associated with depression, anxiety, and PTSD symptomatology during the COVID-19 pandemic: clinical implications for U.S. young adult mental health. *Psychiatry Res.* 290, 113172. <https://doi.org/10.1016/j.psychres.2020.113172>.
- Liu, S., Yang, L., Zhang, C., Xiang, Y.-T., Liu, Z., Hu, S., Zhang, B., 2020. Online mental health services in China during the COVID-19 outbreak. *Lancet Psychiatry* 7, e17–e18. [https://doi.org/10.1016/S2215-0366\(20\)30077-8](https://doi.org/10.1016/S2215-0366(20)30077-8).
- Lu, W., Wang, H., Lin, Y., Li, L., 2020. Psychological status of medical workforce during the COVID-19 pandemic: a cross-sectional study. *Psychiatry Res.* 288, 112936. <https://doi.org/10.1016/j.psychres.2020.112936>.
- Madrigal-Borlor, V., 2020. Open letter on COVID-19 to the LGBT community.
- McConnell, E.A., Birkett, M.A., Mustanski, B., 2015. Typologies of social support and associations with mental health outcomes among LGBT youth. *LGBT Health* 2, 55–61. <https://doi.org/10.1089/lgbt.2014.0051>.
- McConnell, E.A., Janulis, P., Phillips, G., Truong, R., Birkett, M., 2018. Multiple minority stress and LGBT community resilience among sexual minority men. *Psychol. Sex. Orientat. Gend. Divers* 5, 1–12. <https://doi.org/10.1037/sgd0000265>.
- Meng, H., Xu, Y., Dai, J., Zhang, Y., Liu, B., Yang, H., 2020. Analyze the psychological impact of COVID-19 among the elderly population in China and make corresponding suggestions. *Psychiatry Res.* 289, 112983. <https://doi.org/10.1016/j.psychres.2020.112983>.
- Mental Health Association of Hong Kong, 2017. The Hong Kong Depression Index Research 2016. Mental Health Association of Hong Kong, Hong Kong.
- 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>.
- Meyer, I.H., 2013. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol. Sex. Orientat. Gend. Divers* 1, 3–26. <https://doi.org/10.1037/2329-0382.1.S.3>.
- Sanchez, T.H., Zlotorzynska, M., Rai, M., Baral, S.D., 2020. Characterizing the impact of COVID-19 on men who have sex with men across the United States in April, 2020. *AIDS Behav.* <https://doi.org/10.1007/s10461-020-02894-2>.
- SF LGBT Center, 2020. COVID-19 update [WWW Document]. SF LGBT Cent. URL <https://www.sfcenter.org/covid-19-update/> (accessed 6.8.20).
- Snapp, S.D., Watson, R.J., Russell, S.T., Diaz, R.M., Ryan, C., 2015. Social support networks for LGBT young adults: low cost strategies for positive adjustment. *Fam. Relat.* 64, 420–430. <https://doi.org/10.1111/fare.12124>.
- Spitzer, R.L., Kroenke, K., Williams, J.B.W., Löwe, B., 2006. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch. Intern. Med.* 166, 1092. <https://doi.org/10.1001/archinte.166.10.1092>.
- Suen, Y.T., Wong, M.Y., 2017. Male homosexuality in Hong Kong: a 20-year review of public attitudes towards homosexuality and experiences of discrimination self-reported by gay men. In: Lin, X., Haywood, C., Mac an Ghaill, M. (Eds.), *East Asian Men: Masculinity, Sexuality and Desire*. Palgrave Macmillan UK, London, pp. 69–81. https://doi.org/10.1057/978-1-137-55634-9_5.
- Swinson, R.P., 2006. The GAD-7 scale was accurate for diagnosing generalised anxiety disorder. *Evid. Based Med.* 11, 184. <https://doi.org/10.1136/ebm.11.6.184>.
- Tang, D.T.-S., 2011. Conditional spaces: Hong Kong lesbian desires and everyday life. *Queer Asia*. Hong Kong University Press, Hong Kong.
- Tull, M.T., Edmonds, K.A., Scamaldo, K.M., Richmond, J.R., Rose, J.P., Gratz, K.L., 2020. Psychological outcomes associated with stay-at-home orders and the perceived impact of COVID-19 on daily life. *Psychiatry Res.* 289, 113098. <https://doi.org/10.1016/j.psychres.2020.113098>.
- Tzur, Bitan, Grossman-Giron, D., Bloch, A., Mayer, Y., Shiffman, Y., N. Mendlovic, S., 2020. Fear of COVID-19 scale: psychometric characteristics, reliability and validity in the Israeli population. *Psychiatry Res.* 289, 113100. <https://doi.org/10.1016/j.psychres.2020.113100>.
- UN News, 2020. COVID-19: rights experts highlight LGBTI discrimination, antisemitism. UN News.
- Wu, D., Jiang, C., He, C., Li, C., Yang, L., Yue, Y., 2020. Stressors of nurses in psychiatric hospitals during the COVID-19 outbreak. *Psychiatry Res.* 288, 112956. <https://doi.org/10.1016/j.psychres.2020.112956>.
- Xu, J., Xu, Q., Wang, C., Wang, J., 2020. Psychological status of surgical staff during the COVID-19 outbreak. *Psychiatry Res.* 288, 112955. <https://doi.org/10.1016/j.psychres.2020.112955>.
- Yeo, T.E.D., Chu, T.H., 2018. Beyond homonegativity: understanding Hong Kong people's attitudes about social acceptance of gay/lesbian people, sexual orientation discrimination protection, and same-sex marriage. *J. Homosex.* 65, 1372–1390. <https://doi.org/10.1080/00918369.2017.1375363>.
- Yuan, R., Xu, Q., Xia, C., Lou, C., Xie, Z., Ge, Q., Shao, Y., 2020. Psychological status of parents of hospitalized children during the COVID-19 epidemic in China. *Psychiatry Res.* 288, 112953. <https://doi.org/10.1016/j.psychres.2020.112953>.
- Zhang, S.X., Wang, Y., Rauch, A., Wei, F., 2020. Unprecedented disruption of lives and work: health, distress and life satisfaction of working adults in China one month into the COVID-19 outbreak. *Psychiatry Res.* 288, 112958. <https://doi.org/10.1016/j.psychres.2020.112958>.