Disparities in Mental Health and Well-Being between Heterosexual and Sexual Minority Older Adults during the COVID-19 Pandemic

Jen-Hao Chen, PhD[1] ⓘD

Abstract

Objectives: This study examines disparities in older adults' mental health and well-being during the pandemic by sexual minority status. **Methods:** This study analyzed data on older adults from the Health and Retirement Study's COVID-19 Module (N = 3142 for heterosexuals and N = 75 for sexual minorities). Weighted regressions linked concern about COVID-19, depression, pandemic emotional stress, and changes in loneliness, in-person contacts, income, and work to sexual minority status, controlling for sociodemographic characteristics. **Results:** Compared to heterosexuals, sexual minority older adults had more concern about the pandemic and emotional stress and showed a decrease in in-person contact during the pandemic—these differences were not explained by sociodemographic characteristics. Sexual minority older adults were also more likely to have changes in income and work during the pandemic, but these differences were explained by sociodemographic characteristics. **Discussion:** Sexual minority older adults have experienced worse mental health outcomes than heterosexuals during the COVID-19 pandemic, which merits intervention.

Keywords

Coronavirus impact, LGBTQ, minority experience, health inequality, psychosocial health

Introduction

With over 33 million confirmed cases and 600,000 deaths by August 2021 (U.S. Centers for Disease Control and Prevention, 2021), the United States is one of the countries hardest hit by the global COVID-19 pandemic. Epidemiological data has clearly demonstrated that older adults are more vulnerable to serious illness and death from the COVID-19 virus, and research has also documented that certain disadvantaged populations, such as racial minorities and low socioeconomic status (SES) older adults, are more vulnerable to worsening mental health during the pandemic (Choi & Yang, 2021; Fingerman et al., 2021; Holtgrave et al., 2020; Kim & Bostwick, 2020; Millett et al., 2020; Tai et al., 2021). Older adults who are sexual minorities, which the American Psychological Association (2021) defines as persons from diverse populations including but not limited to lesbian, gay, bisexual, pansexual, queer, fluid, and asexual sexual orientations, are another potentially vulnerable subpopulation, but they have received relatively little attention in the discourse and research about the pandemic. We know little about how old age combines with sexual minority status to shape the well-being of persons during the COVID-19 crisis, but there are both scientific and practical reasons for thinking it merits study. Recent estimates suggest there are more than 11 million self-identified sexual minorities in the United States (Williams Institute, 2021) and nearly one-fourth (2.4 million) are aged 65 or older (American Psychological Association, 2013)—a number equivalent to the size of the entire population of New Mexico. The size of the sexual minority older adult population alone merits a fuller understanding of how they have fared during the pandemic.

A social ecological perspective can enhance our understanding of the well-being of sexual minority older adults during the pandemic by recognizing multiple levels of factors that simultaneously affect individuals' opportunities and outcomes (Bronfenbrenner, 1979; Bronfenbrenner & Ceci, 1994).

[1]Department of Sociology & Department of Psychology, National Chengchi University, Taipei, Taiwan

Corresponding Author:
Jen-Hao Chen, PhD, Department of Sociology & Department of Psychology, National Chengchi University, 64 Zhinan Road Section 2, Taipei City, 11605, Taiwan.
Email: jenhao@nccu.edu.tw

From such a perspective, sexual minorities, particularly older sexual minorities, will likely experience worse social and mental health impacts during the pandemic (Movement Advancement Project, 2020; Phillips et al., 2020; Williams Institute, 2020a, 2020b, 2021) because the existing interpersonal, institutional, and social oppressions they experience at multiple levels may be exacerbated by pandemic conditions. Indeed, prior to the pandemic, voluminous research has documented that sexual minorities face daily experiences of interpersonal, institutional, and social oppression that accumulate over the life course into inequalities in mental health outcomes and well-being (Chen & Shiu, 2017; Herek & Garnets, 2007; Nelson & Andel, 2020; Patterson et al., 2020). For example, sexual minority populations still frequently experience interpersonal discrimination, harassment, and violence in daily life (Ayhan et al., 2020; Casey et al., 2019; Harper & Schneider, 2003; Katz-Wise & Hyde, 2012; Mallory et al., 2015). Despite the recognition of same-sex marriage and other legal advances, there are still structural barriers at the societal and community levels that constrain the opportunities and human rights of sexual minorities in the United States. U.S. states vary in how well their nondiscrimination laws in housing, credit, and employment protect sexual orientation (Movement Advancement Project, 2021), and cultural norms and social recognition of sexual minorities vary from place to place (Lewis et al., 2017). Psychologist Mark L. Hatzenbuehler (2016) coined the term "structural stigma" to describe such societal-level conditions that constrain the opportunities, resources, and well-being of sexual minorities. Due to the continuing existence of these multiple levels of oppression, prior research shows that among older adults, sexual minorities are more likely than heterosexuals to experience poor health, disability, and mental distress. For example, a classic study by Fredriksen-Goldsen and colleagues (2013) using data from the Washington State Behavioral Risk Factor Surveillance System found that sexual minority older adults have a higher risk of disability and poor mental health than heterosexuals. Using nationally representative data from the 2013–2014 National Health Interview Survey, another study found that rates of disability and mental distress are higher among sexual minority older adults than heterosexuals and that sexual minority older women are more likely than their heterosexual counterparts to report poor general health (Fredriksen-Goldsen et al., 2017). Other research studies found that even among partnered older adults, those in same-sex relationships exhibit greater odds of psychological distress than their heterosexual counterparts (Gonzales & Henning-Smith, 2015). A recent review of the literature concluded that sexual minority older adults "evidence more mental distress than their heterosexual peers" (King & Richardson, 2017). In sum, the health inequalities between sexual minority older adults and heterosexual older adults were well-documented and substantial before the outbreak of the COVID-19 pandemic.

The present study proposes that the pre-existing inequalities that affect the mental health and well-being of sexual minorities will be amplified during the pandemic. Prior research points to three potential mechanisms that place sexual minority older adults at increased risk for poor mental health and well-being during the pandemic. First, prior studies have found that sexual minority populations are more likely to have pre-existing health conditions such as asthma, diabetes, or heart disease that could increase the risk of complications and death from the COVID-19 virus (Beach et al., 2018; Caceres et al., 2019; Fredriksen-Goldsen et al., 2017). Further, having one or more pre-existing conditions that elevate one's physical health risk during the pandemic may lead to greater anxiety, stress, and worry. Second, the pandemic may disrupt networks of support and specialized services that sexual minority older adults rely on more heavily than heterosexuals. For example, prior research has found that sexual minority older adults depend more significantly on friends (i.e., "chosen families") than family members for care and support (Muraco & Fredriksen-Goldsen, 2011; Orel, 2017). Furthermore, sexual minorities are often reluctant to see regular healthcare providers and instead rely more on specialized healthcare providers that self-identify as being friendly to sexual minorities and sensitive to their needs (Hsieh & Shuster, 2021; Martos et al., 2017, 2018). During the pandemic, public health recommendations that discourage contact with others outside the home, or local policies that forbid it, will limit sexual minority older adults' access to their social support networks. And, if healthcare providers or facilities close or are harder to access during the pandemic, sexual minority older adults will likely have more difficulty than their heterosexual peers finding suitable substitutes. It is also important to note that although sexual minorities live throughout the United States, they are concentrated in the cities and states hardest hit by the COVID-19 pandemic (Newport & Gates, 2015; Williams Institute, 2020a), including California, Florida, Texas, New York, and the major metropolitan areas within these states (Gates, 2013; Williams Institute, 2020c). The pandemic may disproportionately impact sexual minorities because they tend to live in places with the highest numbers of confirmed cases and deaths (U.S. Centers for Disease Control and Prevention, 2021). In all these ways, COVID-19 and its impacts are likely reverberating significantly in the lives of sexual minority older adults.

As such, this study hypothesizes that older adults who are sexual minorities will have poorer mental health and well-being during the pandemic than their counterparts who are heterosexual. This study is one of the first to examine the mental health and social well-being consequences of the COVID-19 pandemic on sexual minority older adults, and the only one, to the author's knowledge, to use nationally representative data. The study will make use of data from the Health Retirement Study (HRS) that has rich measures on both heterosexual and sexual minority older adults that can be used

to uncover inequalities in mental health and well-being by sexual minority status. The study's findings will add to the growing literature on how the COVID-19 pandemic has disproportionately impacted minority and marginalized populations, knowledge that is essential to ultimately reduce these populations' vulnerability during this or future pandemics.

Methods

Data

The data in this study comes from the June 2020 COVID-19 module of the HRS. The HRS is a longitudinal panel study that has surveyed a representative sample of adults over age 50 in the United States since 1992. In June 2020, a COVID-19 module was administered to a subsample of HRS respondents to gather data about older adults' experiences during the pandemic. Data were collected in two stages. First, all respondents participated in a phone interview with a core survey. Second, respondents were asked to complete a leave-behind questionnaire after the core phone interview. The leave-behind questionnaire was mailed to respondents along with a postage-paid envelope for return. The purpose of the leave-behind questionnaire was to collect additional information from respondents without adding to the phone interview length. The HRS has used this format of data collection since 2004 (Smith et al., 2017). The leave-behind questionnaire in the 2020 COVID-19 module included additional questions about older adults' social and mental well-being during the COVID-19 pandemic. Taken together, data from both parts of the 2020 COVID-19 module offer rich information for researchers to assess the mental health and social well-being of older adults in the United States during the pandemic period. Given the urgency of the pandemic, the HRS made its data available to researchers in Spring 2021 under an accelerated process.

For the June 2020 COVID-19 module, 3217 older adults completed the phone interview, and 2129 older adults also completed and returned the leave-behind questionnaire. When properly weighted, results from the HRS can be generalized to the population of older adults in the United States.

Identification of Sexual Minority Older Adults

The present study used data from both 2020 COVID-19 module and prior waves of the HRS to identify sexual minority older adults. Beginning in 2016, newly enrolled respondents in the HRS were asked a question about sexual orientation: "Do you consider yourself to be gay/lesbian, straight, bisexual, or something else?" Wording of the question differed slightly depending on the biological sex of the respondent, that is, the question used the word "gay" for biological males and "lesbian" for biological females. Per previous research, in this study, anyone who answered

lesbian/gay, bisexual, "something else," or "unsure" was categorized as a sexual minority (Boyd et al., 2019; Evans-Polce et al., 2020; Kcomt et al., 2021). For respondents who enrolled before 2016, the household roster and marital status were used to extract sexual minority status. If an older adult was in a same-sex marriage or same-sex cohabitation for at least two waves of the HRS, the respondent was categorized as a sexual minority. This two-wave criterion was used to reduce the chance of misclassifying a heterosexual older adult as a sexual minority due to reporting error in the spouse's gender in one wave of the survey. Following these procedures, the sample included 75 sexual minority older adults who completed the COVID-19 module of the HRS, 52 of which also completed the leave-behind questionnaire. The sociodemographic characteristics of the 2020 COVID-19 module sample were compared to the broader group of sexual minority older adults in the HRS core survey; differences were found to be minimal. Thus, sexual minority older adults in this study were similar in terms of sociodemographic characteristics to the sexual minority older adults in the HRS core survey.

Measures of Mental Health and Well-Being

To explore mental health and well-being during the pandemic from multiple domains, seven indicators were created from data included in the HRS: depression, concern about COVID-19, pandemic emotional stress, change in loneliness, change in in-person contacts, change in income, and change in work. For depression, the HRS questionnaire included the 8-item Center for Epidemiological Depression (CES-D) scale. Respondents reported whether or not they experienced eight specific symptoms (e.g., "I felt depressed," "I felt everything I did was an effort," and "My sleep was restless") for "much of the past week." To create a total depressive symptom score, positive symptoms were reverse-coded and all symptoms were summed; the final scores ranged from 0 to 8. The internal consistency of the CES-D scale was found to be acceptable. Cronbach's alpha for this scale was 0.81 for respondents who completed the core phone interview (N = 3217) and 0.79 for respondents who completed both the phone interview and the leave-behind questionnaire (N = 2129). The summary depression score was created only for respondents who had valid data on at least six of the eight CES-D symptom items. Depressive symptoms were treated as a continuous variable in the statistical analysis.

Concern about COVID-19 was measured with the following single-item question: "Overall, on a scale from 1-10, where one is the least concerned and ten is the most concerned, how concerned are you about the coronavirus pandemic?" Pandemic emotional stress was measured using respondents' ratings on the following two questions: "Since the coronavirus pandemic, how often did you feel emotionally overwhelmed?" and "Since the coronavirus pandemic, how often did you feel stressed?" Answers included

hardly ever or never (= 0), sometimes (= 1), and often (= 2). The two questions were highly correlated with a correlation coefficient of 0.75. As such, the two items were summed to create a pandemic emotional stress scale. The pandemic emotional stress scale ranged from 0 to 4 with a good internal consistency (Cronbach's alpha = 0.85). Change in loneliness was measured by a single-item question that asked respondents to compare their perception of loneliness during the pandemic to before the outbreak. Answer categories for this question were "about the same," "less so," or "more so." Change in not enough in-person contact was separately measured through a similar, single-item question that asked respondents to compare their perception of "not getting enough in-person contact with people outside the household" during the pandemic to before the outbreak. Answer categories for this question again were "about the same," "less so, " or "more so." Lastly, respondents reported whether their income experienced "no change," "went up," or "went down" and if their work had changed owing to the pandemic, that is, "no change," "not working before the pandemic," or "being affected by the pandemic."

Covariates

The statistical analyses included a wide range of covariates. First, demographic characteristics including age, gender, and race/ethnicity (coded as Non-Hispanic White, Non-Hispanic Black, Hispanic, and Others) were included as covariates. To capture the potential non-linear effect of age, an age-squared term was also included. Second, the analyses included several covariates to account for variations in family structure and socioeconomic resources, including education (coded as less than high school, high school, some college, or college and above), household income (coded as less than $5000 per year, $5000-$24,999 per year, $25,000-$49,999 per year, $50,000-$99,999 per year, or above $100,000 per year), marital status (i.e., currently married or not), employment status (coded as employed, unemployed, or retired), number of adults in the household, and number of children in the household. Finally, self-rated health was included to control for older adults' general health status. The one-item assessment of self-rated health (SRH) is a global measure of health status that is widely used in many surveys. Respondents were asked "Would you say your health is excellent, very good, good, fair, or poor?" Answers ranged from 1 (excellent) to 5 (poor).

Analytical Strategy

In the analysis, multiple imputations were used to deal with missing values. The rationale for multiple imputations is to use the distribution of the observed data to estimate a set of plausible values for the missing data. In this method, multiple sets of imputed data were created and analyzed to obtain a set of parameter estimates, which were then combined to obtain the overall estimates (Allison, 2001). Because missing values occurred in several of the variables in the present study, the study used multiple imputations with chained equations to generate imputations based on a set of imputation models, one for each variable with missing values (White et al., 2011). Multiple imputations with chained equations were able to handle different variable types because each variable was imputed using its own imputation model. Although not all variables in the study had missing values, the chained equations approach included all variables (dependent and independent) in the estimations of missing values.

Once missing values were dealt with, the first step in the analysis was to estimate weighted descriptive statistics for both heterosexual and sexual minority older adults. All bivariate analyses were adjusted for multiple comparisons using the Bonferroni correction. Next, a series of weighted regressions were used to link each measure of well-being and changes in experience to respondents' sexual minority status, accounting for covariates. Logistic regression was used for binary outcomes, OLS regression was used for continuously measured outcomes, and multinomial regression was used for categorical outcomes. Because the questions about pandemic emotional stress, change in loneliness and change in in-person contact were asked only in the leave-behind questionnaire; the sample size for the analysis of these three indicators was reduced to include only those who completed the leave-behind questionnaire (N = 2129). All regressions were properly weighted.

Results

Table 1 shows the weighted descriptive statistics of the older adults in the analytical sample. Compared to heterosexuals, sexual minority older adults were younger (heterosexual = 69.22, sexual minority = 61.73; $p = 0.01$), were more likely to be racial and ethnic minorities (57.7%, Non-Hispanic White for heterosexual and 46.7%, Non-Hispanic White for sexual minority; $p = 0.02$), and had a higher income (13.4%, $50,000 or more for heterosexual and 17.4%, $50,000 or more for sexual minority; $p = 0.01$). Table 2 shows the mental health and well-being of older adults during the COVID-19 pandemic by their sexual minority status, with considerable disparities evident. For example, sexual minority older adults were much more concerned about COVID-19 than their heterosexual counterparts (7.77 for heterosexual and 8.44 for sexual minority; $p = 0.042$) and scored higher on the pandemic emotional stress scales (1.25 for heterosexual and 1.80 for sexual minority; $p = 0.014$). Older adult sexual minorities were also more likely to report an increase in loneliness than heterosexuals (25.9% for heterosexual and 34.6% for sexual minority; $p = 0.049$). Moving to changes in income and work, nearly 45% of sexual minority older adults reported their work was affected by the pandemic compared to only 28.4% of heterosexual older adults ($p = 0.007$). While older adult sexual minorities were also more likely to report a decrease in

Table 1. Descriptive Statistics of Older Adults from the 2020 Health and Retirement Study COVID-19 Module.

	Full Sample	By Sexual Minority Status		p value
		Heterosexual	Sexual Minority	
Sample Size	3217	3142	75	-
Female	59.3%	59.4%	56.0%	1.00
Age	69.05 (10.50)	69.22 (10.48)	61.73 (8.59)	.01*
Married	53.7%	53.8%	46.7%	1.00
Race				.02
Non-Hispanic White	57.5%	57.7%	46.7%	
Non-Hispanic Black	21.0%	21.1%	13.3%	
Hispanic	16.0%	15.7%	29.3%	
Others	5.6%	5.4%	10.7%	
Education				1.00
< High school	15.1%	15.0%	17.3%	
High school	31.0%	31.1%	18.7%	
Some college	26.3%	26.2%	29.3%	
College and above	27.4%	27.2%	34.7%	
Employment				.01*
Employed	27.6%	27.5%	32.0%	
Unemployed	5.6%	5.5%	10.7%	
Retired	48.9%	49.5%	24.0%	
Others/Unknown	17.9%	17.5%	33.3%	
Personal Annual Income				.01*
0–4999	45.8%	46.3%	25.3%	
5000–24,999	6.8%	6.7%	10.7%	
25,000–49,999	8.3%	8.3%	8.0%	
50,000–99,999	7.9%	7.7%	14.7%	
≥100,000	5.7%	5.7%	2.7%	
Unknown	25.5%	25.2%	38.7%	
Self-rated health	3.08	3.07	3..17	1.00
Number of children in household	0.25 (0.98)	0.25 (0.98)	0.27 (0.86)	1.00
Number of adults in household	2.43 (1.71)	2.42 (1.69)	2.88 (2.08)	.60

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

income during the pandemic than heterosexuals (16.5% for heterosexual and 27.0% for sexual minority), the difference was not statistically significant.

Table 3 shows the results of the weighted OLS regressions that linked sexual minority status to the three measures of mental health: depression, concern about COVID-19, and pandemic emotional stress. After accounting for differences due to a wide range of sociodemographic characteristics, Table 3 still shows considerable disparities in mental health by sexual minority status. Older adult sexual minorities were more concerned about COVID-19 (coeff. = 0.912, $p = 0.008$) and felt more pandemic emotional stress than heterosexuals (coeff. = 0.555, $p = 0.042$). However, there was no statistical difference in depression between sexual minority older adults and heterosexual older adults. The coefficients of a few covariates in Table 3 are worth mentioning. Compared to males, females had higher depression scores (coeff. = 0.249, $p = 0.002$), more concern about COVID-19 (coeff. = 0.620, $p < 0.001$), and a greater level of pandemic emotional stress

(coeff. = 0.609, $p < 0.001$). For race/ethnicity, being Non-Hispanic Black or Hispanic was associated with more concern about COVID-19 (coeff. = 1.490, $p < 0.001$; coeff. =1.056, $p < 0.001$). Better self-rated health was associated with lower depression scores (coeff. = -0.598, $p < 0.001$) and less pandemic emotional stress (coeff. = -0.171, $p < 0.001$), but not concern about COVID-19.

Table 4 shows the results of the multinominal logistic regressions that linked sexual minority status to four measures of well-being during the pandemic: changes in income, work, in-person contacts, and loneliness. Although sexual minority older adults and heterosexuals differed in their likelihood of changes in income and loneliness, the differences were fully explained by sociodemographic characteristics. However, the differences by sexual minority status for changes in work and not enough in-person contacts remained even after covariates were included. Older adult sexual minorities were more likely to have their work affected by the pandemic (RRR = 2.415, 95% confidence interval = 1.082 to 5.393, $p = 0.031$) and were

Table 2. Descriptive Statistics of Older Adults' Mental Health and Well-Being by Sexual Minority Status from the 2020 Health and Retirement Study COVID-19 Module.

		By Sexual Minority Status		
	Full Sample	Heterosexual	Sexual Minority	p value
Sample Size	3217	3142	75	-
Mental Health				
Depression	1.43 (1,99)	1.42 (1.99)	1.67 (2.26)	1.00
Concern about COVID-19	7.79 (2.66)	7.77 (2.67)	8.44 (2.02)	.042*
Pandemic emotional stress	1.26 (1.24)	1.25 (1.23)	1.80 (1.32)	.014*
Changes in Well-Being				
Income changes				.42
About the same	78.8%	79.0%	70.3%	
Went up	4.5%	4.5%	2.7%	
Went down	16.8%	16.5%	27.0%	
Work changes				.007**
Yes	28.8%	28.4%	48.0%	
No	45.1%	45.2%	40.0%	
Not working/Retired	26.1%	26.4%	12.0%	
Loneliness changes				.049*
About the same	68.6%	68.9%	55.8%	
Less so	5.3%	5.3%	9.6%	
More so	26.1%	25.9%	34.6%	
Changes in not getting enough in-person contact				1.00
About the same	50.7%	50.9%	41.2%	
Less so	10.4%	10.4%	9.8%	
More so	38.9%	38.6%	49.0%	

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

more likely to report that not getting enough in-person contact increased during the pandemic (RRR = 2.817, 95% confidence interval = 1.183 to 6.706, *p* = 0.019). Again, several covariates that were associated with changes in well-being during the pandemic are worth noting. For example, being female was associated with an increase in not getting enough in-person contact during the pandemic (RRR = 1.504, 95% confidence interval = 1.144 to 1.977, *p* = 0.003) and feeling more loneliness (RRR = 1.632, 95% confidence interval = 1.213 to 2.196, *p* = 0.001). Higher education was associated with an increase in not getting enough in-person contact.

Finally, because it is possible that some of the well-being outcomes (i.e., changes in income, work, not getting enough in-person contact, and loneliness) may also explain the associations found between sexual minority status and mental health (i.e., depression, COVID-19 concern, and pandemic emotional stress), two additional sensitivity analyses were performed that included the well-being variables in the regression model. The sensitivity analyses found the association between COVID-19 concern and sexual minority status was not explained by the inclusion of the well-being variables, but the association between pandemic emotional stress and sexual minority status was explained by two of the well-being variables: changes in not getting enough in-person contact and changes in loneliness.

Discussion

The present study is one of the first studies of mental health and well-being during the COVID-19 pandemic that uses a nationally representative sample of sexual minority older adults and therefore provides new and critical insight into the pandemic experiences of an under-researched population. Taken together, the results of the weighted regressions make clear that compared to their heterosexual counterparts, sexual minority older adults had poorer mental health outcomes and their lives were more likely to be disrupted by the COVID-19 pandemic, specifically at work and socially. This study has three key findings. First, on average, sexual minority older adults reported poorer mental health and well-being during the pandemic than heterosexual older adults, and most of the associations were not explained by differences in sociodemographic characteristics. Second, sexual minority older adults experienced more difficulty socially than their heterosexual counterparts during the pandemic, as manifested by a greater decline in-person contact. Importantly, the differences in well-being and mental health that were found in the analysis cannot be fully explained by differences in age, marital status, racial-ethnic background, household composition, and self-rated health. However, somewhat surprisingly, sexual minority

Table 3. Results from Weighted OLS Regressions Linking Sexual Minority Status to Older Adults' Mental Health During the COVID-19 Pandemic.

	Depression	Concern about COVID-19	Pandemic emotional stress
	Coeff. (SE) (95% CI) *p* value	Coeff. (SE) (95% CI) *p* value	Coeff. (SE) (95% CI) *p* value
Sexual Minority	.099 (.293) (−.475, .673) *p* = .736	.912** (.344) (.238, 1.586) *p* = .008	.555* (.276) (.016, 1.094) *p* = .042
Age	.028 (.061) (-.092, .148) *p* = .648	.152 (.104) (-.052, .356) *p* = .147	.032 (.046) (-.058, .122) *p* = .481
Age (squared)	−.000 (.000) (.000, .000) *p* = .524	−.000 (.001) (−.002, .002) *p* = .166	−.000 (.000) (.000, .000) *p* = .323
Female	.249** (.081) (.090, .408) *p* = .002	.620*** (.135) (.355, .885) *p* < .001	.609*** (.066) (.480, .738) *p* < .001
Married	−.472*** (.099) (−.666, −.278) *p* < .001	.047 (.149) (−.245, .339) *p* = .753	−.099 (.079) (−.254, .056) *p* = .208
Race (ref: Non-Hispanic White)			
Non-Hispanic Black	.071 (.127) (−.178, .320) *p* = .573	1.490*** (.166) (1.165, 1.815) *p* < .001	−.173 (.090) (−.349, .003) *p* = .053
Hispanic	−.014 (.147) (−.302, .274) *p* = .922	1.056*** (.207) (.650, 1.462) *p* < .001	.258* (.126) (.011, .505) *p* = .042
Others	.264 (.172) (−.073, .601) *p* = .125	.622* (.267) (.099, 1.145) *p* = .020	.149 (.194) (−.231, .529) *p* = .445
Education (ref: < High school)			
High school	−.261 (.158) (−.571, .049) *p* = .099	.315 (.243) (−.161, .791) *p* = .196	.040 (.127) (−.209, .289) *p* = .747
Some college	−.207 (.155) (−.511, .097) *p* = .183	.130 (.228) (−.317, .577) *p* = .569	−.155 (.118) (−.386, .076) *p* = .189
College and above	−.142 (.161) (−.458, .174) *p* = .379	.002 (.241) (−.470, .474) *p* = .994	−.219 (.124) (−.462, .024) *p* = .079
Employment (ref: Unemployed)			
Employed	−.271 (.186) (−.636, .094) *p* = .146	−.065 (.288) (−.629, .499) *p* = .822	.085 (.185) (−.278, .448) *p* = .645
Others	.358 (.226) (−.085, .801) *p* = .113	−.218 (.316) (−.837, .401) *p* = .489	−.083 (.186) (−.448, .282) *p* = .656
Retired	−.237 (.195) (−.619, .145) *p* = .224	.141 (.305) (−.457, .739) *p* = .643	−.205 (.178) (−.554, .144) *p* = .250
Personal Annual Income (ref: 0–4999)			
5000–24,999	−.304 (.179) (−.655, .047) *p* = .090	.028 (.317) (−.593, .649) *p* = .931	.051 (.176) (−.294, .396) *p* = .770
25,000–49,999	−.257 (.182) (−.614, .100) *p* = .159	−.352 (.286) (−.913, .209) *p* = .219	−.398** (.137) (−.667, −.129) *p* = .004
50,000–99,999	−.414** (.149) (−.706, −.122) *p* = .006	−.013 (.251) (−.505, .479) *p* = .959	−.026 (.143) (−.306, .254) *p* = .858
≥ 100,000	−.470** (.158) (−.780, −.160) *p* = .003	−.462 (.303) (−1.056, .132) *p* = .127	−.205 (.148) (−.495, .085) *p* = .166
Unknown	−.128 (.118) (−.359, .103) *p* = .277	−.086 (.175) (−.429, .257) *p* = .624	−.090 (.093) (−.272, .092) *p* = .333
Self-rated health	−.598*** (.049) (−.694, −.502) *p* < .001	−.130 (.071) (−.269, .009) *p* = .070	−.171*** (.035) (−.240, −.102) *p* < .001
Number of children in household	−.017 (.045) (−.105, .071) *p* = .707	.059 (.072) (−.082, .200) *p* = .418	.042 (.039) (−.034, .118) *p* = .281
Number of adults in household	.019 (.029) (−.038, .076) *p* = .516	−0.38 (.041) (−.460, −.300) *p* = .347	−.003 (.024) (−.050, .044) *p* = .889

Note. * *p* < .05, ** *p* < .01, *** *p* < .001. Because the questions that were used to calculate the pandemic emotional stress scale were only in the leave-behind questionnaire, the sample size dropped to 2129 when pandemic emotional stress was the outcome variable.

Table 4. Results from Weighted Multinomial Logistic Regressions Linking Sexual Minority Status to Older Adults' Changes in Well-Being During the COVID-19 Pandemic.

| | Income changes (ref: about the same) | | Work changes (ref: about the same) | | Changes in not getting enough in-person contact (ref: about the same) | | Loneliness changes (ref: about the same) | |
| | Went down | Went up | Not working | Yes | Less so | More so | Less so | More so |
	RRR (95% CI) p value	RRR (95% CI) p value	RRR (95% CI) p value	RRR (95% CI) p value	RRR (95% CI) p value	RRR (95% CI) p value	RRR (95% CI) p value	RRR (95% CI) p value
Sexual Minority	1.188 (.488, 2.891) p = .703	.610 (.128, 2.904) p = .534	.246 (.057, 1.061) p = .060	2.415* (1.082, 5.393) p = .031	.649 (.187, 2.248) p = .496	2.817* (1.183, 6.706) p = .019	1.111 (.322, 3.834) p = .868	1.681 (.717, 3.941) p = .232
Age	1.468* (1.076, 2.004) p = .015	.072 (.479, 1.084) p = .116	.793* (.629, 999) p = .050	1.544* (1.09, 2.169) p = .012	.963 (.732, 1.265) p = .785	1.146 (.921, 1.426) p = .221	.984 (.671, 1.444) p = .938	1.053 (.858, 1.293) p = .617
(squared)	.997* (.995, 999) p = .014	1.002 (.999, 1.084) p = .127	1.001 (.999, 1.003) p = .085	.996** (.994, 999) p = .009	1.000 (.998, 1.002) p = .780	.998 (.997, 1.001) p = .164	1.000 (.997, 1.002) p = .988	.999 (.998, 1.001) p = .548
Female	.821 (.573, 1.176) p = .283	1.160 (.631, 2.129) p = .632	1.050 (.781, 1.411) p = .744	1.054 (.715, 1.555) p = .788	.845 (.550, 1.297) p = .442	1.504** (1.144, 1.977) p = .003	1.066 (.659, 1.722) p = .793	1.632** (1.213, 2.196) p = .001
Married	.942 (.628, 1.411) p = .770	2.250* (1.054, 4.800) p = .036	.673* (.481, .942) p = .021	.682 (.415, 1.120) p = .131	.934 (.572, 1.527) p = .787	.890 (.655, 1.209) p = .458	1.251 (.637, 2.455) p = .514	.679* (.486, .948) p = .023
Race (ref: Non-Hispanic White)								
Non-Hispanic Black	.870 (.552, 1.373) p = .551	1.060 (.527, 2.132) p = .868	.584 * (.382, .892) p = .013	.976 (.565, 1.685) p = .933	1.109 (.649, 1.892) p = .704	.583* (.399, .852) p = .005	2.213* (1.111, 4.408) p = .024	.709 (.472, 1.065) p = .098
Hispanic	2.001* (1.173, 3.413) p = .011	1.062 (.397, 2.851) p = .904	1.081 (.655, 1.782) p = .759	1.261 (.692, 2.297) p = .448	1.564 (.881, 2.773) p = .126	.641 (.404, 1.016) p = .059	1.830 (.899, 3.726) p = .096	.755 (.469, 1.216) p = .249
Others	.585 (.216, 1.586) p = .293	0.158* (.033, .746) p = .020	.764 (.313, 1.867) p = .556	.488 (.200, 1.193) p = .116	.519 (.204, 1.319) p = .169	.427** (.232, .786) p = .006	1.347 (.393, 4.611) p = .635	.430 (.182, 1.016) p = .055
Education (ref: < High school)								
High school	.716 (.363, 1.412) p = .335	.251* (.084, .756) p = .014	.845 (.495, 1.441) p = .536	.793 (.379, 1.658) p = .538	.569 (.257, 1.257) p = .164	4.862*** (2.861, 8.259) p < .001	.363 (.129, 1.019) p = .054	1.950* (1.129, 3.367) p = .017
Some college	.570 (.299, 1.085) p = .087	0.315* (.126, .789) p = .014	.840 (.521, 1.353) p = .474	.499 (.244, 1.023) p = .058	1.040 (.552, 1.960) p = .903	1.889* (1.135, 3.143) p = .014	.740 (.368, 1.491) p = .401	1.103 (.652, 1.867) p = .713
College and above	.647 (.337, 1.242) p = .191	.436 (.164, 1.158) p = .096	1.039 (.628, 1.715) p = .882	.664 (.322, 1.371) p = .269	.975 (.493, 1.930) p = .943	2.703*** (1.606, 4.549) p < .001	.378* (.166, .859) p = .020	1.146 (.667, 1.969) p = .619
Employment (ref: Employed)								
Unemployed	.268*** (.132, .555) p < .001	.321* (.120, .857) p = .023	NA	NA	.665 (.268, 1.650) p = .379	.878 (.421, 1.832) p = .703	.383* (.153, .954) p = .039	1.177 (.556, 2.488) p = .669
Retired	.182*** (.081, .406) p < .001	.076 *** (.023, .249) p < .001	NA	NA	.616 (.234, 1.621) p = .327	.958 (.449, 2.044) p = .913	.744 (.257, 2.154) p = .586	1.541 (.695, 3.417) p = .286
Others	.148** (.071, .309) p < .001	.111** (.038, .324) p < .001	NA	NA	.355* (.146, .862) p = .022	1.130 (.556, 2.299) p = .734	.305* (.098, .946) p = .040	1.317 (.628, 2.762) p = .466
Personal Annual Income (ref: 0–4999)								
5000–24,999	2.289 (.895, 5.853) p = .084	.373 (.093, 1.488) p = .162	.295 (.057, 1.521) p = .145	8.858*** (3.424, 22.91) p < .001	.654 (.195, 2.202) p = .494	1.082 (.523, 2.235) p = .831	1.526 (.331, 7.051) p = .588	1.301 (.600, 2.822) p = .505
25,000–49,999	1.835 (.876, 3.844) p = .107	1.268 (.381, 4.211) p = .698	.223* (.077, .642) p = .005	3.584*** (1.775, 7.234) p < .001	.399 (.131, 1.220) p = .107	.822 (.474, 1.428) p = .488	.396 (.115, 1.370) p = .144	.873 (.471, 1.618) p = .668
50,000–99,999	4.039*** (1.980, 8.239) p < .001	2.684 (.969, 7.432) p = .057	.519 (.226, 1.189) p = .121	5.517*** (2.689, 11.31) p < .001	.432 (.137, 1.356) p = .151	1.172 (.703, 1.954) p = .542	.324 (.084, 1.252) p = .102	1.276 (.737, 2.207) p = .383
≥ 100,000	2.445** (1.036, 5.772) p = .041	1.111 (.333, 3.709) p = .863	.774 (.231, 2.596) p = .679	5.341*** (2.627, 10.85) p < .001	.704 (.233, 2.130) p = .535	.718 (.402, 1.283) p = .264	2.370 (.523, 10.72) p = .262	1.172 (.620, 2.217) p = .624
Unknown	2.009** (1.192, 3.387) p = .009	1.068 (.436, 2.614) p = .884	1.104 (.751, 1.621) p = .613	3.332*** (1.967, 5.646) p < .001	.760 (.418, 1.381) p = .368	1.245 (.869, 1.783) p = .232	.734 (.330, 1.635) p = .451	1.234 (.844, 1.805) p = .277
Self-rated health	0.987 (.825, 1.179) p = .886	1.183 (.908, 1.542) p = .211	.852* (.736, .987) p = .033	1.001 (.823, 1.223) p = .925	.769* (.615, .962) p = .022	1.128 (.976, 1.303) p = .101	1.097 (.817, 1.473) p = .536	.976 (.847, 1.124) p = .738
Number of children in household	.945 (.797, 1.121) p = .521	1.094 (.828, 1.445) p = .526	.943 (.780, 1.141) p = .549	.994 (.809, 1.221) p = .955	.823* (.679, .999) p = .049	.900 (.734, 1.103) p = .312	1.019 (.851, 1.219) p = .836	1.001 (.801, 1.249) p = .994
Number of adults in household	.997 (.859, 1.157) p = .973	.891 (.690, 1.151) p = .377	1.029 (.906, 1.169) p = .659	.924 (.785, 1.088) p = .349	1.101 (.952, 1.273) p = .193	1.107 (.999, 1.227) p = .051	1.064 (.911, 1.243) p = .435	.890 (.779, 1.016) p = .086

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Because the questions on changes in not getting enough in-person contact and changes in loneliness were only in the leave-behind questionnaire, the sample size dropped to 2129 when these two variables were the outcome variables.

older adults did not differ from heterosexual older adults in their levels of depression.

To date, many studies from different countries and with different sampling strategies, sample sizes, and research designs have investigated the well-being and mental health of older populations during the pandemic. Some studies have found that older adults have a lower prevalence of depression symptoms, psychological distress, and anxiety compared to younger adults (e.g., Arpino et al., 2021; Bohn et al., 2021; Kobayashi et al., 2021; Taylor et al., 2021). However, variations in mental health and well-being in the older adult population has been understudied. In particular, how sexual minorities' well-being and mental health has differed during the pandemic, if at all, has been less clear in the existing literature. Using nationally representative data, this is one of the few studies that reveals that sexual minority older adults have born a disproportionate mental and social burden during the COVID-19 pandemic compared to their heterosexual counterparts in the United States. The study's findings highlight the health inequities and social injustices that sexual minority older adults face in the United States during an emergency like the COVID-19 pandemic. Of course, the relationships found in this study are not causal, and thus, caution must be taken with interpretation. Future studies that investigate whether pandemics worsen inequalities for sexual minorities would provide firmer ground for interpretation. Notwithstanding, findings from this study still add to the growing literature on health disparities and aging populations in times of a national, public health crisis (Walubita et al., 2021) and a small but growing literature on the health and well-being of sexual minority adults worldwide (e.g., Barrientos et al., 2021; Hafford-Letchfield et al., 2021; Westwood et al., 2021).

It is worth considering why sexual minority older adults' pandemic emotional distress was not explained by sociodemographic factors. Descriptive statistics suggest that sexual minority older adults in this sample were also more likely to be in other socially disadvantaged categories, for example, a racial or ethnic minority or unmarried. As such, this finding may underscore the relatively powerful disadvantage that being a sexual minority and a racial and ethnic minority confers. Further, although the descriptive statistics find that consistent with previous research (Fine, 2015; Herek et al., 2010), sexual minority older adults have more education, this educational advantage may not be able to fully compensate for the structural and institutional oppressions that sexual minority older adults experience in everyday life, such as the lack of legal protection from discrimination in housing, credit, and employment. In other words, among sexual minority older adults, education may be less protective of health and well-being than it is for heterosexuals (Zhang et al., 2020) and in this study, may have helped drive the observed disparities. Future studies that investigate such mechanisms further will advance the understanding of how sexual minority status may translate to poorer well-being and

heightened mental health inequities during crises like the COVID-19 pandemic.

It is also worth considering why sexual minority older adults experienced more COVID-19 concern and pandemic emotional stress during the pandemic, but not more depression. One potential explanation is that sexual minority older adults managed to avoid depression during the pandemic because they have coping strategies in place to deal with emergencies and unexpected events, like the concept of "crisis competency" developed by Kimmel (1978). This interpretation aligns with prior research that finds that coping among sexual minority populations has led to variations in successful aging across physical, mental, emotional, and social domains (Van Wagenen et al., 2013). Seen this way, the negative impact of the COVID-19 pandemic on sexual minority older adults is real, but also points to a certain degree of resilience in this minority population.

As always, the research undertaken is not without limitations. First, the analysis in this study was cross-sectional and therefore, as noted earlier, the results cannot be interpreted as causal. Second, the total number of sexual minority older adults in the HRS sample was relatively small, leaving the study without enough statistical power to incorporate an intersectional framework for the analysis of disparities. This issue is common for many publicly funded, nationally representative datasets, but is also a limitation that must be corrected to understand the unique experiences of minority, marginalized populations. Without better data, there cannot be an evidence-informed and equitable response to the COVID-19 pandemic and future crises. Third, although the interpretation of this study's results has drawn reasonable connections between the findings and extant evidence of factors that impact the health of sexual minority older adults, the empirical analysis did not directly assess experiences, such as exposure to structural stigma. Future qualitative work that directly assesses experiences may help to elucidate the causal pathways that this study can only suggest as associations. Finally, many of the HRS's COVID-19 related measures have not been previously validated and many of them are single-item measures. However, given the quickly evolving nature of the COVID-19 pandemic and its status as a public health emergency, there was not enough time for the survey team to validate instruments per the usual procedure without unreasonably delaying the collection and release of data to researchers for analysis. Future studies should validate these measures to provide firmer estimates and clearer understanding of the social and mental health consequences of the COVID-19 pandemic on older adults.

Taken together, the study's findings highlight several important implications for practice and public policy concerning sexual minority older adults. First, the findings underscore the critical importance of including questions about sexual orientation and gender identity in large-scale surveys and government data collection efforts, a current shortcoming that scholars and advocates have asked public officials to

address (e.g., Akre et al., 2021; Martino et al., 2021). Currently, data on the experience of sexual minorities during the pandemic is sparse. New data with larger sample sizes and detailed measures will allow for a better understanding of the lives and well-being of sexual minority older adults during this pandemic as well as any future public health crisis. Second, the finding that sexual minority older adults experienced a greater reduction in in-person social contact during the pandemic highlights the need for policy attention to sexual minorities' somewhat unique social support needs. Because sexual minority older adults may not feel comfortable using existing support services and networks that are largely populated by heterosexuals, it may be necessary to create targeted service programs or dedicated on-line support groups for sexual minority older adults. Such programs and services could collaborate with local community organizations that represent sexual minorities to improve outreach and effectively meet social needs. Finally, the study found that compared to other adults, sexual minority older adults were more concerned about COVID-19 and its potential impact on their lives. As such, governments, social service organizations, and healthcare providers, particularly those in cities or regions that have a higher proportion of sexual minorities, would do well to put extra effort around providing up-to-date information on services and support to sexual minority older adults, thus easing these older adults' concerns and worries in times of crisis.

Conclusion

Since the outbreak of the coronavirus disease, minority and marginalized older adults have faced greater risk of COVID-19 exposure, infection, and complications, in large part because of the daily realities of historical and ongoing oppression and social injustice (Walubita et al., 2021). A growing number of studies have also demonstrated that the pandemic has had far-reaching consequences beyond the physical effects of the disease itself. Unfortunately, one such consequence is the disproportionate, negative effect of the COVID-19 pandemic on sexual minority older adults, a population that is often overlooked in both LGBTQ literature and aging studies (Fredriksen-Goldsen & Muraco, 2010). This study is one of few that examines the well-being of diverse populations during the pandemic, and the first to do so using a nationally representative sample. By analyzing a nationally representative sample from the HRS that includes data collected during the pandemic (2020), the study finds that compared to heterosexual older adults, sexual minority older adults experienced more concern about COVID-19 and emotional stress and were more likely to reduce their in-person contacts, and also had a higher chance of income and work disruptions. Although the differences in income and work disruptions were explained by sociodemographic characteristics, the psychosocial outcomes were not. These findings suggest two things. First, again it is clear that

COVID-19 does not impact all populations equally. In this case, sexual minority older adults are a disadvantaged population that is disproportionately affected and, in order to achieve equitable well-being, deserve focused policy attention. Second, fully understanding the disproportionate impacts of a public health crisis like COVID-19 requires better data. Publicly funded data collection efforts must include questions about sexual orientation or gender identity so that sufficient sample sizes are available to unpack sexual minorities' experiences during times of public health crises.

ORCID iD

Jen-Hao Chen ⓘ https://orcid.org/0000-0002-1522-3616

References

Akré, E. R., Anderson, A., Stojanovski, K., Chung, K. W., VanKim, N. A., & Chae, D. H. (2021). Depression, anxiety, and alcohol use among LGBTQ+ people during the COVID-19 pandemic. *American Journal of Public Health*, *111*(9), 1610–1619. https://doi.org/10.2105/AJPH.2021.306394

Allison, P. D. (2001). *Missing data*. Sage publications.

American Psychological Association. (2013). *Lesbian, gay, bisexual and transgender aging*. https://www.apa.org/pi/lgbt/resources/aging

American Psychological Association. (2021). *Guidelines for psychological practice with sexual minority persons*. American Psychological Association.

Arpino, B., Pasqualini, M., Bordone, V., & Solé-Auró, A. (2021). Older people's nonphysical contacts and depression during the COVID-19 lockdown. *The Gerontologist*, *61*(2), 176–186. https://doi.org/10.1093/geront/gnaa144

Ayhan, C. H. B., Bilgin, H., Uluman, O. T., Sukut, O., Yilmaz, S., & Buzlu, S. (2020). A systematic review of the discrimination against sexual and gender minority in health care settings. *International Journal of Health Services*, *50*(1), 44–61. https://doi.org/10.1177/0020731419885093

Barrientos, J., Guzmán-González, M., Urzúa, A., & Ulloa, F. (2021). Psychosocial impact of COVID-19 pandemic on LGBT people in Chile. *Sexologies*, *30*(1), e35–e41. https://doi.org/10.1016/j.sexol.2020.12.006

Beach, L. B., Elasy, T. A., & Gonzales, G. (2018). Prevalence of self-reported diabetes by sexual orientation: Results from the 2014 behavioral risk factor surveillance system. *LGBT Health*, *5*(2), 121–130. https://doi.org/10.1089/lgbt.2017.0091

Bohn, L., Gomes, S., Neto, E. S. D. Q., Lage, A. C. S. D. S., de Freitas, M. D. D. B., Magalhães, F. D. P., Mota, J., & Soares

Miranda, L. (2021). Predictors of lower depression levels in older adults during COVID-19 lockdown. *Journal of Applied Gerontology.* Advance online publication. https://doi.org/10.1177/07334648211025116

Boyd, C. J., Veliz, P. T., Stephenson, R., Hughes, T. L., & McCabe, S. E. (2019). Severity of alcohol, tobacco, and drug use disorders among sexual minority individuals and their "not sure" counterparts. *LGBT Health*, *6*(1), 15–22. https://doi.org/10.1089/lgbt.2018.0122

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard university press.

Bronfenbrenner, U., & Ceci, S. J. (1994). Nature-nurture reconceptualized: A bioecological model. *Psychological Review*, *101*, 568–586. https://doi.org/10.1037/0033-295X.101.4.568

Caceres, B. A., Makarem, N., Hickey, K. T., & Hughes, T. L. (2019). Cardiovascular disease disparities in sexual minority adults: an examination of the behavioral risk factor surveillance system (2014-2016). *American Journal of Health Promotion*, *33*(4), 576–585. https://doi.org/10.1177/0890117118810246

Casey, L. S., Reisner, S. L., Findling, M. G., Blendon, R. J., Benson, J. M., Sayde, J. M., & Miller, C. (2019). Discrimination in the United States: Experiences of lesbian, gay, bisexual, transgender, and queer Americans. *Health Services Research*, *54*(Suppl 2), 1454–1466. https://doi.org/10.1111/1475-6773.13229

Centers for Disease Control and Prevention. (2021). *COVID data tracker.* https://covid.cdc.gov/covid-data-tracker/#datatracker-home

Chen, J.-H., & Shiu, C.-S. (2017). Sexual orientation and sleep in the US: A national profile. *American Journal of Preventive Medicine*, *52*(4), 433–442. https://doi.org/10.1016/j.amepre.2016.10.039

Choi, S.-W. E., & Yang, T.-C. (2021). Are older populations at a disadvantage? County-level analysis of confirmed COVID-19 cases in urban and rural America. *The Journals of Gerontology: Series B*, *76*(3), e93–e98. https://doi.org/10.1093/geronb/gbaa182

Evans-Polce, R. J., Veliz, P. T., Boyd, C. J., Hughes, T. L., & McCabe, S. E. (2020). Associations between sexual orientation discrimination and substance use disorders: Differences by age in US adults. *Social Psychiatry and Psychiatric Epidemiology*, *55*(1), 101–110. https://doi.org/10.1007/s00127-019-01694-x

Fine, L. E. (2015). Penalized or privileged? Sexual identity, gender, and postsecondary educational attainment. *American Journal of Education*, *121*(2), 271–297. https://doi.org/10.1086/679393

Fingerman, K. L., Ng, Y. T., Zhang, S., Britt, K., Colera, G., Birditt, K. S., & Charles, S. T. (2021). Living alone during COVID-19: Social contact and emotional well-being among older adults. *The Journals of Gerontology: Series B*, *76*(3), e116–e121. https://doi.org/10.1093/geronb/gbaa200

Fredriksen-Goldsen, K. I., Kim, H. J., Barkan, S. E., Muraco, A., & Hoy-Ellis, C. P. (2013). Health disparities among lesbian, gay male, and bisexual older adults: Results from a population-based study. *American Journal of Public Health*, *103*, 1802–1809. https://doi.org/10.2105/AJPH.2012.301110

Fredriksen-Goldsen, K. I., Kim, H. J., Shui, C., & Bryan, A. E. (2017). Chronic health conditions and key health indicators among lesbian, gay, and bisexual older US adults, 2013–2014. *American Journal of Public Health*, *107*(8), 1332–1338. https://doi.org/10.2105/AJPH.2017.303922

Fredriksen-Goldsen, K. I., & Muraco, A. (2010). Aging and sexual orientation: A 25-year review of the literature. *Research on Aging*, *32*(3), 372–413. https://doi.org/10.1177/0164027509360355

Gates, G. J. (2013). Geography of the LGBT population. In *International handbook on the demography of sexuality* (pp. 229–242). Springer.

Gonzales, G., & Henning-Smith, C. (2015). Disparities in health and disability among older adults in same-sex cohabiting relationships. *Journal of Aging and Health*, *27*(3), 432–453. https://doi.org/10.1177/0898264314551332

Hafford-Letchfield, T., Toze, M., & Westwood, S. (2021). Unheard voices: A qualitative study of LGBT+ older people experiences during the first wave of the COVID-19 pandemic in the UK. *Health & Social Care in the Community.* Advance online publication. https://doi.org/10.1111/hsc.13531

Harper, G. W., & Schneider, M. (2003). Oppression and discrimination among lesbian, gay, bisexual, and transgendered people and communities: A challenge for community psychology. *American Journal of Community Psychology*, *31*(3-4), 243–252. https://doi.org/10.1023/A:1023906620085

Hatzenbuehler, M. L. (2016). Structural stigma: Research evidence and implications for psychological science. *American Psychologist*, *71*(8), 742. https://doi.org/10.1177/09637214211043884

Herek, G. M., & Garnets, L. D. (2007). Sexual orientation and mental health. *Annual Review of Clinical Psychology*, *3*, 353–375. https://doi.org/10.1146/annurev.clinpsy.3.022806.091510

Herek, G. M., Norton, A. T., Allen, T. J., & Sims, C. L. (2010). Demographic, psychological, and social characteristics of self-identified lesbian, gay, and bisexual adults in a US probability sample. *Sexuality Research & Social Policy*, *7*(3), 176–200. https://doi.org/10.1007/s13178-010-0017-y

Holtgrave, D. R., Barranco, M. A., Tesoriero, J. M., Blog, D. S., & Rosenberg, E. S. (2020). Assessing racial and ethnic disparities using a COVID-19 outcomes continuum for New York State. *Annals of Epidemiology*, *48*(August), 9–14. https://doi.org/10.1016/j.annepidem.2020.06.010

Hsieh, N., & Shuster, S. M. (2021). Health and health care of sexual and gender minorities. *Journal of Health and Social Behavior*, *62*(3), 318–333. https://doi.org/10.1177/00221465211016436

Katz-Wise, S. L., & Hyde, J. S. (2012). Victimization experiences of lesbian, gay, and bisexual individuals: A meta-analysis. *Journal of Sex Research*, *49*(2-3), 142–167. https://doi.org/10.1080/00224499.2011.637247

Kcomt, L., Evans-Polce, R. J., Engstrom, C. W., West, B. T., Boyd, C. J., & McCabe, S. E. (2021). Moderate-to-severe tobacco use disorder and discrimination among US sexual minority older adults. *The Journals of Gerontology: Series B.* Advance online publication. https://doi.org/10.1093/geronb/gbab067

Kim, S. J., & Bostwick, W. (2020). Social vulnerability and racial inequality in COVID-19 deaths in Chicago. *Health Education & Behavior*, *47*(4), 509–513. https://doi.org/10.1177/1090198120929677

Kimmel, D. C. (1978). Adult development and aging: A gay perspective. *Journal of Social Issues*, *34*(3), 113–130. https://doi.org/10.1111/j.1540-4560.1978.tb02618.xd

King, S. D., & Richardson, V. E. (2017). Mental health for older LGBT adults. *Annual Review of Gerontology and Geriatrics*, *37*(1), 59–75. https://doi.org/10.1891/0198-8794.37.59

Kobayashi, L. C., O'Shea, B. Q., Kler, J. S., Nishimura, R., Palavicino-Maggio, C. B., Eastman, M. R., Vinson, Y. R., & Finlay, J. M. (2021). Cohort profile: The COVID-19 coping study, a longitudinal mixed-methods study of middle-aged and older

adults' mental health and well-being during the COVID-19 pandemic in the USA. *BMJ Open*, *11*(2), Article e044965. https://doi.org/10.1136/bmjopen-2020-044965

Lewis, D. C., Flores, A. R., Haider-Markel, D. P., Miller, P. R., Tadlock, B. L., & Taylor, J. K. (2017). Degrees of acceptance: Variation in public attitudes toward segments of the LGBT community. *Political Research Quarterly*, *70*(4), 861–875. https://doi.org/10.1177/1065912917717352

Mallory, C., Hasenbush, A., & Sears, B. (2015). *Discrimination and harassment by law enforcement officers in the LGBT community*. Los Angeles, California: Williams Institute. https://williamsinstitute.law.ucla.edu/publications/lgbt-discrim-law-enforcement/

Martino, R. J., Krause, K. D., Griffin, M., LoSchiavo, C., Comer-Carruthers, C., Karr, A. G., Bullock, A. F., & Halkitis, P. N. (2021). A nationwide survey of COVID-19 testing in LGBTQ+ populations in the United States. *Public Health Reports*, *136*(4), 493–507. https://doi.org/10.1177/00333549211018190

Martos, A. J., Wilson, P. A., Gordon, A. R., Lightfoot, M., & Meyer, I. H. (2018). "Like finding a unicorn": Healthcare preferences among lesbian, gay, and bisexual people in the United States. *Social Science & Medicine*, *208*(July), 126–133. https://doi.org/10.1016/j.socscimed.2018.05.020

Martos, A. J., Wilson, P. A., & Meyer, I. H. (2017). Lesbian, gay, bisexual, and transgender (LGBT) health services in the United States: Origins, evolution, and contemporary landscape. *PLOS One*, *12*(7), Article e0180544. https://doi.org/10.1371/journal.pone.0180544

Millett, G. A., Jones, A. T., Benkeser, D., Baral, S., Mercer, L., Beyrer, C., Honermann, B., Lankiewicz, E., Mena, L., Crowley, J. S., Sherwood, J., & Sullivan, P. S. (2020). Assessing differential impacts of COVID-19 on black communities. *Annals of Epidemiology*, *47*(July), 37–44. https://doi.org/10.1016/j.annepidem.2020.05.003

Movement Advancement Project. (2020). *The disproportionate impacts of COVID-19 on LGBTQ households in the US*. https://www.lgbtmap.org/file/2020-covid-lgbtq-households-report.pdf

Movement Advancement Project. (2021). *Nondiscrimination laws*. https://www.lgbtmap.org/equality-maps/non_discrimination_laws

Muraco, A., & Fredriksen-Goldsen, K. (2011). "That's what friends do": Informal caregiving for chronically ill midlife and older lesbian, gay, and bisexual adults. *Journal of Social and Personal Relationships*, *28*(8), 1073–1092. https://doi.org/10.1177/0265407511402419

Nelson, C. L., & Andel, R. (2020). Does sexual orientation relate to health and well-being? Analysis of adults 50+ years of age. *The Gerontologist*, *60*(7), 1282–1290. https://doi.org/10.1093/geront/gnz187

Newport, F., & Gates, J. G. (2015, March 20). *San Francisco metro area ranks highest in LGBT percentage*. https://news.gallup.com/poll/182051/san-francisco-metro-area-ranks-highest-lgbt-percentage.aspx

Orel, N. A. (2017). Families and support systems of LGBT elders. *Annual Review of Gerontology and Geriatrics*, *37*(1), 89–109. https://doi.org/10.1891/0198-8794.37.89

Patterson, C. J., Sepúlveda, M. J. E., & White, J. E. (2020). *Understanding the well-being of LGBTQI+ populations*. The National Academies Press. https://doi.org/10.17226/25877

Phillips, G. II, 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*(6), 279–282. https://doi.org/10.1089/lgbt.2020.0187

Smith, J., Fisher, G., Ryan, L., Clarke, P., House, J., & Weir, D. (2017). *Psychosocial and lifestyle questionnaire: 2006-2016*. Survey Research Center, Institute for Social Research.

Tai, D. B. G., Shah, A., Doubeni, C. A., Sia, I. G., & Wieland, M. L. (2021). The disproportionate impact of COVID-19 on racial and ethnic minorities in the United States. *Clinical Infectious Diseases*, *72*(4), 703–706. https://doi.org/10.1093/cid/ciaa815

Taylor, A. M., Page, D., Okely, J. A., Corley, J., Welstead, M., Skarabela, B., Redmond, P., Russ, T. C., & Cox, S. R. (2021). Impact of COVID-19 lockdown on psychosocial factors, health, and lifestyle in Scottish octogenarians: The Lothian Birth Cohort 1936 Study. *Plos One*, *16*(6), Article e0253153. https://doi.org/10.1371/journal.pone.0253153

Van Wagenen, A., Driskell, J., & Bradford, J. (2013). "I'm still raring to go": Successful aging among lesbian, gay, bisexual, and transgender older adults. *Journal of Aging Studies*, *27*(1), 1–14. https://doi.org/10.1016/j.jaging.2012.09.001

Walubita, T., Beccia, A., Boama-Nyarko, E., Goulding, M., Herbert, C., Kloppenburg, J., Mabry, G., Masters, G., McCullers, A., & Forrester, S. (2021). Aging and COVID-19 in minority populations: A perfect storm. *Current Epidemiology Reports*, *8*(2), 1–9. https://doi.org/10.1007/s40471-021-00267-4

Westwood, S., Hafford-Letchfield, T., & Toze, M. (2021). 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. *Journal of Women & Aging*. Advance online publication. https://doi.org/10.1080/08952841.2021.1965456

White, I. R., Royston, P., & Wood, A. M. (2011). Multiple imputation using chained equations: Issues and guidance for practice. *Statistics in Medicine*, *30*(4), 377–399. https://doi.org/10.1002/sim.4067

Williams Institute. (2020c, July). *Adult LGBT population in the United States*. https://williamsinstitute.law.ucla.edu/wp-content/uploads/LGBT-Adult-US-Pop-Jul-2020.pdf

Williams Institute. (2020b, May). *Economic vulnerabilities to COVID-19 among LGBT adults in California*. https://williamsinstitute.law.ucla.edu/publications/covid-economics-lgbt-ca/

Williams Institute. (2020a, April). *Vulnerabilities to COVID-19 among older LGBT adults in California*. https://williamsinstitute.law.ucla.edu/wp-content/uploads/Older-LGB-COVID-CA-Apr-2020.pdf

Williams Institute. (2021, May). *COVID-19 and LGBT adults ages 45 and older in the US*. https://williamsinstitute.law.ucla.edu/publications/covid-19-lgbt-45-and-older/

Zhang, Z., Solazzo, A., & Gorman, B. K. (2020). Education and health: The joint role of gender and sexual identity. *SSM-population Health*, *12*(December), Article 100668. https://doi.org/10.1016/j.ssmph.2020.100668