

Original quantitative research

Social isolation, loneliness and positive mental health among older adults in Canada during the COVID-19 pandemic

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Abstract

Introduction: Social isolation and loneliness are associated with poorer mental health among older adults. However, less is known about how these experiences are independently associated with positive mental health (PMH) during the COVID-19 pandemic.

Methods: We analyzed data from the 2020 and 2021 cycles of the Survey on COVID-19 and Mental Health to provide estimates of social isolation (i.e. living alone), loneliness and PMH outcomes (i.e. high self-rated mental health, high community belonging, mean life satisfaction) in the overall older adult population (i.e. 65+ years) and across sociodemographic groups. We also conducted logistic and linear regressions to separately and simultaneously examine how social isolation and loneliness are associated with PMH.

Results: Nearly 3 in 10 older adults reported living alone, and over a third reported feelings of loneliness due to the pandemic. When examined separately, living alone and loneliness were each associated with lower PMH. When assessed simultaneously, loneliness remained a significant independent factor associated with all three PMH outcomes (overall and across all sociodemographic groups), but living alone was only a significant factor for high community belonging in the overall population, for males and for those aged 65 to 74 years.

Conclusion: Overall, social isolation and loneliness were associated with poorer well-being among older adults in Canada during the pandemic. Loneliness remained a significant factor related to all PMH outcomes after adjusting for social isolation, but not vice versa. The findings highlight the need to appropriately identify and support lonely older adults during (and beyond) the pandemic.

Keywords: COVID-19, older adults, social isolation, living alone, loneliness, positive mental health

Introduction

The COVID-19 pandemic has had widespread negative effects on Canadians' mental health.^{1,2} Although older adults (i.e. 65+ years) appear to be doing comparatively better than younger age groups,^{1,3,4} the pandemic has still taken a toll on many older adults' mental health.⁵

For instance, in the spring of 2021, one-third (33%) of older adults reported that their mental health had worsened since the start of the pandemic.⁶ Moreover, in addition to lower mean levels of life satisfaction,¹ fewer older adults reported high self-rated mental health (SRMH) in early 2021 as compared to before the pandemic.⁴ With older adults accounting for nearly

Highlights

- This study examined the associations between social isolation (i.e. living alone) and loneliness and positive mental health among older adults in Canada during the COVID-19 pandemic.
- Nearly 3 in 10 older adults reported living alone, and more than one-third reported feelings of loneliness due to the pandemic.
- When examined separately, living alone and loneliness were each associated with poorer well-being; however, when examined simultaneously, only loneliness remained significantly associated with positive mental health, overall and across sociodemographic groups.
- Males and those aged 65 to 74 years who live alone (vs. who live with others) may also be more vulnerable to poorer mental health.

one-fifth (19%) of the Canadian population,⁷ there are urgent calls to pay attention to the unintended consequences of the pandemic on older adults' mental health.⁸

Researchers have highlighted social disruptions during the pandemic as important contributors to some older adults' poorer mental health.^{5,9} Social isolation (i.e. an objective lack of social contact and network size)⁹ and loneliness (i.e. a perceived dissatisfaction with one's social relationships)¹⁰ are associated with physical

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and mental health problems^{11,12} and poorer well-being among older adults.^{13,14} Prior to the pandemic, older adults were already at increased risk for social isolation and loneliness¹² due to life events (e.g. retirement, bereavement, health/mobility limitations),¹⁵ and community and societal factors (e.g. ageism, transportation barriers, poor access to digital technology).¹⁶ Indeed, more than a quarter of community-dwelling older adults in Canada live alone,^{14,17} a broad indicator of social isolation.¹⁸⁻²⁰ It has also been estimated that approximately 20% of older adults experience loneliness at least some of the time.²¹

Physical distancing protocols implemented during the pandemic may have further exacerbated older adults' risk for social isolation and loneliness, as they have been especially encouraged to distance from others due to the heightened probability of severe illness, hospitalization and death from COVID-19.⁴ During fall 2020, nearly a third (31%) of older adults reported wanting to participate in more social activities, most of whom (76%) cited pandemic-related restrictions as barriers to doing so.²² Many have also faced challenges with communication technology, a critical tool used for social connection during the pandemic.²¹ Consequently, many have lost access to social supports and networks previously obtained outside the household. Indeed, 11% of older adults reported that they often felt lonely in fall 2020 (up from 7% in 2019).²² Even larger proportions (26%–43%) of certain older adult populations have reported feeling lonely at least some of the time during the pandemic.^{21,23} Importantly, older adults who have experienced loneliness or social isolation (e.g. who live alone) during the pandemic appear to be at greater risk for mental health problems.⁵

However, it is important to distinguish between social isolation and loneliness, and their associated health outcomes. Due to the shared element of social disconnectedness and apparent overlap in health implications, social isolation and loneliness have previously been used as interchangeable terms,²⁴ similarly operationalized, or both.²⁵ However, whereas social isolation is the objective lack of social contacts, loneliness represents the subjective experience of feeling alone. Thus, it is possible to be socially isolated (e.g. live alone, have limited social contacts) but not feel lonely, or to feel lonely despite being socially integrated.^{26,27}

Indeed, social isolation and loneliness are only weakly to moderately correlated,^{15,19,28,29} suggesting they are related but distinct experiences.²⁹ Moreover, when the independent effects of social isolation and loneliness among older adults are considered by modelling their effects concurrently,³⁰ social isolation is uniquely or more consistently associated with physical health problems and mortality,^{15,29} while loneliness is independently or more consistently associated with mental health problems (e.g. depression).^{28,29,31} However, we know very little about their potential independent effects on positive mental health (PMH),³² an important dimension of an individual's mental and overall health. Nevertheless, in a representative sample of older German adults, loneliness (but not living alone) was significantly and negatively associated with positive affect and was a stronger predictor of lower life satisfaction than living alone.²⁸ Thus, there is a growing indication that distinguishing between, and simultaneously examining, social isolation and loneliness is important for understanding their unique health impacts.

Furthermore, subpopulations of older adults may be differentially at risk for social isolation, loneliness and their associated mental health outcomes. For example, older females in Canada are more likely to live alone than males.^{13,17,33} In the context of the pandemic, older females are also more likely to report feeling lonely,²¹ and less likely to report high SRMH than males.¹ Age may also be an important factor. For example, life satisfaction appears to increase with age among older adults,³⁴ despite concurrent increases in rates of living alone.¹³ Adults aged 75 years or older are also more likely to report always or often feeling lonely during the pandemic than those aged 65 to 74 years.³⁵ Finally, older adults with lower socioeconomic status may be more vulnerable to isolation,³³ and at greater risk for poorer mental health outcomes during the pandemic.⁵ It is, however, unknown whether the associations between social isolation, loneliness and PMH vary across sociodemographic groups. Accordingly, we sought to provide estimates for the overall older adult population, stratified by gender, age group and education level, to provide a nuanced understanding of older adults' social experiences and PMH during the pandemic.

Specifically, our first aim was to provide estimates of PMH outcomes (i.e. high SRMH, life satisfaction, high community belonging), social isolation (i.e. living alone) and feelings of loneliness among older adults during the COVID-19 pandemic (i.e. fall 2020 and winter/spring 2021). Consistent with previous findings,^{1,13,17,21,33-35} we expected some differences in the prevalence of social isolation, loneliness and PMH outcomes across sociodemographic groups. Our second aim was to separately and simultaneously examine whether social isolation and loneliness are associated with PMH outcomes. We hypothesized that, when examined separately, social isolation and loneliness would each be associated with PMH outcomes after adjusting for sociodemographic characteristics. However, when accounting for shared variance between the two constructs, consistent with previous findings,^{28,29,31} we hypothesized that loneliness (but not social isolation) would remain significantly associated with PMH outcomes. Given the novel and exploratory nature of examining these analyses across sociodemographic groups, we had no specific hypotheses regarding these associations by gender, age or education level.

Methods

Data sources and participants

We conducted a secondary analysis of cross-sectional data from the 2020³⁶ and 2021³⁷ cycles of the Survey on COVID-19 and Mental Health (SCMH), collected by Statistics Canada between 11 September and 4 December 2020, and 1 February and 7 May 2021. The target population was adults aged 18 years or older living in the 10 provinces and three territorial capitals in Canada. A random sample of dwellings was selected from within each province and territorial capital, and an adult respondent was selected from within each dwelling. Individuals living on reserves, in institutions and in noncapital cities in the territories were excluded from the survey. Respondents voluntarily completed the survey by electronic questionnaire or computer-assisted telephone interviews.

Response rates were 53.3% (n = 14 689) for the 2020 SCMH and 49.3% (n = 8032) for the 2021 SCMH. Of those, 12 344 (2020 SCMH) and 6592 (2021 SCMH) respondents agreed to share their information with the Public Health Agency of Canada

(PHAC). For our analysis, we limited the sample to adults aged 65 years and over (3493 in the 2020 SCMH; 1839 in the 2021 SCMH). To achieve sufficient sample sizes to support the analyses, data from the two cycles were pooled, for a total of 5332 respondents. Combined sociodemographic characteristics are presented in Table 1.

Measures

Positive mental health outcomes

Consistent with PHAC's Positive Mental Health Surveillance Indicator Framework,^{32,38} high SRMH, high community belonging, and life satisfaction were assessed as indicators of PMH. SRMH was assessed using the question "In general, how is your mental health?", with response options of "Excellent", "Very good", "Good", "Fair", and "Poor". Individuals who rated their mental health as "Excellent" or "Very good" were coded as having high SRMH. Community belonging was assessed by asking participants "How would you describe your sense of belonging to your local community?" Response options included "Very strong", "Somewhat strong", "Somewhat weak", and "Very weak". Individuals who responded "Very strong" or "Somewhat strong" were coded as having high community belonging. To measure life satisfaction, individuals were asked "Using a scale of 0 to 10, where 0 means 'very dissatisfied' and 10 means 'very satisfied', how do you feel about your life as a whole right now?" Responses were treated as a numerical variable.

Social isolation

Living alone status was assessed as an index of social isolation. Participants were asked "Including yourself, how many people live in your household?" Response options included "1" to "20 or more". Responses were dichotomized such that "1" was coded as living alone, and all other responses were coded as living with others.¹⁸

Loneliness

Loneliness was assessed using the question "Have you experienced any of the following impacts due to the COVID-19 pandemic?" Those who selected the response option "Feelings of loneliness or isolation" were coded as experiencing loneliness.³⁹

Covariates

Given previous indication that risk for social isolation and loneliness may differ across groups of older adults in Canada,³³

TABLE 1
Sociodemographic characteristics

| Sociodemographic characteristics | % (95% CI), weighted |
|---|----------------------|
| Gender (n = 5330) | |
| Males | 46.6 (46.5, 46.7) |
| Females | 53.4 (53.3, 53.6) |
| Age group (n = 5332) | |
| 65–74 years | 63.2 (61.3, 65.1) |
| 75+ years | 36.8 (34.9, 38.7) |
| Highest education level (n = 5314) | |
| High school and below | 44.2 (42.2, 46.2) |
| Postsecondary education | 55.8 (53.8, 57.8) |
| Place of residence (n = 5303) | |
| Population centre | 78.3 (76.8, 79.9) |
| Rural area | 21.7 (20.1, 23.2) |
| Racialized group member^a (n = 5267) | |
| Yes | 9.8 (8.4, 11.2) |
| No | 90.2 (88.8, 91.6) |
| Immigrant status (n = 5294) | |
| Yes | 22.8 (21.0, 24.7) |
| No | 77.2 (75.4, 79.0) |

Data source: 2020 and 2021 Survey on COVID-19 and Mental Health, combined.

Abbreviation: CI, confidence interval.

Notes: Missing data were excluded from percentages. Gender-diverse individuals were excluded from gender percentages due to the small sample size (< 0.01%).

^a Individuals classified as a visible minority or who identified as Indigenous.

the following sociodemographic variables were statistically controlled for in the regression analyses: gender (male, female), age group (65–74 years, 75+ years), the individual's highest level of education (high school and below, postsecondary), place of residence (population centre, rural), racialized group member status (yes, no), and immigrant status (yes, no). Highest education level was selected as a proxy for socioeconomic status over income level, as many older adults are likely to have transitioned from employment to retirement.¹⁵ Individuals classified as a visible minority or who identified as Indigenous were coded as racialized group members (vs. White). Landed immigrants and nonpermanent residents were coded as immigrants (vs. Canadian-born).¹

Analyses

Analyses were conducted in SAS Enterprise Guide version 7.1 (SAS Institute Inc., Cary, NC, US). All analyses were conducted using survey and bootstrap weights provided by Statistics Canada to account for the complex survey design, to

adjust for nonresponses and to make the results representative of community-dwelling older adults living in the 10 provinces and three territorial capitals.

Descriptive statistics were used to calculate percentages, means and 95% confidence intervals (CIs) for all main study variables. Differences between sociodemographic groups were determined based on two-tailed hypothesis tests at a significance level of $p < 0.05$. Next, mean life satisfaction and the percentage of individuals reporting high SRMH and high community belonging by living alone and loneliness indicators were assessed.

Logistic regression analyses were conducted to explore the associations of living alone and loneliness with high SRMH and high community belonging. Linear regression analyses were conducted to explore the associations of living alone and loneliness with life satisfaction. Living alone (Model 1) and loneliness (Model 2) were first entered separately as explanatory variables, while controlling for sociodemographic covariates. Next,

living alone and loneliness were included simultaneously as explanatory variables (Model 3) to account for any shared variance, again controlling for sociodemographic covariates. Odds ratios with 95% CIs that did not include 1.00 and regression coefficients with 95% CIs that did not include 0 were interpreted as statistically significant.

Analyses were conducted for the overall sample, and stratified by gender (male, female), age group (65–74 years, 75+ years) and highest education level (high school and below, postsecondary). To maximize sample sizes, regression models for each PMH outcome included all individuals with complete data for the relevant questions. Gender-diverse respondents were excluded from all regression analyses due to insufficient samples. Sample sizes within sets of regression analyses for PMH outcomes were kept consistent to make Models 1 and 2 comparable with Model 3.

Results

Descriptive statistics

Descriptive statistics are presented in Table 2. Overall, 70.2% of older adults

reported high SRMH, with females (vs. males), those aged 65 to 74 years (vs. 75+ years), and those with high school education or below (vs. postsecondary) less likely to report high SRMH. Nearly three-quarters (74.6%) of older adults reported high community belonging. Females (vs. males), those aged 65 to 74 years (vs. 75+ years) and those with postsecondary education (vs. high school or below) were less likely to report high community belonging. On a scale of 0 (very dissatisfied) to 10 (very satisfied), older adults reported an average life satisfaction score of 7.6, with females (vs. males) and those with postsecondary education (vs. high school or below) reporting lower mean scores. Overall, 29.0% of older adults reported living alone. Females (vs. males), those aged 75 years and older (vs. 65–74 years) and those with high school education or below (vs. postsecondary education) were more likely to be living alone. Finally, over one-third (34.1%) of older adults reported feeling lonely due to the pandemic, with a greater proportion of females reporting feelings of loneliness than males.

Living alone and PMH

Model 1 analyses revealed that, after taking sociodemographic covariates into account,

older adults living alone were overall significantly less likely to report high SRMH and community belonging, and reported lower average life satisfaction than those living with others (Table 3). These associations remained for males (Table 4), those aged 65 to 74 years (Table 5), and those with postsecondary education (Table 6). Additionally, those aged 75 years and older living alone were significantly less likely to report high SRMH (but not high community belonging or lower life satisfaction) as compared to those living with others (Table 5). Those with high school education or below living alone reported lower life satisfaction than those living with others (but did not differ on high SRMH or high community belonging; Table 6).

After adjusting for loneliness (Model 3), those living alone (vs. with others) were significantly less likely to report high community belonging in the overall population (Table 3), among males (Table 4) and among those aged 65 to 74 years (Table 5), with associations of similar magnitude as in the unadjusted analyses. However, living alone was no longer significantly associated with high SRMH or life satisfaction

TABLE 2
Descriptive statistics of living alone, loneliness and positive mental health outcomes among older adults in Canada during the COVID-19 pandemic, overall and stratified by gender, age group and education level

| Variable | Overall n = 5332 | Gender | | Age group | | Highest education level | |
|-------------------------------|----------------------|----------------------|----------------------|-------------------------|-----------------------|-----------------------------------|-------------------------------------|
| | | Males n = 2306 | Females n = 3024 | 65–74 years n = 3388 | 75+ years n = 1944 | High school and below n = 2204 | Postsecondary education n = 3110 |
| | | | | % (95% CI) | | | |
| Living alone | 29.0 (27.6, 30.4) | 19.2 (17.3, 21.2) | 37.6 (35.3, 39.9) | 24.7 (22.9, 26.5) | 36.5 (33.7, 39.3) | 32.4 (30.0, 34.8) | 26.5 (24.6, 28.4) |
| | | p < 0.001 | | p < 0.001 | | p < 0.001 | |
| Loneliness | 34.1 (32.3, 35.9) | 24.5 (22.1, 27.0) | 42.4 (39.7, 45.0) | 33.3 (31.1, 35.5) | 35.6 (32.3, 38.5) | 33.6 (30.8, 36.3) | 34.5 (31.9, 37.0) |
| | | p < 0.001 | | p = 0.29 | | p = 0.65 | |
| High self-rated mental health | 70.2 (68.3, 72.1) | 74.5 (71.9, 77.1) | 66.5 (63.9, 69.1) | 68.6 (66.1, 71.1) | 73.0 (70.3, 75.7) | 66.6 (63.7, 69.5) | 73.1 (70.6, 75.7) |
| | | p < 0.001 | | p = 0.02 | | p = 0.001 | |
| High community belonging | 74.6 (72.8, 76.4) | 76.8 (74.2, 79.4) | 72.7 (70.3, 75.1) | 72.6 (70.3, 74.9) | 78.0 (75.2, 80.8) | 77.8 (75.3, 80.3) | 71.9 (69.4, 74.4) |
| | | p = 0.02 | | p = 0.003 | | p = 0.001 | |
| | | Mean (95% CI) | | | | | |
| Life satisfaction | 7.6 (7.5, 7.7) | 7.7 (7.6, 7.9) | 7.5 (7.4, 7.6) | 7.6 (7.5, 7.7) | 7.7 (7.6, 7.9) | 7.7 (7.6, 7.9) | 7.5 (7.4, 7.6) |
| | | p = 0.02 | | p = 0.07 | | p = 0.01 | |

Data source: 2020 and 2021 Survey on COVID-19 and Mental Health, combined.

Abbreviation: CI, confidence interval.

Notes: Life satisfaction was rated on a scale from 0 (very dissatisfied) to 10 (very satisfied). Statistically significant differences between sociodemographic groups (at $p < 0.05$) are bolded.

TABLE 3
Associations between living alone and loneliness and indicators of positive mental health among older adults during the COVID-19 pandemic

| | High self-rated mental health | | | High community belonging | | | | Life satisfaction | | | | |
|---------------------|-------------------------------|------------------------------------|------------------------------------|------------------------------------|----------------------|------------------------------------|------------------------------------|------------------------------------|-------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| | Model 1 | Model 2 | Model 3 | Model 1 | Model 2 | Model 3 | Model 1 | Model 2 | Model 3 | | | |
| | % (95% CI) | aOR (95% CI) | aOR (95% CI) | % (95% CI) | aOR (95% CI) | aOR (95% CI) | Mean (95% CI) | B (95% CI) | B (95% CI) | B (95% CI) | | |
| Overall | n = 5068 | | | n = 5047 | | | | n = 5057 | | | | |
| Living alone | | | | | | | | | | | | |
| Yes | 65.11 (62.3, 67.9) | 0.74 (0.61, 0.89) | — | 0.85 (0.70, 1.04) | 70.2 (67.5, 72.8) | 0.72 (0.59, 0.87) | — | 0.81 (0.67, 0.99) | 7.4 (7.3, 7.5) | -0.28 (-0.45, -0.11) | — | -0.08 (-0.23, 0.08) |
| No | 76.3 (69.9, 74.8) | (ref.) | — | (ref.) | 76.4 (74.2, 78.6) | (ref.) | — | (ref.) | 7.7 (7.6, 7.8) | (ref.) | — | (ref.) |
| Loneliness | | | | | | | | | | | | |
| Yes | 52.1 (48.6, 55.5) | — | 0.28 (0.23, 0.35) | 0.29 (0.23, 0.35) | 60.8 (57.5, 64.2) | — | 0.35 (0.29, 0.43) | 0.36 (0.29, 0.44) | 6.6 (6.4, 6.7) | — | -1.60 (-1.79, -1.42) | -1.60 (-1.79, -1.40) |
| No | 79.2 (77.0, 81.5) | — | (ref.) | (ref.) | 81.2 (79.2, 83.3) | — | (ref.) | (ref.) | 8.2 (8.1, 8.3) | — | (ref.) | (ref.) |

Data source: 2020 and 2021 Survey on COVID-19 and Mental Health, combined.

Abbreviations: aOR, adjusted odds ratio; B, adjusted unstandardized regression coefficient; CI, confidence interval; ref., reference group.

Notes: Explanatory variables are living alone (Model 1), loneliness (Model 2) and both (Model 3). All models are adjusted for age, gender, highest education, place of residence, immigrant status and racialized group member status. Gender-diverse and missing data are excluded from all regression analyses. Statistically significant odds ratios and regression coefficients are bolded.

in the overall sample (Table 3) or across sociodemographic groups (Tables 4–6).

Loneliness and PMH

Model 2 results indicated that, after taking sociodemographic covariates into account, older adults experiencing loneliness were significantly less likely to report high SRMH and high community belonging, and reported significantly lower life satisfaction than those who were not lonely, overall and across all sociodemographic groups (Tables 3–6). These associations remained significant (and of similar magnitude) after adjusting for living alone status (Model 3).

Discussion

The goal of our study was to examine older adults' social experiences and PMH during the pandemic. Although the majority of older adults reported PMH during the pandemic, some sociodemographic groups were less likely to report high SRMH (i.e. females, those aged 65–74 years and those with a high school education or below) and high community belonging

(i.e. females, those aged 65–74 years and those with a postsecondary education), and had lower mean life satisfaction (i.e. females and those with a postsecondary education).

Social isolation (assessed via living alone status) and loneliness were not uncommon among older adults during the pandemic. Consistent with pre-pandemic rates,¹⁷ almost 3 in 10 older adults reported living alone, with higher rates among females, those aged 75 years and older and those with high school education or below.¹³ Over a third of older adults reported feelings of loneliness due to the pandemic and, consistent with pre-pandemic findings,¹⁵ females were more likely to report loneliness than males. When examined separately, living alone and loneliness were each associated with lower mean life satisfaction and a lower likelihood of reporting high SRMH and high community belonging in the overall population. When living alone and loneliness were assessed simultaneously, loneliness remained significantly associated with all PMH indicators, whereas living alone was only significantly associated with high community

belonging overall and among males and adults aged 65 to 74 years.

Overall, our findings support calls to enhance social connections to support well-being as a public health priority.^{9,16} However, consistent with previous studies,^{28,29,31} our findings suggest that the subjective feeling of loneliness is a more consistent correlate of PMH outcomes than the objective social isolation measure of living alone among community-dwelling older adults. By contrast, associations between social isolation and PMH may be largely attributable to shared variance with loneliness³¹ and/or restricted to certain sociodemographic groups. For instance, older males living alone may be less likely to report high community belonging because they tend to have smaller social networks and less stable family contact, and are at increased risk of isolation due to divorce or widowhood.⁴⁰ Adults aged 65 to 74 years who live alone may also be less likely to report high community belonging because living alone is less common for this group as compared to older age groups (and therefore more alienating), they have more recently lost

TABLE 4
Associations between living alone and loneliness and indicators of positive mental health among older adults during the COVID-19 pandemic, stratified by gender

| | High self-rated mental health | | | | High community belonging | | | | Life satisfaction | | | |
|---------------------|-------------------------------|--|--|--|--------------------------|--|--|--|-------------------|---|---|---|
| | Model 1 | Model 2 | Model 3 | | Model 1 | Model 2 | Model 3 | Mean | Model 1 | Model 2 | Model 3 | |
| | % (95% CI) | aOR (95% CI) | aOR (95% CI) | aOR (95% CI) | % (95% CI) | aOR (95% CI) | aOR (95% CI) | aOR (95% CI) | Mean (95% CI) | B (95% CI) | B (95% CI) | B (95% CI) |
| Males | n = 2190 | | | | n = 2183 | | | | n = 2184 | | | |
| Living alone | | | | | | | | | | | | |
| Yes | 66.9 (62.0, 71.9) | 0.63 (0.47 , 0.85) | — | 0.73 (0.53, 1.01) | 70.9 (66.0, 75.8) | 0.61 (0.45 , 0.82) | — | 0.70 (0.51 , 0.96) | 7.4 (7.2, 7.6) | -0.43 (-0.71 , -0.15) | — | -0.23 (-0.50, 0.04) |
| No | 76.2 (73.2, 79.3) | (ref.) | — | (ref.) | 78.3 (75.3, 81.3) | (ref.) | — | (ref.) | 7.8 (7.7, 8.0) | (ref.) | — | (ref.) |
| Loneliness | | | | | | | | | | | | |
| Yes | 55.6 (49.7, 61.4) | — | 0.28 (0.20 , 0.38) | 0.28 (0.21 , 0.39) | 60.2 (54.5, 66.0) | — | 0.30 (0.22 , 0.41) | 0.31 (0.23 , 0.43) | 6.6 (6.3, 6.9) | — | -1.54 (-1.85 , -1.22) | -1.51 (-1.83 , -1.18) |
| No | 80.5 (77.5, 83.4) | — | (ref.) | (ref.) | 81.7 (78.9, 84.6) | — | (ref.) | (ref.) | 8.1 (8.0, 8.2) | — | (ref.) | (ref.) |
| Females | n = 2878 | | | | n = 2864 | | | | n = 2873 | | | |
| Living alone | | | | | | | | | | | | |
| Yes | 64.3 (60.9, 67.7) | 0.80 (0.63, 1.02) | — | 0.93 (0.72, 1.21) | 69.9 (66.9, 73.0) | 0.79 (0.62, 1.00) | — | 0.89 (0.69, 1.14) | 7.4 (7.3, 7.6) | -0.22 (-0.44 , 0.01) | — | 0.01 (-0.19, 0.20) |
| No | 68.0 (64.3, 71.7) | (ref.) | — | (ref.) | 74.3 (71.0, 77.5) | (ref.) | — | (ref.) | 7.6 (7.5, 7.8) | (ref.) | — | (ref.) |
| Loneliness | | | | | | | | | | | | |
| Yes | 50.3 (46.0, 54.6) | — | 0.29 (0.22 , 0.38) | 0.29 (0.22 , 0.38) | 61.1 (57.2, 65.1) | — | 0.38 (0.29 , 0.50) | 0.39 (0.30 , 0.51) | 6.5 (6.4, 6.7) | — | -1.65 (-1.87 , -1.43) | -1.65 (-1.88 , -1.43) |
| No | 77.8 (74.6, 81.0) | — | (ref.) | (ref.) | 80.7 (77.8, 83.5) | — | (ref.) | (ref.) | 8.2 (8.1, 8.4) | — | (ref.) | (ref.) |

Data source: 2020 and 2021 Survey on COVID-19 and Mental Health, combined.

Abbreviations: aOR, adjusted odds ratio; B, adjusted unstandardized regression coefficient; CI, confidence interval; ref., reference group.

Notes: Explanatory variables are living alone (Model 1), loneliness (Model 2) and both (Model 3). All models are adjusted for age, highest education, place of residence, immigrant status and racialized group member status. Gender-diverse and missing data are excluded from all regression analyses. Statistically significant odds ratios and regression coefficients are bolded.

sources of social connection due to retirement or other life transitions,¹⁵ and/or they have less experience living alone than their older counterparts.

This study informs public health policy and opportunities to enhance older adult health care through the use of targeted identification and support strategies. For example, primary care workers (e.g. family physicians, social workers) are uniquely positioned to screen for social vulnerabilities and initiate services.⁴¹ Training practitioners to assess social vulnerabilities as part of regular care practices may be

critical for identifying those at risk for poorer well-being.

Additionally, funding is needed for programs and services that specifically target loneliness among older adults. For example, at the individual level, programs that teach older adults how to develop and maintain meaningful and emotionally satisfying relationships (e.g. social skills training) and that facilitate connection (e.g. through shared-interest activities) may be more beneficial than solely increasing the quantity of social interactions.^{16,42} Offering cognitive modification programs, which involve reframing

maladaptive perceptions about social relationships, as an accessible mental health service for older adults may also help reduce feelings of loneliness,^{16,43} particularly in the context of a pandemic, when in-person social interactions are limited.⁴⁴

However, community- and societal-level investments to support older adults are also warranted, including improving infrastructure and creating age-friendly communities (e.g. accessible transportation and services, digital inclusion, safe outdoor spaces, affordable and well-designed housing) and developing policies to address systemic barriers to older adults'

TABLE 5
Associations between living alone and loneliness and indicators of positive mental health among older adults during the COVID-19 pandemic, stratified by age group

| | High self-rated mental health | | | | High community belonging | | | | Life satisfaction | | | |
|---------------------|-------------------------------|--|--|--|--------------------------|--|--|--|-------------------|---|---|---|
| | Model 1 | Model 2 | Model 3 | % | Model 1 | Model 2 | Model 3 | Mean | Model 1 | Model 2 | Model 3 | |
| | aOR (95% CI) | aOR (95% CI) | aOR (95% CI) | | aOR (95% CI) | aOR (95% CI) | aOR (95% CI) | | B (95% CI) | B (95% CI) | B (95% CI) | |
| 65–74 years | n = 3225 | | | | n = 3216 | | | | n = 3219 | | | |
| Living alone | | | | | | | | | | | | |
| Yes | 62.7 (58.8, 66.6) | 0.74 (0.59 , 0.93) | — | 0.93 (0.73, 1.18) | 65.9 (62.2, 69.7) | 0.67 (0.53 , 0.84) | — | 0.76 (0.60 , 0.97) | 7.3 (7.1, 7.5) | -0.30 (-0.52 , -0.08) | — | -0.03 (-0.23, 0.17) |
| No | 70.6 (67.5, 73.6) | (ref.) | — | (ref.) | 74.9 (72.1, 77.6) | (ref.) | — | (ref.) | 7.7 (7.5, 7.8) | (ref.) | — | (ref.) |
| Loneliness | | | | | | | | | | | | |
| Yes | 46.8 (42.3, 51.3) | — | 0.23 (0.17 , 0.30) | 0.23 (0.18 , 0.30) | 59.7 (55.5, 63.9) | — | 0.40 (0.31 , 0.52) | 0.41 (0.32 , 0.54) | 6.5 (6.3, 6.6) | — | -1.64 (-1.86 , -1.42) | -1.63 (-1.86 , -1.41) |
| No | 79.4 (76.5, 82.4) | — | (ref.) | (ref.) | 78.8 (76.1, 81.5) | — | (ref.) | (ref.) | 8.1 (8.0, 8.2) | — | (ref.) | (ref.) |
| 75+ years | n = 1843 | | | | n = 1831 | | | | n = 1838 | | | |
| Living alone | | | | | | | | | | | | |
| Yes | 67.9 (63.9, 71.9) | 0.72 (0.53 , 0.99) | — | 0.78 (0.56, 1.08) | 75.1 (71.4, 78.9) | 0.81 (0.57, 1.15) | — | 0.90 (0.63, 1.30) | 7.5 (7.4, 7.7) | -0.26 (-0.54 , 0.01) | — | -0.13 (-0.39, 0.12) |
| No | 76.0 (72.2, 79.8) | (ref.) | — | (ref.) | 79.5 (75.7, 83.4) | (ref.) | — | (ref.) | 7.8 (7.6, 8.0) | (ref.) | — | (ref.) |
| Loneliness | | | | | | | | | | | | |
| Yes | 60.6 (55.4, 65.9) | — | 0.40 (0.29 , 0.56) | 0.41 (0.30 , 0.57) | 62.7 (57.2, 68.2) | — | 0.27 (0.19 , 0.38) | 0.27 (0.19 , 0.38) | 6.7 (6.5, 7.0) | — | -1.56 (-1.85 , -1.26) | -1.55 (-1.84 , -1.25) |
| No | 78.9 (75.5, 82.3) | — | (ref.) | (ref.) | 85.5 (82.6, 88.5) | — | (ref.) | (ref.) | 8.3 (8.1, 8.4) | — | (ref.) | (ref.) |

Data source: 2020 and 2021 Survey on COVID-19 and Mental Health, combined.

Abbreviations: aOR, adjusted odds ratio; B, adjusted unstandardized regression coefficient; CI, confidence interval; ref., reference group.

Notes: Explanatory variables are living alone (Model 1), loneliness (Model 2) and both (Model 3). All models are adjusted for gender, highest education, place of residence, immigrant status and racialized group member status. Gender-diverse and missing data are excluded from all regression analyses. Statistically significant odds ratios and regression coefficients are bolded.

social inclusion (e.g. combatting ageism, socioeconomic inequality).^{16,21} Our findings suggest that certain populations (e.g. females, those aged 75+ years) are disproportionately at risk for isolation or loneliness, or both, and therefore may especially benefit from such efforts. However, future work examining whether such programs, supports and policies positively impact PMH is also needed.

Strengths and limitations

Our study addresses important evidence gaps by examining the wider health

impacts of the COVID-19 pandemic on PMH using a population-based sample of older adults. We provided estimates of multiple indicators of PMH, as well as social isolation and loneliness during the pandemic. Furthermore, we examined the associations of social isolation and loneliness with PMH overall, and stratified by gender, age group and education level.

Despite these contributions, the findings should be interpreted within the context of important limitations. To begin with, data from the SCM were cross-sectional and therefore neither causality nor temporality

could be established, and it is possible that there are bidirectional effects (e.g. those with poorer mental health may be more likely to feel lonely or be isolated).¹¹ Additionally, there may be more complex effects among the constructs of interest that cannot be established with the current data. For example, loneliness may mediate the association between social isolation and PMH. In other words, individuals who live alone may have poorer mental health because they feel lonelier.

The data also did not capture social isolation or loneliness experiences before the

TABLE 6
Associations between living alone and loneliness and indicators of positive mental health among older adults during the COVID-19 pandemic, stratified by education level

| | High self-rated mental health | | | | High community belonging | | | | Life satisfaction | | | |
|--------------------------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------|--------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------|--------------------------------|--------------------------------|--------------------------------|
| | Model 1 | | Model 2 | Model 3 | Model 1 | | Model 2 | Model 3 | Model 1 | Model 2 | Model 3 | |
| | % (95% CI) | aOR (95% CI) | aOR (95% CI) | aOR (95% CI) | % (95% CI) | aOR (95% CI) | aOR (95% CI) | aOR (95% CI) | Mean (95% CI) | B (95% CI) | B (95% CI) | B (95% CI) |
| High school and below | n = 2101 | | | | n = 2092 | | | | n = 2096 | | | |
| Living alone | | | | | | | | | | | | |
| Yes | 63.3 (59.1, 67.5) | 0.81 (0.62, 1.06) | — | 0.90 (0.68, 1.19) | 74.3 (70.4, 78.2) | 0.77 (0.58, 1.03) | — | 0.83 (0.62, 1.12) | 7.5 (7.4, 7.7) | -0.28 (-0.54, -0.03) | — | -0.12 (-0.35, 0.11) |
| No | 68.2 (64.4, 72.0) | (ref.) | — | (ref.) | 79.4 (76.3, 82.6) | (ref.) | — | (ref.) | 7.8 (7.7, 8.0) | (ref.) | — | (ref.) |
| Loneliness | | | | | | | | | | | | |
| Yes | 46.5 (41.1, 52.0) | — | 0.27 (0.20, 0.36) | 0.27 (0.20, 0.36) | 65.7 (60.8, 70.7) | — | 0.40 (0.29, 0.55) | 0.41 (0.30, 0.56) | 6.5 (6.3, 6.8) | — | -1.85 (-2.12, -1.57) | -1.83 (-2.11, -1.56) |
| No | 76.1 (72.9, 79.4) | — | (ref.) | (ref.) | 83.6 (80.9, 86.3) | — | (ref.) | (ref.) | 8.3 (8.2, 8.5) | — | (ref.) | (ref.) |
| Postsecondary education | n = 2967 | | | | n = 2955 | | | | n = 2961 | | | |
| Living alone | | | | | | | | | | | | |
| Yes | 66.7 (62.9, 70.5) | 0.68 (0.52, 0.88) | — | 0.81 (0.61, 1.07) | 66.3 (62.4, 70.1) | 0.68 (0.52, 0.88) | — | 0.79 (0.61, 1.04) | 7.3 (7.1, 7.4) | -0.28 (-0.50, -0.06) | — | -0.05 (-0.27, 0.16) |
| No | 75.5 (72.3, 78.6) | (ref.) | — | (ref.) | 74.0 (70.9, 77.1) | (ref.) | — | (ref.) | 7.6 (7.5, 7.8) | (ref.) | — | (ref.) |
| Loneliness | | | | | | | | | | | | |
| Yes | 56.3 (51.8, 60.7) | — | 0.30 (0.23, 0.40) | 0.31 (0.23, 0.41) | 56.7 (52.3, 61.2) | — | 0.32 (0.25, 0.42) | 0.33 (0.25, 0.43) | 6.6 (6.4, 6.8) | — | -1.41 (-1.67, -1.16) | -1.40 (-1.67, -1.14) |
| No | 81.8 (78.7, 84.9) | — | (ref.) | (ref.) | 79.3 (76.4, 82.2) | — | (ref.) | (ref.) | 8.0 (7.9, 8.2) | — | (ref.) | (ref.) |

Data source: 2020 and 2021 Survey on COVID-19 and Mental Health, combined.

Abbreviations: aOR, adjusted odds ratio; B, adjusted unstandardized regression coefficient; CI, confidence interval; ref., reference group.

Notes: Explanatory variables are living alone (Model 1), loneliness (Model 2) and both (Model 3). All models are adjusted for age, gender, place of residence, immigrant status and racialized group member status. Gender-diverse and missing data are excluded from all regression analyses. Statistically significant odds ratios and regression coefficients are bolded.

pandemic, loneliness due to causes other than the pandemic, or changes in severity that may have occurred throughout the pandemic. Although older adults have reported poorer mental health during the third (vs. second) wave of the pandemic,³ it is unclear whether the associations between social experiences and PMH might have differed at different stages of the pandemic. It is also possible that those who experienced chronic (vs. transient) isolation or loneliness before and/or during the pandemic were at greater risk for poorer mental health outcomes.⁴⁵

Consistent with previous work,^{18,19,28} living alone status was used as an indicator of social isolation. Living alone status has been identified as a readily accessible and useful (albeit imperfect) measure of older adults' social isolation, particularly when using population-based data.²⁰ It may be an especially useful indicator in the context of the pandemic, when social interactions outside the household were limited.⁴ Indeed, older adults living alone (vs. with others) during the pandemic reported less social support⁴⁶ and in-person contact.⁴⁷

Nevertheless, living alone status does not provide a complete picture of an individual's

social connections.²⁰ Future work should consider additional indices of social isolation and integration (e.g. social participation, social network size, contact frequency, marital status), the mode of social connection (e.g. in-person, online)⁴⁸ and sources of support (e.g. spouse, children, friends)⁴⁹ to obtain a more comprehensive understanding of older adults' social experiences. Relatedly, the SCMHS only included a dichotomous single-item indicator of loneliness. Using more established (i.e. validated and widely used) and nuanced (e.g. multi-item, multiple response options) assessments of loneliness would allow for

cross-study comparisons,²⁶ and the assessment of varying degrees of loneliness (e.g. low, moderate, high).²⁷

The SCMH sampling frame excluded those living in institutions, who may have faced unique social isolation, loneliness and physical and mental health challenges.²¹ Thus, our study population likely includes a healthier subset of older adults. Nevertheless, our findings represent the majority of the population of interest, as 93% of older adults live in private dwellings.⁵⁰ Data availability and sample sizes also limited our ability to examine other socio-demographic groups that may be vulnerable to isolation, loneliness, or both (e.g. gender and sexual minorities, those with pre-existing mental and physical health problems or disabilities).^{21,33} Moreover, it is possible that results could have differed if we had statistically controlled for other potential confounding factors (e.g. mental illness). Relatedly, the SCMH included individual education level, which may differ from household education as a proxy for SES, and may have contributed to the differing pattern of PMH outcomes across education level groups.

Finally, although sampling weights were used for all estimates, nonresponse bias cannot be ruled out, due to the relatively low response rates of the SCMH surveys.

Conclusion

Already vulnerable to social isolation and loneliness and their associated health risks,¹² older adults were encouraged to further restrict in-person contacts due to heightened risk for negative outcomes stemming from contracting COVID-19.⁴ However, the impact of such restrictions on older adults' mental health have yet to be fully understood. Our findings indicate that, overall, social isolation and loneliness during times of heightened social restriction are associated with poorer PMH among older adults living in Canada. However, after taking loneliness and various sociodemographic characteristics into account, most associations between social isolation and PMH are no longer significant. By contrast, overall and in all sociodemographic groups examined, loneliness is associated with poorer PMH even after adjusting for social isolation and sociodemographic covariates, highlighting the need to appropriately identify and support lonely older adults during (and beyond) the pandemic.

Conflicts of interest

The authors have no conflicts of interest.

Authors' contributions and statement

LO conceived the project. LO and LL decided on the analytic approach. LL conducted the statistical analyses. All authors interpreted the results and LO drafted and revised the manuscript in response to feedback provided from LL, KR, GG and CC.

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