BMJ Open

Retrospective cross-sectional study examining the association between loneliness and unmet healthcare needs among middle-aged and older adults using the Canadian Longitudinal Study of Aging (CLSA)

Stephanie Chamberlain ,[1] Rachel D Savage ,[2,3] Susan E Bronskill ,[3,4] Lauren E Griffith ,[5] Paula Rochon ,[2,6] Jesse Batara,[7] Andrea Gruneir[2,7]

To cite: Chamberlain S, Savage RD, Bronskill SE, *et al*. Retrospective cross-sectional study examining the association between loneliness and unmet healthcare needs among middle-aged and older adults using the Canadian Longitudinal Study of Aging (CLSA). *BMJ Open* 2023;**13**:e068769. doi:10.1136/bmjopen-2022-068769

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2022-068769).

Received 29 September 2022
Accepted 28 February 2023

For numbered affiliations see end of article.

Correspondence to
Dr Stephanie Chamberlain; sachambe@ualberta.ca

ABSTRACT

Objectives Our primary objective was to estimate the association between loneliness and unmet healthcare needs and if the association changes when adjusted for demographic and health factors. Our secondary objective was to examine the associations by gender (men, women, gender diverse).

Design, setting, participants Retrospective cross-sectional data from 44 423 community-dwelling Canadian Longitudinal Study on Aging participants aged 45 years and older were used.

Primary outcome measure Unmet healthcare needs are measured by asking respondents to indicate (yes, no) if there was a time when they needed healthcare in the last 12 months but did not receive it.

Results In our sample of 44 423 respondents, 8.5% (n=3755) reported having an unmet healthcare need in the previous 12 months. Lonely respondents had a higher percentage of unmet healthcare needs (14.4%, n=1474) compared with those who were not lonely (6.7%, n=2281). Gender diverse had the highest percentage reporting being lonely and having an unmet healthcare need (27.3%, n=3), followed by women (15.4%, n=887) and men (13.1%, n=583). In our logistic regression, lonely respondents had higher odds of having an unmet healthcare need in the previous 12 months than did not lonely (adjusted odd ratios (aOR) 1.80, 95% CI 1.64 to 1.97), adjusted for other covariates. In the gender-stratified analysis, loneliness was associated with a slightly greater likelihood of unmet healthcare needs in men (aOR 1.90, 95% CI 1.64 to 2.19) than in women (aOR 1.73, 95% CI 1.53 to 1.95). In the gender diverse, loneliness was also associated with increased likelihood of having an unmet healthcare need (aOR 1.38, 95% CI 0.23 to 8.29).

Conclusions Loneliness was related to unmet healthcare needs in the previous 12 months, which may suggest that those without robust social connections experience challenges accessing health services. Gender-related differences in loneliness and unmet needs must be further examined in larger samples.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Our study analysed data from the Canadian Longitudinal Study on Aging (CLSA), the largest population-based survey of its kind in Canada.
⇒ We were able to adjust for many key sociodemographic characteristics using the CLSA survey.
⇒ Our primary independent variable of loneliness was assessed using a validated measure of loneliness (three-item Loneliness Scale).
⇒ Gender is examined in our study (as opposed to sex) as both a covariate and stratification variable.
⇒ We had a small sample of gender diverse survey respondents.

BACKGROUND

An unmet healthcare need occurs when an individual is unable to receive needed care either because it is unavailable or inaccessible. This can result in a number of poor outcomes including death.[1 2] Although Canada has a publicly funded healthcare system, generally considered universally accessible, unmet healthcare needs for healthcare still persist.[3 4] Unmet healthcare needs are often a result of access barriers such as long wait times, unavailability of services in a certain geographical locations or individual reasons (eg, too busy).[3] In addition to wait times and accessibility of services, fewer Canadian older adults are satisfied with the overall quality of healthcare compared with other Commonwealth countries. Perceptions that received care may be inadequate and an overall sense of disappointment being unable to receive timely access to treatment may result in unmet needs.[5] Examining factors associated with unmet healthcare needs is one way to

identify barriers to accessing care and to evaluate the overall performance of the health system.

Most research on unmet healthcare needs has focused on sociodemographic predictors such as age, sex, number of health conditions and income.[6–10] Some studies have examined the impact of social connection on unmet healthcare needs, using measures such as size of social network and/or availability of social support.[11] These studies typically include objective measures of social support (ie, living alone, number of family/friends) but do not examine subjective measures such as loneliness. Loneliness is an individual's experience of social connection and satisfaction with their social relationships. It reflects the discrepancy between desired and actual social connections.[12–14] Loneliness is associated with lower overall well-being and negative health outcomes, including cognitive decline, physical health, sleep, mental health conditions (eg, depression, anxiety) and all-cause mortality.[15 16] Little is known about loneliness and its association with unmet healthcare needs. Evolutionary theories of loneliness postulate that loneliness may serve an important function to motivate individuals to seek out connection to ward off the ill effects of loneliness, this might suggest that those who are lonely have less unmet needs.[17] On the other hand, those who are lonely may exhibit avoidant behaviours, increasing likelihood of unmet needs.[18] Research suggests that loneliness is somehow associated with increased use of health services such as more emergency department use and general practitioner visits; however, the evidence is mixed and the quality of studies varies due to differences in operational definitions, measurement, study samples and cross-sectional study designs.[19–24] The results of these studies found that being lonely, as opposed to not lonely, may be associated with greater use of certain types of health services. It is not yet clear if loneliness is associated with unmet healthcare needs.

Studies examining loneliness, health service use and unmet healthcare needs have found important sex differences.[25] More older women report feeling lonely compared with older men.[26 27] Compared with men, women often report more physician visits independent of other health-related factors.[25 28] In a large population-based Canadian survey, female sex as opposed to male was associated with more unmet care needs.[4] Most studies of unmet healthcare needs use participant sex, not participant gender and often include it solely as a covariate to be adjusted for rather than directly studied. Gender may contribute to unmet care needs through inequities in socioeconomic status (eg, educational achievement, income, employment status).[4] Fear of gender discrimination and not receiving affirming care also contribute to unmet needs.[29] Our primary objective was to estimate the association between loneliness and unmet care needs in the previous 12 months. Our secondary objective was to examine the associations between loneliness and unmet healthcare needs in the previous 12 months by gender (men, women, gender diverse).

METHODS

Conceptual framework

We used Andersen's Health Behaviour Model to inform the variables selected for the analysis and to inform the analytical procedure.[30 31] This conceptual model was used because it aims to understand why respondents use or do not use healthcare services. The model is often used to identify specific measures that might influence access to healthcare services. It generally focuses on three main factors related to health service use: predisposing (factors that increase the likelihood to use services), enabling (factors that facilitate the use of services) and need (factors that increase the perceived need for care).

Data: the Canadian Longitudinal Study on Aging

We used a retrospective cross-sectional study design to analyse population-based survey data from the Canadian Longitudinal Study on Aging (CLSA).[32] At the time of this study, the CLSA had collected two waves of data referred to as baseline (2011–2015) and the first follow-up (2015–2018). The CLSA collects data from two cohorts known as the Tracking and Comprehensive cohorts. The Tracking Cohort (baseline, n=21 241) is an age-stratified and sex-stratified random sample of community-dwelling Canadians aged 45 years and older who completed a computer-assisted telephone interview. The Comprehensive Cohort (baseline, n=30 097) is a stratified (age, sex) random sample of individuals 45 years and older who took part in in-home interviews and provided biological data at data collection sites and therefore have to live within 25–50 km of a CLSA data collection site.[32 33] Both cohorts collect a common set of core questionnaire data. CLSA exclusion criteria are the following: individuals unable to respond in either English or French, persons who are cognitively impaired at the time of recruitment, those living in the three territories Yukon, Northwest Territories, Nunavut), full-time members of the Canadian Armed Forces, individuals living in long-term care homes (ie, nursing homes, personal care homes) at baseline and persons living on First Nations reserves and settlements.

Sample

Our sample included participants in the first follow-up survey of the CLSA (2015–2018), which incorporated the validated three-item Loneliness Scale[34]; baseline data collection did not include the validated loneliness measure. Our sample includes both the Tracking cohort version 2.1 (n=17 051) and Comprehensive cohort version 3.0 (n=27 765). From the 44 816 respondents to survey follow-up 1, we excluded 393 cases due to missing responses in the dependent variable of unmet healthcare needs. This resulted in an overall missingness of 0.88% (393/44 816). Based on the small percentage of missing data, we chose not to impute missing values and instead used listwise deletion.

Independent variable: loneliness

Our primary independent variable was loneliness, as measured by the score generated from the three-item Loneliness Scale. The items ask: (1) How often do you feel left out?; (2) How often do you feel isolated from others? and (3) How often do you feel that you lack companionship? Items are scored with a Likert scale response category (hardly ever, some of the time, often). Higher scores indicate greater perceived loneliness. We created a dichotomous independent variable to measure loneliness (lonely vs not lonely). We defined the top quintile of respondents as lonely. This quintile approach is consistent with other research examining loneliness and health outcomes.[35] The three-item Loneliness Scale was introduced in the first follow-up and not included at baseline, so we were unable to assess loneliness in the baseline survey.

Dependent variable: self-reported unmet healthcare needs in previous 12 months

Unmet healthcare needs are measured in the CLSA using a dichotomous variable (yes, no). Respondents are asked if there was a time when they needed healthcare in the last 12 months but did not receive it. The unmet needs items were only available for the first follow-up survey and not baseline. Survey respondents were also asked about the reason for the perceived unmet healthcare need with the following question 'Thinking of the most recent time, why did not you get care?' Participants could choose multiple responses from the following list: (1) not available—in the area, (2) not available—at time required (eg, doctor on holidays, inconvenient hours), (3) waiting time too long, (4) felt would be inadequate, (5) cost, (6) too busy, (7) did not get around to it/did not bother, (8) decided not to seek care, (9) doctor—did not think it was necessary and (10) other.

Covariates: predisposing, enabling, need variables

We included other variables in our analysis based on the Andersen's Behavioural Model of Health Service utilisation that have been associated with unmet healthcare needs.[31] Predisposing factors typically include demographic and social characteristics. We examined respondent age (<65, 65+), education (university degree or higher) and gender. Gender was examined in our study as both a covariate and stratification variable. It was measured as the respondent's reported gender identity at the time of the survey (male, female, transgender man/transman, transgender woman/transwoman, genderqueer, other and do not know). We used the following categories: men (includes transmen), women (includes transwomen), gender diverse (gender queer, other, do not know). These three categories are consistent with Statistics Canada's gender classification.[36] We examined respondent gender, rather than sex at birth, because our interest was not in biological differences. Research demonstrates that gender-related factors influence both loneliness and unmet healthcare need.[37–39] We did analyse the overlap between respondent sex at birth and current gender identity and found high levels of concordance between the two measures.[26]

Enabling factors include personal or family resources and community or regional resources. We examined personal/family resources including household income (<US$20 000, US$20 000 to <US$50 000, US$50 000+), living alone (yes, no) and number and frequency of social contact (0–1, 2–3, 4–5).[40 41] Other enabling factors such as marital status were examined in the initial analytical stage; however, due to collinearity, they were removed from subsequent analyses. To measure social contact, we identified whether respondents had seen any of the following social contacts within the last 6 months: children, siblings, other relatives, close friends and neighbours. Each social contact was given a score of 1. Total social contact was scored from 0 to 5: 0–1=low contact, 2–3=moderate contact, 4–5=high contact. Other enabling factors relate to community resources, specifically access to a primary care physician and hospital.[42] Respondents were asked if they had seen their family doctor in the last 12 months (yes, no) and emergency department visit in the last 12 months (yes, no). We measured any care the individual received (professional or non-professional) across nine dimensions (personal care such as assistance with eating, dressing, bathing or toileting; medical care such as help taking medicine or help with nursing care; managing care such as making appointments; help with activities such as housework, home maintenance or outdoor work; transportation, including trips to the doctor or for shopping; meal preparation or delivery; none; other). We categorised respondents based on care received or not received in the last 12 months (no professional or non-professional care received, professional care only, non-professional only, both professional and non-professional care (exclusive categories)).

Need factors primarily focus on the individual's perceived healthcare needs or functional status. We examined self-perceived functional impairment (none, mild/moderate/severe/total impairment), self-perceived mental health (poor, fair/good/very good/excellent) and number of self-reported chronic conditions (<4, 4+).

Analysis

We calculated descriptive statistics using unweighted survey data for all variables and present these for our total sample and by gender (men, women, gender diverse). We present standardised differences in proportions for all variables by loneliness (lonely/not lonely). Standardised difference scores measure the effect size between two groups in studies using large sample sizes.[43] It is suggested that a difference in proportion of less than 10% (0.1) indicates little difference.[43] Logistic regression was used to estimate the association between loneliness and unmet healthcare needs in the previous 12 months. We used multivariable regression analysis first in the full sample and then disaggregated by gender, which was important given the role of gender in loneliness and the reporting

of unmet healthcare needs.[37] We used a block-enter technique to sequentially introduce variables into the model. This enabled us to examine the relative impact of loneliness on unmet healthcare needs after adding in predisposing, enabling and need variables. The blocks were structured as such: block 1 (primary independent variable: loneliness), block 2 (predisposing factors: age, gender, education), block 3 (enabling factors: income, living alone, social contact, family physician visit in last 12 months, emergency department visit in last 12 months, professional/non-professional care received), block 4 (need factors: functional impairment, self-rated mental health, chronic conditions). The regression analysis used analytical weights provided by the CLSA, which adjust for inclusion probability.[44] Unadjusted ORs (uOR) and adjusted ORs (aOR) using the analytical weights are presented. Due to the small number of gender diverse respondents, we adjusted only for age in this regression analysis. Statistical software used in the analyses were IBM SPSS V.26 and SAS V.9.4. We followed the Strengthening the Reporting of Observational Studies in Epidemiology guidelines for reporting observational cohort studies.

Patient and public involvement

There were no participants involved in the development of this study. The results of the CLSA are available to the public through the CLSA website and relevant social media.

RESULTS

In our sample of 44 423 respondents, 52.4% (n=23 257) were over 65 years of age, 66.4% (n=29 505) had an income over US$50 000, and 80.2% (n=35 626) had <4 chronic conditions (table 1). In the full sample, 23% were lonely (n=10 227). When respondent demographics were examined by loneliness, a different pattern emerged. Compared with those that were not lonely, a higher proportion of lonely respondents had an income less than US$50 000 (39.7%, n=4064 vs 23.1%, n=7911) and lived alone (41.9%, n=4306 vs 20.3%, n=6949). Lonely respondents had more functional impairment (22%, n=2249) compared with those that were not lonely (11.2%, n=3821). Lonely respondents had low social contact (11.8%, n=1210) compared with not lonely respondents (6.9%, n=2365). We found differences in the type of care received based on loneliness. A higher percentage of lonely respondents reported not receiving any care (7.2%, n=733) compared with those who were not lonely (3.5%, n=1200). For those that received both professional and non-professional care, those who were lonely reported a lower percentage of care received (73.9%, n=7556) compared with not lonely recipients (83.5%, n=28 564).

Of our total sample, 8.5% (n=3755) reported having an unmet healthcare need in the previous 12 months. Lonely respondents had a higher percentage of unmet healthcare needs (14.4%, n=1474) compared with those that were not lonely (6.7%, n=2281) (table 1). For those respondents who indicated they had an unmet healthcare need, most indicated the reason was due to waiting times (39.5%, n=1482) (online supplemental table 1). Overall, we did not observe significant differences reasons for unmet healthcare needs by loneliness. However, we did find that more respondents who were lonely reported cost as a reason for an unmet healthcare need (6.2%, n=91) compared with those that were not lonely (3.2%, n=74).

We examined loneliness and unmet healthcare needs by gender (table 1). Gender diverse respondents reported the highest percentage with unmet healthcare needs (28.2%, n=11, 95% CI 14.1% to 42.3%) followed by women (9.5%, n=2158, 95% CI 9.1% to 9.9%)) and men (7.3%, n=1597, 95% CI: 7.0% to 7.7%)). Women had the highest percentage of respondents who reported being both lonely and having an unmet healthcare need (15.4%, n=887, 95% CI 14.5% to 16.4%) compared with men (13.1%, n=583, 95% CI 12.1% to 14.1%).

Loneliness association with self-reported unmet healthcare needs in previous 12 months

We used a block entry method to examine the relative change in the adjusted odds of loneliness and unmet healthcare needs when predisposing, enabling and need factors were entered into the regression model (table 2). In the unadjusted model (block 1), loneliness was associated with an unmet healthcare need in the previous 12 months (uOR 2.36 (95 CI 2.20 to 2.53)), but this association was attenuated in subsequent models, with the largest change after the introduction of the enabling variables (ie, income, living alone, social contact, health service use, care received). In the final model, after adjusting for predisposing, enabling and need factors, we found that lonely respondents had higher odds of perceiving they had an unmet healthcare need in the previous 12 months than did not lonely respondents (aOR 1.80, 95% CI 1.64 to 1.97).

In the gender stratified fully adjusted models, loneliness was associated with only slightly greater likelihood of unmet healthcare needs in men (aOR 1.90, 95% CI 1.64 to 2.19) than in women (aOR 1.73, 95% CI 1.53 to 1.95) (tables 3 and 4). Due to a small size of the gender diverse strata, we conducted a modified logistic regression controlling only for age. In this gender diverse group, loneliness was also associated with increased likelihood of having an unmet healthcare need in the previous 12 months (aOR 1.38, 95% CI 0.23 to 8.29) (table 5).

DISCUSSION

In our large population-based sample of CLSA respondents, 8.5% had an unmet healthcare need in the previous 12 months. Our estimate of unmet needs is slightly lower than other Canadian reports; however, the samples have considerable variation. Comparable studies using Canadian Community Health Survey data examined a wide age range (ages 12 years and older) and

Table 1 Demographic characteristics, health, social and health service use of 44 423 CLSA Tracking and Comprehensive Follow-up 1 survey respondents (2015–2018) aged 45 years and older by loneliness (lonely, not lonely) and gender (men, women, gender diverse), Canada

		Lonely (n=44 423)			Men (n=21 675)		Women (n=22 693)		Gender diverse (n=39)	
					Lonely		Lonely		Lonely	
	Total	No	Yes	Std. difference	No	Yes	No	Yes	No	Yes
Variables	N (%)	N (%)	N (%)		N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Total	44 423(100)	34 196(77)	10 227(23)		17 213 (79.4)	4462 (20.6)	16 943 (74.7)	5750 (25.3)	28 (71.8)	11 (28.2)
Unmet needs										
Yes	3755 (8.5)	2281 (6.7)	1474 (14.4)	0.25	1002 (5.8)	583 (13.1)	1271 (7.5)	887 (15.4)	8 (28.6)	3 (27.3)
No	40 668 (91.5)	31 915 (93.3)	8753 (85.6)	0.25	16 211 (94.2)	3879 (86.9)	15 672 (92.5)	4863 (84.6)	20 (71.4)	8 (72.7)
Age (years)										
<65	21 166 (47.6)	16 230 (47.5)	4936 (48.3)	0.02	7913(46)	2180 (48.9)	8300(49)	2746 (47.8)	15 (53.6)	7 (63.6)
65+	23 257 (52.4)	17 966 (52.5)	5291 (51.7)	0.02	9300(54)	2282 (51.1)	8643(51)	3004 (52.2)	13 (46.4)	4 (36.4)
Education*										
Less than university	22 830 (51.4)	17 287 (50.6)	5543 (54.2)		8023 (46.6)	2233(50)	9248 (54.6)	3307 (57.5)	9 (32.1)	3 (27.3)
University or higher	18 932 (42.6)	15 084 (44.1)	3848 (37.6)		8301 (48.2)	1899 (42.6)	6761 (39.9)	1942 (33.8)	18 (64.3)	4 (36.4)
Income										
<US$20 000	2072 (4.7)	1099 (3.2)	973 (9.5)	0.26	339(2)	332 (7.4)	756 (4.5)	635(11)	3 (10.7)	5 (45.5)
US$20 000 to <US$50 000	9903 (22.3)	6812 (19.9)	3091 (30.2)	0.24	2795 (16.2)	1177 (26.4)	4006 (23.6)	1911 (33.2)	9 (32.1)	3 (27.3)
US$50 000+	29 505 (66.4)	24 202 (70.8)	5303 (51.9)	0.40	13 340 (77.5)	2659 (59.6)	10 842(64)	2639 (45.9)	14(50)	2 (18.2)
Living alone										
No	33 187 (74.7)	27 247 (79.7)	5940 (58.1)	0.48	14 890 (86.5)	2785 (62.4)	12 330 (72.8)	3150 (54.8)	20 (71.4)	2 (18.2)
Yes	11 236 (25.3)	6949 (20.3)	4287 (41.9)	0.48	2323 (13.5)	1677 (37.6)	4613 (27.2)	2600 (45.2)	8 (28.6)	9 (81.8)
No of chronic conditions										
<4	35 626 (80.2)	28 397(83)	7229 (70.7)	0.30	15 286 (88.8)	3546 (79.5)	13 079 (77.2)	3675 (63.9)	24 (85.7)	6 (54.5)
4+	8797 (19.8)	5799(17)	2998 (29.3)	0.30	1927 (11.2)	916 (20.5)	3864 (22.8)	2075 (36.1)	4 (14.3)	5 (45.5)
Functional impairment										
None	37 017 (83.3)	29 358 (85.9)	7659 (74.9)	0.28	15 819 (91.9)	3730 (83.6)	13 507 (79.7)	3920 (68.2)	25 (89.3)	6 (54.5)
Mild/moderate/severe/total	6070 (13.7)	3821 (11.2)	2249(22)	0.29	1213(7)	681 (15.3)	2601 (15.4)	1563 (27.2)	2 (7.1)	4 (36.4)
Self-rated mental health										
Poor	384 (0.9)	117 (0.3)	267 (2.6)	0.19	56 (0.3)	127 (2.8)	61 (0.4)	140 (2.4)	0 (0)	0 (0)
Fair/good/very good/excellent	43 978(99)	34 044 (99.6)	9934 (97.1)	0.19	17 141 (99.6)	4325 (96.9)	16 863 (99.5)	5596 (97.3)	28(100)	9 (81.8)
No of social contacts										
Median (Q1–Q3)	2 (2–3)	3 (2–3)	2 (2–3)		2 (2–3)	2 (2–3)	3 (2–3)	2 (2–3)	2 (2–3)	2 (1–2)
High contact (4–5)	22 091 (49.7)	17 878 (52.3)	4213 (41.2)	0.22	8519 (49.5)	1668 (37.4)	9348 (55.2)	2541 (44.2)	7 (25)	2 (18.2)
Moderate contact (2–3)	18 756 (42.2)	13 952 (40.8)	4804(47)	0.12	7320 (42.5)	2173 (48.7)	6606(39)	2625 (45.7)	20 (71.4)	4 (36.4)

Continued

Table 1 Continued

Variables	Total	Lonely (n=44 423)		Std. difference	Men (n=21 675)		Women (n=22 693)		Gender diverse (n=39)	
		No	Yes		Lonely		Lonely		Lonely	
	N (%)	N (%)	N (%)		No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)
Low contact (0–1)	3575(8)	2365 (6.9)	1210 (11.8)	0.17	1374(8)	621 (13.9)	988 (5.8)	584 (10.2)	1 (3.6)	5 (45.5)
Family doctor in last 12 months										
No	3938 (8.9)	3086(9)	852 (8.3)	0.02	1694 (9.8)	440 (9.9)	1389 (8.2)	412 (7.2)	2 (7.1)	0 (0)
Yes	40 443(91)	31 080 (90.9)	9363 (91.6)	0.02	15 510 (90.1)	4016(90)	15 533 (91.7)	5332 (92.7)	26 (92.9)	11(100)
Care received										
No care received	1933 (4.4)	1200 (3.5)	733 (7.2)	0.16	479 (2.8)	247 (5.5)	720 (4.2)	486 (8.5)	1 (3.6)	0 (0)
Non-professional received	1536 (3.5)	985 (2.9)	551 (5.4)	0.13	435 (2.5)	216 (4.8)	547 (3.2)	330 (5.7)	0 (0)	5 (45.5)
Professional received	4833 (10.9)	3446 (10.1)	1387 (13.6)	0.11	1416 (8.2)	493(11)	2024 (11.9)	892 (15.5)	2 (7.1)	1 (9.1)
Both non-professional and professional received	36 120 (81.3)	28 564 (83.5)	7556 (73.9)	0.24	14 882 (86.5)	3506 (78.6)	13 652 (80.6)	4042 (70.3)	25 (89.3)	5 (45.5)

*Missing education data from n=2661.
CLSA, Canadian Longitudinal Study on Aging.

found that between 10% and 12% of respondents report an unmet need.[3 4] Twenty-three per cent of our sample were identified as lonely and our descriptive findings indicate that lonely respondents had a different demographic profile than non-lonely respondents. Those who were lonely tended to lived alone, had lower income, less social contact and more functional impairment. Nearly 15% of lonely respondents reported an unmet healthcare need compared with 6.7% in non-lonely respondents.

Loneliness was associated with increased likelihood of unmet healthcare needs in the previous 12 months, adjusted for various predisposing, enabling and need factors. While research on loneliness and healthcare utilisation is mixed and has methodological limitations,[24 45] findings suggest that compared with those who are not lonely, lonely individuals are more likely to use certain types of health services, such as more frequent emergency department visits and more visits to general practitioners.[19 26] Researchers examining loneliness and visits to primary care providers have found that those who are lonely have a greater number of visits to providers than those who are not lonely.[25] These findings may in part be due to a lonely person's desire to connect socially with care providers and integrate the provider into their social network or support system. Lonely individuals having unmet healthcare needs may also point to challenges accessing other routine or preventative services and using health services outside a reactive, acute care setting. Certain types of health service use often related to more routine or preventative care may require support that lonely individuals lack. This support may include someone to assist with regular monitoring, to recognise the need for different care and services, and to facilitate access to services like scheduling visits and accompanying them to appointments. Furthermore, lonely people may not use more routine or preventative healthcare—and therefore have more unmet healthcare needs despite using more healthcare services— because they have developed poor health behaviours more broadly that reinforce negative feelings about their health and about taking ownership of health and well-being.[46] Loneliness and its relationship to healthcare utilisation has sparked renewed interest in the role of the health system broadly and specifically general practitioners in the identification and screening for loneliness.[47–49] Initiatives such as social prescribing may be an approach for clinicians to help address loneliness for community-dwelling older adults; however, a recent systematic review found while patients and providers consider it a helpful tool, the small number of studies and evidence variability limit the extent to which any conclusions can be drawn.[50] Lonely individuals may not have robust social connections to help them access services which could result in reporting an unmet healthcare need. A study using the Canadian Community Health Survey data examined respondents' sense of community belonging and likelihood of unmet healthcare needs and found that weaker ties were associated with increased likelihood of reporting unmet healthcare needs.[11] Not

Table 2 Logistic regression model results to test associations between loneliness and unmet healthcare needs in 44 423 CLSA Tracking and Comprehensive Follow-up 1 (2015–2018) survey respondents aged 45 years and older, Canada

	Block 1 OR		Block 2 OR		Block 3 OR		Block 4 OR	
Variables	Unadjusted	Adjusted (weighted)	Unadjusted	Adjusted (weighted)	Unadjusted	Adjusted (weighted)	Unadjusted	Adjusted (weighted)
Lonely (ref: not lonely)	2.36 (2.2–2.53)			2.37 (2.19–2.57)		1.98 (1.81–2.16)		1.80 (1.64–1.97)
Predisposing								
Age 65+ (ref: <65)			0.80 (0.75–0.85)	0.81 (0.75–0.87)		0.70 (0.65–0.76)		0.66 (0.60–0.72)
Women (ref: men)			1.33 (1.24–1.42)	1.30 (1.20–1.41)		1.24 (1.14–1.35)		1.16 (1.06–1.26)
Gender diverse (ref: men)			4.98 (2.47–0.02)	4.88 (2.18–0.89)		3.63 (1.34–9.84)		3.10 (1.06–9.09)
University degree or higher (ref: less than university)			0.96 (0.90–1.03)	1.03 (0.95–1.11)		1.13 (1.04–1.23)		1.16 (1.06–1.26)
Enabling								
Income US$20 000 to <US$50 000 (ref: <US$20 000)					0.59 (0.51–0.67)	0.72 (0.61–0.86)		0.81 (0.68–0.97)
Income US$50 000+ (ref: <US$20 000)					0.43 (0.38–0.49)	0.54 (0.45–0.65)		0.64 (0.54–0.77)
Living alone (ref: no)					1.38 (1.29–1.49)	0.90 (0.82–1.00)		0.93 (0.84–1.03)
Moderate contact (2–3) (ref: high contact 4–5)					1.24 (1.16–1.33)	1.17 (1.07–1.27)		1.15 (1.05–1.25)
Low contact (0–1) (ref: high contact 4–5)					1.70 (1.52–1.90)	1.47 (1.28–1.69)		1.41 (1.22–1.62)
Family physician last 12 months (ref: no)					1.02 (0.91–1.15)	0.98 (0.85–1.14)		0.92 (0.80–1.07)
ED visit in last 12 months (ref: no)					2.18 (2.03–2.33)	1.84 (1.68–2.02)		1.73 (1.58–1.90)
Non-professional received (ref: none)					0.68 (0.55–0.82)	0.65 (0.51–0.83)		0.65 (0.50–0.84)
Professional received (ref: none)					0.82 (0.71–0.95)	0.76 (0.63–0.91)		0.89 (0.73–1.07)
Non-professional/professional received (ref: none)					0.40 (0.35–0.45)	0.45 (0.38–0.53)		0.60 (0.5–0.73)
Need								
Functional impairment (ref: no impairment)							2.17 (2.00–2.35)	1.37 (1.21–1.54)
Self-rated mental health (ref: poor)							0.19 (0.15–0.24)	0.36 (0.27–0.47)
4+ chronic conditions (ref: <4)							2.30 (2.14–2.48)	1.74 (1.58–1.92)

CLSA, Canadian Longitudinal Study on Aging; ED, emergency department.

Table 3 Logistic regression model results by gender (women) to test associations between loneliness and unmet needs in CLSA Tracking and Comprehensive Follow-up 1 (2015–2018) survey

	Women (N=22 693)							
	Block 1 OR		Block 2 OR		Block 3 OR		Block 4 OR	
Variables	Unadjusted	Adjusted (weighted)	Unadjusted	Adjusted (weighted)	Unadjusted	Adjusted (weighted)	Unadjusted	Adjusted (weighted)
Lonely (ref: not lonely)	2.25 (2.05–2.47)			2.32 (2.09–2.58)		1.90 (1.7–2.14)		1.73 (1.53–1.95)
Predisposing								
Age 65+ (ref: <65)			0.82 (0.75–0.90)	0.82 (0.74–0.9)		0.70 (0.63–0.79)		0.65 (0.57–0.73)
University degree or higher (ref: less than university)			1.04 (0.95–1.14)	1.07 (0.97–1.19)		1.18 (1.05–1.32)		1.21 (1.08–1.36)
Enabling								
Income US$20 000 to <US$50 000 (ref: <$20,000)					0.57 (0.48–0.67)	0.62 (0.5–0.77)		0.70 (0.57–0.87)
Income US$50 000+ (ref: <US$20 000)					0.47 (0.40–0.54)	0.49 (0.39–0.60)		0.58 (0.47–0.73)
Living alone (ref: no)					1.20 (1.09–1.31)	0.85 (0.75–0.97)		0.88 (0.77–1.00)
Moderate contact (2–3) (ref: high contact 4–5)					1.25 (1.14–1.37)	1.15 (1.03–1.29)		1.12 (1.00–1.26)
Low contact (0–1) (ref: high contact 4–5)					1.70 (1.45–1.99)	1.48 (1.22–1.8)		1.44 (1.18–1.75)
Family physician last 12 months (ref: no)					1.04 (0.88–1.23)	0.98 (0.8–1.19)		0.91 (0.74–1.11)
ED visit in last 12 months (ref:no)					2.34 (2.14–2.57)	2.03 (1.8–2.28)		1.90 (1.68–2.14)
Non-professional received (ref: none)					0.74 (0.58–0.94)	0.8 (0.59–1.08)		0.81 (0.59–1.11)
Professional received (ref: none)					0.81 (0.67–0.96)	0.74 (0.58–0.93)		0.85 (0.67–1.08)
Non-professional/professional received(ref:none)					0.41 (0.35–0.48)	0.47 (0.38–0.59)		0.64 (0.51–0.80)
Need								
Functional impairment (ref: no impairment)							2.01 (1.82–2.22)	1.36 (1.18–1.58)
Self-rated mental health (ref: poor)							0.18 (0.13–0.24)	0.29 (0.20–0.43)
4+ chronic conditions (ref: <4)							2.20 (2.01–2.41)	1.73 (1.53–1.96)

CLSA, Canadian Longitudinal Study on Aging; ED, emergency department.

Table 4 Logistic regression model results by gender (men) to test associations between loneliness and unmet needs in CLSA Tracking and Comprehensive Follow-up 1 (2015–2018) survey

	Men (N=21 675)							
Variables	**Block 1 OR**		**Block 2 OR**		**Block 3 OR**		**Block 4 OR**	
	Unadjusted	**Adjusted (weighted)**	**Unadjusted**	**Adjusted (weighted)**	**Unadjusted**	**Adjusted (weighted)**	**Unadjusted**	**Adjusted (weighted)**
Lonely (ref: not lonely)	2.43 (2.18–2.71)			2.45 (2.16–2.78)		2.08 (1.81–2.39)		1.90 (1.64–2.19)
Predisposing								
Age 65+ (ref: <65)			0.78 (0.71–0.87)	0.81 (0.72–0.91)		0.72 (0.63–0.81)		0.67 (0.59–0.77)
University degree or higher (ref: less than university)			0.92 (0.83–1.03)	0.97 (0.86–1.09)		1.07 (0.94–1.21)		1.09 (0.96–1.24)
Enabling								
Income US$20 000 to <US$50 000 (ref: <US$20 000)					0.67 (0.52–0.85)	0.96 (0.70–1.30)		1.08 (0.79–1.49)
Income US$50 000+ (ref: <US$20 000)					0.44 (0.35–0.56)	0.67 (0.49–0.9)		0.79 (0.57–1.08)
Living alone (ref: no)					1.57 (1.39–1.76)	1.01 (0.86–1.2)		1.04 (0.88–1.23)
Moderate contact (2–3) (ref: high contact 4–5)					1.28 (1.14–1.42)	1.19 (1.04–1.36)		1.18 (1.03–1.35)
Low contact (0–1) (ref: high contact 4–5)					1.79 (1.52–2.11)	1.46 (1.20–1.79)		1.39 (1.13–1.71)
Family physician last 12 months (ref: no)					0.97 (0.81–1.14)	1.00 (0.81–1.23)		0.94 (0.76–1.16)
ED visit in last 12 months (ref:no)					1.97 (1.76–2.19)	1.64 (1.42–1.88)		1.54 (1.34–1.78)
Non-professional received (ref: none)					0.58 (0.41–0.81)	0.45 (0.30–0.69)		0.46 (0.29–0.71)
Professional received (ref: none)					0.85 (0.67–1.09)	0.78 (0.58–1.06)		0.94 (0.68–1.30)
Non-professional/professional received(ref:none)					0.41 (0.33–0.51)	0.41 (0.31–0.54)		0.56 (0.41–0.76)
Need								
Functional impairment (ref: no impairment)							2.23 (1.94–2.57)	1.40 (1.13–1.73)
Self-rated mental health (ref: poor)							0.21 (0.15–0.28)	0.45 (0.29–0.67)
4+chronic conditions (ref: <4)							2.31 (2.04–2.6)	1.82 (1.54–2.14)

CLSA, Canadian Longitudinal Study on Aging.

Table 5 Logistic regression model results by gender (gender diverse) to test associations between loneliness and unmet needs in CLSA Tracking and Comprehensive Follow-up 1 (2015–2018) survey

	Gender diverse (N=39)	
Variables	Unadjusted	Adjusted (weighted)
Lonely (ref: not lonely)	0.94 (0.20–4.46)	1.38 (0.23–8.29)
Age 65+ (ref: <65)	0.19 (0.04–1.06)	0.16 (0.03–1.05)

CLSA, Canadian Longitudinal Study on Aging.

having close ties or the perception of insufficient social connection (loneliness) could inhibit one's ability to seek out and/or access care. Our finding that lonely individuals report more unmet healthcare needs, irrespective of sociodemographic and health factors, could also indicate that loneliness contributes to a persistent feeling of dissatisfaction, reinforcing the feeling that a need is not being met. Interventions aimed at reducing loneliness have been described in numerous reviews, ranging from personal contact interventions (eg, friendly visitor programmes) to animal/pet therapy and various technological interventions[51 52]; however, these reviews found small to medium effect sizes and note significant limitations of the included studies such as variable study quality, small sample sizes, distinct populations (eg, community vs nursing homes) and incomparable loneliness measures. Efforts to address loneliness will remain stalled until findings from robust interventions are available.

In our fully adjusted analysis including women and men, we found that women had greater odds of reporting unmet healthcare needs compared with men, adjusted for other covariates. In our gender-stratified regression analysis, we found a slightly stronger association between loneliness and unmet healthcare needs among men than women; however, the CIs did overlap so our finding was inconclusive. Our findings do indicate that something is much different among the gender diverse respondents. Although their reported prevalence of loneliness was lower, their unmet healthcare need was much higher and strongly associated with loneliness. We examined gender diverse respondents and found that compared with women and men, they had the highest percentage of unmet healthcare needs. Interestingly, the aOR estimates for loneliness and unmet needs were lower in the gender diverse group (aOR: 1.38) than the full sample (aOR: 1.80) and women (aOR: 1.73) and men samples (aOR: 1.90), respectively. Unlike women and men, the gender diverse group with unmet needs does not seem to vary as much by loneliness. Due to a small sample of gender diverse respondents, we are unable to draw meaningful conclusions from our logistic regression analysis, but our findings do point to an important area for future inquiry. A recent meta-analysis compared loneliness between sexual minority (ie, non-heterosexual) and heterosexual individuals and found that sexual minority individuals were more likely to report feelings of loneliness.[53] This association was observed for both younger and older adults. Higher prevalence of loneliness in this population speaks to a need for distinct interventions to address their unique needs and systemic access barriers they may face. We must be aware of context and historical issues that might influence certain populations desire and ability to seek care. Unmet healthcare needs in gender diverse individuals may be due to poor experiences seeking care related to stigma and discrimination which might lead them to delay seeking care.[54] Sharek *et al*[54] interviewed older lesbian, gay, bisexual and transgender persons about their use and concerns accessing healthcare services and many reported that care providers did not have enough knowledge about their specific issues and did not feel respected by care providers. Our small sample of gender diverse respondents speaks to broader challenges about the sample in the CLSA. Our study and the CLSA sample generally is composed primarily of white, middle class, urban-dwelling individuals and, as a result, we are unable to delve into issues related to loneliness and unmet healthcare needs in diverse populations. It is unclear how other social (eg, ethnocultural traditions related to caregiving) and geographical barriers (eg, rural location) may contribute to unmet healthcare needs.

Limitations

We examined data from a large population-based survey; however, as is the case in many national surveys, the respondents are relatively homogenous. A large proportion (29%) of respondents who had an unmet healthcare need indicated that the reason for that unmet healthcare need was 'other', with no further information. While we aimed to examine differences in unmet healthcare needs based on gender, sample size across the strata were small and made it difficult to explore differences by gender and reason for unmet healthcare need. The small number of gender diverse respondents leaves us unable to generalise our findings for this important group. This study was cross-sectional, loneliness and unmet needs in the previous 12 months were assessed only once and in the same survey (first follow-up).

Given that both items were asked in the same survey, and only at first follow-up (not baseline), the temporal relationship between loneliness and unmet needs is unclear. Unmet needs may also lead to loneliness and the potential bidirectional nature of this relationship cannot be fully explored without longitudinal data. We hope with future waves of CLSA data collection we will be able to further examine temporal relationships between loneliness and unmet needs.

Conclusion

Our findings indicate that lonely individuals may not have robust social connections to help them access services which could coincide with reporting an unmet healthcare need. Identifying loneliness early and intervening is

essential to mitigate the potential negative effects of loneliness on health and associated unmet needs.

Author affiliations
[1]Faculty of Nursing, University of Alberta, Edmonton, Alberta, Canada
[2]Women's College Research Institute, Toronto, Ontario, Canada
[3]ICES, Toronto, Ontario, Canada
[4]University of Toronto Institute of Health Policy Management and Evaluation, Toronto, Ontario, Canada
[5]Department of Health Research Methods, Evidence, and Impact, McMaster University, Hamilton, Ontario, Canada
[6]Division of Geriatric Medicine, University of Toronto Department of Medicine, Toronto, Ontario, Canada
[7]Department of Family Medicine, University of Alberta Faculty of Medicine & Dentistry, Edmonton, Alberta, Canada

Twitter Rachel D Savage @savagera and Lauren E Griffith @LaurenGriff1

Acknowledgements This research was made possible using the data/biospecimens collected by the Canadian Longitudinal Study on Aging (CLSA). Funding for the Canadian Longitudinal Study on Aging (CLSA) is provided by the Government of Canada through the Canadian Institutes of Health Research (CIHR) under grant reference: LSA 94473 and the Canada Foundation for Innovation, as well as the following provinces, Newfoundland, Nova Scotia, Quebec, Ontario, Manitoba, Alberta and British Columbia. This research has been conducted using the CLSA dataset Baseline Tracking Dataset version 3.6, Baseline Comprehensive Dataset version 4.2, Follow-up 1 Tracking version 2.1 and Follow-up 1 Comprehensive version 3.0 under Application Number 20CA004. The CLSA is led by Drs. Parminder Raina, Christina Wolfson and Susan Kirkland.

Contributors SC, AG, LEG, SEB, RDS and PR planned the study. JB conducted the data analysis. SC and AG drafted the manuscript. All authors contributed to the development and revision of the final manuscript. All authors have read and approved the manuscript. SC is the study guarantor and accepts full responsibility for the work.

Funding This work was supported by a Canadian Institutes of Health Research Catalyst Grant: Analysis of Canadian Longitudinal Study in Aging (CLSA) to AG (Grant #: 170313). SC was supported by a Canadian Institutes of Health Research Postdoctoral Fellowship (#430201) and Professorship funding from the Faculty of Nursing at the University of Alberta.

Disclaimer The funders had no role in the design, conduct, interpretation, or writing of the manuscript. The opinions expressed in the manuscript are the author's own and do not reflect the views of the Canadian Longitudinal Study on Aging.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Consent obtained directly from patient(s).

Ethics approval We received research ethics approval from the University of Alberta (Pro00100416). Informed consent was obtained from all CLSA participants prior to data collection.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available from the Canadian Longitudinal Study on Aging (www.clsa-elcv.ca) for researchers who meet the criteria for access to deidentified CLSA data.

ORCID iDs
Stephanie Chamberlain http://orcid.org/0000-0001-9602-3060
Rachel D Savage http://orcid.org/0000-0002-2746-373X
Susan E Bronskill http://orcid.org/0000-0002-7341-0655
Lauren E Griffith http://orcid.org/0000-0002-2794-9692
Paula Rochon http://orcid.org/0000-0002-5973-4151

REFERENCES

1 Alonso J, Orfila F, Ruigómez A, *et al*. Unmet health care needs and mortality among Spanish elderly. *Am J Public Health* 1997;87:365–70.
2 Lindström C, Rosvall M, Lindström M. Unmet health-care needs and mortality: a prospective cohort study from southern Sweden. *Scand J Public Health* 2020;48:267–74.
3 Sanmartin C, Houle C, Tremblay S, *et al*. Changes in unmet health care needs. *Health Rep* 2002;13:15–21.
4 Tadiri CP, Gisinger T, Kautzky-Willer A, *et al*. Determinants of perceived health and unmet healthcare needs in universal healthcare systems with high gender equality. *BMC Public Health* 2021;21:1488.
5 CIHI. Commonwealth fund survey, 2021. Available: www.cihi.ca/en/commonwealth-fund-survey-2021 [Accessed 22 Aug 2022].
6 Connolly S, Wren M-A. Unmet healthcare needs in ireland: analysis using the EU-SILC survey. *Health Policy* 2017;121:434–41.
7 Herr M, Arvieu J-J, Aegerter P, *et al*. Unmet health care needs of older people: prevalence and predictors in a French cross-sectional survey. *Eur J Public Health* 2014;24:808–13.
8 Hlebec V, Srakar A, Majcen B. Determinants of unmet needs among Slovenian old population. *Zdr Varst* 2016;55:78–85.
9 Hwang J. Understanding reasons for unmet health care needs in korea: what are health policy implications? *BMC Health Serv Res* 2018;18:557.
10 Jang H-Y, Ko Y, Han S-Y. The effects of social networks of the older adults with limited instrumental activities of daily living on unmet medical needs. *Int J Environ Res Public Health* 2020;18:27.
11 Baiden P, den Dunnen W, Arku G, *et al*. The role of sense of community belonging on unmet health care needs in Ontario, Canada: findings from the 2012 Canadian community health survey. *J Public Health* 2014;22:467–78.
12 Cacioppo S, Grippo AJ, London S, *et al*. Loneliness: clinical import and interventions. *Perspect Psychol Sci* 2015;10:238–49.
13 Ong AD, Uchino BN, Wethington E. Loneliness and health in older adults: a mini-review and synthesis. *Gerontology* 2016;62:443–9.
14 Perissinotto CM, Covinsky KE. Living alone, socially isolated or Lonely -- what are we measuring? *J Gen Intern Med* 2014;29:1429–31.
15 Park C, Majeed A, Gill H, *et al*. The effect of loneliness on distinct health outcomes: a comprehensive review and meta-analysis. *Psychiatry Res* 2020;294:S0165-1781(20)33175-9.
16 Rico-Uribe LA, Caballero FF, Martín-María N, *et al*. Association of loneliness with all-cause mortality: a meta-analysis. *PLoS ONE* 2018;13:e0190033.
17 Cacioppo JT, Hawkley LC, Ernst JM, *et al*. Loneliness within a nomological net: an evolutionary perspective. *J Res Personality* 2006;40:1054–85.
18 Saporta N, Scheele D, Lieberz J, *et al*. Opposing association of situational and chronic loneliness with interpersonal distance. *Brain Sci* 2021;11:1135.
19 Chamberlain SA, Bronskill SE, Hsu Z, *et al*. Resident loneliness, social isolation and unplanned emergency department visits from supportive living facilities: a population-based study in Alberta, Canada. *BMC Geriatr* 2022;22:21.
20 Genell Andrén K, Rosenqvist U. Heavy users of an emergency department -- a two year follow-up study. *Soc Sci Med* 1987;25:825–31.
21 Gerst-Emerson K, Jayawardhana J. Loneliness as a public health issue: the impact of loneliness on health care utilization among older adults. *Am J Public Health* 2015;105:1013–9.
22 Hastings SN, George LK, Fillenbaum GG, *et al*. Does lack of social support lead to more ED visits for older adults? *Am J Emerg Med* 2008;26:454–61.
23 Wang H, Zhao E, Fleming J, *et al*. Is loneliness associated with increased health and social care utilisation in the oldest old? findings from a population-based longitudinal study. *BMJ Open* 2019;9:e024645.

24 Smith KJ, Victor C. The association of loneliness with health and social care utilization in older adults in the general population: a systematic review. *Gerontologist* 2022;62:e578–96.
25 Sirois FM, Owens J. A meta-analysis of loneliness and use of primary health care. *Health Psychol Rev* 2021:1–18.
26 Chamberlain SA, Savage R, Bronskill SE, *et al*. Examining the association between loneliness and emergency department visits using Canadian longitudinal study of aging (CLSA) data: a retrospective cross-sectional study. *BMC Geriatr* 2022;22:69.
27 Savage RD, Wu W, Li J, *et al*. Loneliness among older adults in the community during COVID-19: a cross-sectional survey in Canada. *BMJ Open* 2021;11:e044517.
28 Burns A, Leavey G, Ward M, *et al*. The impact of loneliness on healthcare use in older people: evidence from a nationally representative cohort. *J Public Health* 2020.
29 Manuel JI, Stebbins MB, Wu E. Gender differences in perceived unmet treatment needs among persons with and without co-occurring disorders. *J Behav Health Serv Res* 2018;45:1–12.
30 Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav* 1995;36:1–10.
31 Andersen RM. National health surveys and the behavioral model of health services use. *Med Care* 2008;46:647–53.
32 Raina PS, Wolfson C, Kirkland SA, *et al*. The Canadian longitudinal study on aging (CLSA). *Can J Aging* 2009;28:221–9.
33 Raina P, Wolfson C, Kirkland S, *et al*. Cohort profile: the Canadian longitudinal study on aging (CLSA). *Int J Epidemiol* 2019;48:1752–1753j.
34 Hughes ME, Waite LJ, Hawkley LC, *et al*. A short scale for measuring loneliness in large surveys: results from two population-based studies. *Res Aging* 2004;26:655–72.
35 Steptoe A, Shankar A, Demakakos P, *et al*. Social isolation, loneliness, and all-cause mortality in older men and women. *Proc Natl Acad Sci U S A* 2013;110:5797–801.
36 Statistics Canada. Classification of gender. 2021. Available: www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=467245&CVD=467245&CLV=0&MLV=1&D=1
37 Bryant T, Leaver C, Dunn J. Unmet healthcare need, gender, and health inequalities in Canada. *Health Policy* 2009;91:24–32.
38 Dahlberg L, Andersson L, McKee KJ, *et al*. Predictors of loneliness among older women and men in Sweden: a national longitudinal study. *Aging Ment Health* 2015;19:409–17.
39 Redondo-Sendino A, Guallar-Castillón P, Banegas JR, *et al*. Gender differences in the utilization of health-care services among the older adult population of Spain. *BMC Public Health* 2006;6:1–9.
40 Dickens AP, Richards SH, Greaves CJ, *et al*. Interventions targeting social isolation in older people: a systematic review. *BMC Public Health* 2011;11:1–22.
41 Dury R. Social isolation and loneliness in the elderly: an exploration of some of the issues. *Br J Community Nurs* 2014;19:125–8.
42 Fan L, Shah MN, Veazie PJ, *et al*. Factors associated with emergency department use among the rural elderly. *J Rural Health* 2011;27:39–49.
43 Austin PC. Using the standardized difference to compare the prevalence of a binary variable between two groups in observational research. *Communications in Statistics - Simulation and Computation* 2009;38:1228–34.
44 CLSA technical document: sampling and computation of response rates and sample weights for the tracking (telephone interview) participants and comprehensive participants. 2020. Available: www.clsa-elcv.ca/doc/3965
45 Valtorta NK, Moore DC, Barron L, *et al*. Older adults' social relationships and health care utilization: a systematic review. *Am J Public Health* 2018;108:e1–10.
46 Hawkley LC, Cacioppo JT. Loneliness matters: a theoretical and empirical review of consequences and mechanisms. *Ann Behav Med* 2010;40:218–27.
47 Mullen RA, Tong S, Sabo RT, *et al*. Loneliness in primary care patients: a prevalence study. *Ann Fam Med* 2019;17:108–15.
48 National Academies of Sciences E, Medicine. *Social isolation and loneliness in older adults: opportunities for the health care system*. National Academies Press, 2020.
49 Freedman A, Nicolle J. Social isolation and loneliness: the new geriatric giants: approach for primary care. *Can Fam Physician* 2020;66:176–82.
50 Reinhardt GY, Vidovic D, Hammerton C. Understanding loneliness: a systematic review of the impact of social prescribing initiatives on loneliness. *Perspect Public Health* 2021;141:204–13.
51 Hoang P, King JA, Moore S, *et al*. Interventions associated with reduced loneliness and social isolation in older adults: a systematic review and meta-analysis. *JAMA Netw Open* 2022;5:e2236676.
52 O'Rourke HM, Collins L, Sidani S. Interventions to address social connectedness and loneliness for older adults: a scoping review. *BMC Geriatr* 2018;18:214.
53 Gorczynski, PhD P, Fasoli, PhD F. Loneliness in sexual minority and heterosexual individuals: a comparative meta-analysis. *Journal of Gay & Lesbian Mental Health* 2022;26:112–29.
54 Sharek DB, McCann E, Sheerin F, *et al*. Older LGBT people's experiences and concerns with healthcare professionals and services in Ireland. *Int J Older People Nurs* 2015;10:230–40.