

Social isolation in older adults residing in social housing in Ontario: a cross-sectional study

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Abstract

Background: Older adults, particularly those living in social housing, face greater risk of social isolation. Thus, this study aims to explore the rate of, and risk factors contributing towards, social isolation in low-income older adults in social housing.

Methods: A cross-sectional design was used to study data collected between May 2018 to May 2019 from the Community Paramedicine at Clinic (CP@clinic) program. A total of 806 adult participants residing in designated seniors' or mixed family-seniors' public housing buildings attended CP@clinic within fourteen communities across Ontario, Canada.

Results: Based on the Three-Item UCLA Loneliness Scale, nearly half of the participants were socially isolated, with 12.4% socially isolated and at risk of potential depression. Increased age (OR = 3.05, 95%CI 1.54-6.06), being separated (OR = 4.64, 95%CI 1.59-13.52), divorced (OR = 2.36, 95%CI 1.25-4.49), or widowed (OR = 2.13, 95%CI 1.20-3.78), and experiencing problems doing usual activities were significantly associated with increased odds of social isolation (OR = 2.03, 95%CI 1.20-3.45), while belonging to a non-white ethnicity (OR = 0.53, 95%CI 0.31-0.88) and having a lower education level (OR = 0.46, 95%CI 0.28-0.74) were protective against social isolation.

Interpretation: At 45.8%, the rate of social isolation in low-income older adults living in social housing was over twice the rate observed in the general population aged 65 and over. Structural barriers could prevent engagement in social activities or maintenance of social support. Further research should explore which aspects of social isolation are most relevant to older adults for inclusion in measurement tools.

Introduction

Seniors aged 65 and over are the fastest growing age group in Ontario, projected to increase from 16.9% of the population in 2018 to 23.4% by 2046.¹ Approximately 75,000 seniors live in social housing in Ontario (subsidized, rent-geared-to-income units), while 50,295 senior households were on waiting lists in 2015, representing a third of households waiting for social housing in Ontario.² Given the significant and increasing number of older adults in Ontario living in social housing, it is important to understand factors influencing their health, such as social isolation.

Social isolation is the objective lack of social contacts or limitation in the frequency of interaction with social network members, including family, friends, and the larger community environment.³ In Canada, seniors are at high risk of social isolation,⁴ with 19% of adults over 65 reporting either a lack of companionship, feeling left out, and/or feeling isolated from others.⁵ Older adults are particularly vulnerable due to decreasing economic resources, reduced social networks, changes in household structure, and limitations in function and mobility.⁶ Social isolation is associated with an increased risk of cardiovascular disease, stroke, depression, dementia, and all-cause mortality.⁷⁻¹⁰ These health outcomes are particularly important for older adults living in social housing, given that this population reports poorer health and faces higher mortality rates than their unsubsidized counterparts.¹¹⁻¹² Social isolation also affects the broader community by increasing use of health and social services.¹³ For example, socially isolated older adults demonstrate higher rates of certain high-cost and possibly avoidable health care services, such as hospital readmissions and longer hospitalizations.¹⁴

While low income has been associated with social isolation among the general population, few studies have focused on social isolation in low-income older adults.¹⁵⁻¹⁶ Low-income older adults living in social housing typically have less social support and therefore face an even greater risk of social isolation.¹⁷ By identifying risk factors in this population, targeted interventions could be designed and policies developed to prevent social isolation and thereby improve quality of life,¹² reduce health inequalities,¹⁴ and decrease health system costs associated with social isolation in an aging population.¹⁴ Given the gap in literature on this hard-to-reach population, this study aims to explore the rate of, and risk factors contributing towards, social isolation in low-income older adults in social housing. Following the definition of “senior” used by many Ontario Housing providers for housing eligibility, we will define “older adults” as those aged 55 years of age and over.¹⁸ We hypothesize that social isolation and its risk factors will have a higher rate in older adults living in social housing compared to the general population.

Objectives

The present study aims to (1) estimate the rates of social isolation in an older adult social housing population in Ontario, and (2) identify risk factors associated with social isolation in an older adult social housing population in Ontario.

Methods

Study Setting and Participants

This cross-sectional study was conducted with data from the Community Paramedicine at Clinic (CP@clinic) program. CP@clinic is a community-based health promotion and disease prevention program held weekly in social housing for older adults. At this drop-in program, paramedics conduct risk assessments, provide health education, and offer referrals to community resources. For a detailed description of CP@clinic, see the published protocol for the randomized controlled trial.¹⁸

Study participants were adults living in designated seniors' or mixed family/seniors' social housing from fourteen regions across Ontario, Canada (Frontenac County, Grey County, Guelph, Halton Region, Hamilton, Hastings Region, Hearst, Iroquois Falls, Matheson, Norfolk Region, Peel Region, Sudbury, Timmins, and York Region). While the minimum age to qualify for seniors' social housing varies across Ontario, it can be as low as 55.¹⁸ The study sample included all program participants and data was collected between May 2018 and May 2019.

Measures

Standard measures were used for patient interviews to reduce bias in the data collection.

Social isolation: The validated Three-Item UCLA Loneliness Scale was used to assess the participant's own perception of their social isolation, which differs from objective measures of social contacts.¹⁹ Participants answered three questions: "How often do you feel that you lack companionship?", "How often do you feel left out?", and "How often do you feel isolated from others?", with the response options being "hardly ever," "some of the time," or "often." For each question, "hardly ever" corresponded to a score of 1, "some of the time" to a score of 2, and "often" to a score of 3. The final score was the sum of all items, for a minimum score of 3 and maximum of 9. A participant with a score of <4 was considered "not socially isolated", while scores of 4-6 or >6 were respectively categorized as "socially isolated" or "socially isolated and potentially depressed." This classification was based on prior research which found that individuals who score high on loneliness are more likely to experience depressive symptoms.¹⁹

Risk factors: Sociodemographic data collected were age, gender, ethnicity, marital status, and living alone. Physical measures included weight, height, and body mass index (BMI; calculated by kilograms/metre²). In addition, participants self-reported their history of transient ischemic attack (TIA) or stroke, heart attack, and diabetes. Information on physical activity, fruit and vegetable consumption, high-fat or fast food consumption, alcohol use, current smoking status, fall risk, having a family doctor, and self-reported general health was collected. Health-related quality of life (HRQoL) was measured using five domains from the EQ-5D-3L: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression.²⁰

Statistical Analysis

Descriptive statistics were performed and binary logistic regression models were used to analyse associations for each social isolation subgroup with all independent variables (sociodemographic factors and health-related indicators). To limit the number of variables in the regression model and to account for response options with small numbers, some variables were collapsed into fewer response categories. Some variables were also not included in the final model due to having a very high correlation with the outcome or high correlation with another independent variable. Only complete cases were analyzed. All analyses were completed with IBM SPSS Statistics 17.0.

Ethics Approval

This study was approved by the Hamilton Integrated Research Ethics Board (no. 14-645).

Results

The 806 participants were most commonly female (69.5%), aged 65-84 years (64.1%), white (74.8%), lived alone (77.5%), widowed (38.5%), and had some high-school education or less (44.3%). Nearly half (45.8%) were classified as having any social isolation; 33.4% scored positively for social isolation alone and 12.4% scored positively for social isolation with potential depression. Similarly, for those 65 and older, 47.3% were classified as having any social isolation. Among the 100 participants classified as having social isolation with potential depression, a notably high proportion self-reported as being male (30.0%), a current smoker (33.0%), income insecure (32.0%), food insecure (13.0%), and stressed often or always (63.0%), as well as having fair/poor health (59.0%), a history of stroke or TIA (30.0%), and diabetes (42.0%). Please see Table 1.

Table 1: Sociodemographic factors, health behaviours, and HRQoL for all study participants and specific to participants experiencing social isolation

Variable	All participants (<i>n</i> = 806) <i>n</i> (%)	Any social isolation, score of 4 and up (<i>n</i> = 369) <i>n</i> (%)	Social isolation and no potential depression, score of 4 to 6 (<i>n</i> = 269) <i>n</i> (%)	Social isolation and potential depression, score above 6 (<i>n</i> = 100) <i>n</i> (%)	Not socially isolated, score below 4 (<i>n</i> = 437) <i>n</i> (%)
Demographics					
Sex					
Male	186 (23.1)	76 (20.6)	46 (17.1)	30 (30.0)	110 (25.2)
Female	560 (69.5)	263 (71.3)	197 (73.2)	66 (66.0)	297 (68.0)
No response	60 (7.4)	30 (8.1)	26 (9.7)	4 (4.0)	30 (6.9)
Age					
55-64	124 (15.4)	46 (12.5)	33 (12.3)	13 (13.0)	78 (17.8)
65-84	517 (64.1)	232 (62.9)	165 (61.3)	67 (67.0)	285 (65.2)
85+	153 (19.0)	83 (22.5)	67 (24.9)	16 (16.0)	70 (16.0)
No response	12 (1.5)	8 (2.2)	4 (1.5)	4 (4.0)	4 (0.9)

Ethnicity					
White	603 (74.8)	295 (79.9)	218 (81.0)	77 (77.0)	308 (70.5)
Other	203 (25.2)	74 (20.1)	51 (19.0)	23 (23.0)	129 (29.5)
Education					
Some high school or less	357 (44.3)	151 (40.9)	108 (40.1)	43 (43.0)	206 (47.1)
High school diploma	185 (23.0)	91 (24.7)	69 (25.7)	22 (22.0)	94 (21.5)
Any post-secondary education	250 (31.0)	120 (32.5)	88 (32.7)	32 (32.0)	130 (29.7)
No response	14 (1.7)	7 (1.9)	4 (1.5)	3 (3.0)	7 (1.6)
Marital status					
Divorced	154 (19.1)	81 (22.0)	52 (19.3)	29 (29.0)	73 (16.7)
Common-law	12 (1.5)	8 (2.2)	4 (1.5)	4 (4.0)	4 (0.9)
Married	155 (19.2)	40 (10.8)	32 (11.9)	8 (8.0)	115 (26.3)
Separated	40 (5.0)	26 (7.0)	16 (5.9)	10 (10.0)	14 (3.2)
Single, never married	95 (11.8)	55 (14.9)	36 (13.4)	19 (19.0)	40 (9.2)
Widowed	310 (38.5)	143 (38.8)	116 (43.1)	27 (27.0)	167 (38.2)
No response	40 (5.0)	16 (4.3)	13 (4.8)	3 (3.0)	24 (5.5)
Lives alone	625 (77.5)	312 (84.6)	223 (82.9)	89 (89.0)	313 (71.6)
No response	6 (0.7)	1 (0.3)	0 (0.0)	1 (1.0)	5 (1.1)
Ontario region					
South West	292 (36.2)	141 (38.2)	100 (37.2)	34 (34.0)	151 (34.5)
Central	272 (33.7)	99 (26.8)	71 (26.4)	28 (28.0)	173 (39.6)
South East	125 (15.5)	73 (20.0)	51 (18.9)	22 (22.0)	52 (11.9)
North East	117 (14.5)	56 (15.2)	47 (17.5)	16 (16.0)	61 (14.0)
With chronic disease					
Had a TIA or stroke	170 (21.1)	81 (22.0)	51 (19.0)	30 (30.0)	89 (20.4)
No response	3 (0.4)	1 (0.3)	0 (0.0)	1 (1.0)	2 (0.5)
Had a heart attack	101 (12.5)	44 (11.9)	27 (10.0)	17 (17.0)	57 (13.0)
No response	3 (0.4)	1 (0.3)	0 (0.0)	1 (1.0)	2 (0.5)
Has history of high BP	558 (69.2)	252 (68.3)	188 (69.9)	64 (64.0)	306 (70.0)
No response	8 (1.0)	3 (0.8)	1 (0.4)	2 (2.0)	5 (1.1)
Has diabetes	251 (31.1)	121 (32.8)	79 (29.4)	42 (42.0)	130 (29.7)
No response	4 (0.5)	1 (0.3)	0 (0.0)	1 (1.0)	3 (0.7)
Health behaviours					
Low physical activity	322 (40.0)	181 (49.1)	123 (45.7)	58 (58.0)	141 (32.3)
No response	7 (0.9)	3 (0.8)	2 (0.7)	1 (1.0)	4 (0.9)
Low fruit and vegetable intake	278 (34.5)	156 (42.3)	104 (38.7)	52 (52.0)	122 (27.9)
No response	6 (0.7)	2 (0.5)	1 (0.4)	1 (1.0)	4 (0.9)
Consumes high-fat or fast food	426 (52.9)	190 (51.5)	138 (51.3)	52 (52.0)	236 (54.0)
No response	5 (0.6)	1 (0.3)	0 (0.0)	1 (1.0)	4 (0.9)
Alcohol drinker	42 (5.3)	22 (6.0)	14 (5.2)	8 (8.0)	21 (4.8)
No response	8 (1.0)	2 (0.5)	1 (0.4)	1 (1.0)	6 (1.4)
Current Smoker	117 (14.5)	70 (19.0)	37 (13.8)	33 (33.0)	47 (10.8)
No response	8 (1.0)	4 (1.1)	3 (1.1)	1 (1.0)	4 (0.9)
High BMI	525 (65.1)	236 (64.0)	176 (65.4)	60 (60.0)	289 (66.1)
No response	64 (7.9)	33 (8.9)	23 (8.6)	10 (10.0)	31 (7.1)
CANRISK ¹					
Moderate	141 (25.6)	75 (30.4)	58 (30.5)	17 (29.8)	66 (21.7)
High	392 (71.1)	165 (66.8)	127 (66.8)	38 (66.7)	227 (74.7)

At risk for falling	416 (51.6)	312 (84.6)	159 (59.1)	64 (64.0)	193 (44.2)
Has a family doctor	722 (89.6)	336 (91.1)	246 (91.4)	90 (90.0)	386 (88.3)
Health status and quality-of-life					
Reported poor to fair health	254 (31.5)	139 (37.7)	80 (29.7)	59 (59.0)	115 (26.3)
No response	5 (0.6)	1 (0.3)	0 (0.0)	1 (1.0)	4 (0.9)
With mobility problems	411 (51.0)	210 (56.9)	149 (55.4)	61 (61.0)	201 (46)
No response	7 (0.9)	4 (1.1)	2 (0.7)	2 (2.0)	3 (0.7)
With self-care problems	151 (18.7)	86 (23.3)	51 (19.0)	35 (35.0)	65 (14.9)
No response	9 (1.1)	5 (1.4)	1 (0.4)	4 (4.0)	4 (0.9)
With problems doing usual activities	260 (32.3)	155 (42.0)	100 (37.2)	55 (55.0)	105 (24)
No response	6 (0.7)	3 (0.8)	2 (0.7)	1 (1.0)	3 (0.7)
With pain/discomfort	511 (63.4)	252 (68.3)	178 (66.2)	74 (74.0)	259 (59.3)
No response	6 (0.7)	3 (0.8)	2 (0.7)	1 (1.0)	3 (0.7)
With anxiety/depression	386 (47.9)	246 (66.7)	156 (60.0)	90 (90.0)	140 (32)
No response	18 (2.2)	7 (1.9)	5 (1.9)	2 (2.0)	11 (2.5)
Stressed					
Always/often	183 (22.7)	132 (35.8)	70 (26.0)	63 (63.0)	51 (11.6)
Sometimes	251 (31.1)	133 (36.0)	103 (38.3)	30 (30.0)	118 (27.0)
Rarely/once in a while	365 (45.3)	101 (27.4)	96 (35.7)	5 (5.0)	264 (60.4)
No response	7 (0.9)	3 (0.8)	0 (0.0)	3 (3.0)	4 (0.9)
Income insecure	120 (14.9)	77 (20.9)	45 (16.7)	32 (32.0)	43 (9.8)
No response	2 (0.2)	1 (0.3)	1 (0.4)	0 (0.0)	1 (0.2)
Food insecure	41 (5.1)	28 (7.6)	15 (5.6)	13 (13.0)	13 (3.0)
No response	2 (0.2)	1 (0.3)	1 (0.4)	0 (0.0)	1 (0.2)
Social isolation					
Isolated	204 (25.3)	204 (55.3)	112 (41.6)	92 (92.0)	0 (0.0)
Left out	227 (28.2)	227 (61.5)	232 (49.1)	95 (95.0)	0 (0.0)
Lacks companionship	295 (36.6)	295 (79.9)	200 (74.3)	95 (95.0)	0 (0.0)

Notes: ¹Only for participants not previously diagnosed with diabetes; TIA = Transient ischemic attack

Significant factors associated with a social isolation score of 4-6 (“socially isolated”) versus no social isolation (see Table 2) were age of 85 and older, compared to those aged <65 (odds ratio [OR] = 3.05, 95% confidence interval [CI] 1.54-6.06); marital status as divorced (OR=2.36, 95%CI 1.25-4.49), widowed (OR=2.13, 95%CI 1.20-3.78), or separated (OR=4.64, 95%CI 1.59-13.52), compared to common-law or married; and, having problems doing usual activities (OR=2.03, 95%CI 1.20-3.45). Protective factors against social isolation were belonging to non-white ethnicities (OR=0.53, 95%CI 0.31-0.88) and having some high school or less (OR=0.46, 95%CI 0.28-0.74) compared to having any post-secondary education.

Comparing to those without social isolation (score <4), individuals had higher odds of having social isolation and potential depression (score >6) if they were divorced (OR=6.43, 95%CI 2.11-19.64) or separated (OR=11.35, 95% CI 2.56-50.33), compared to common-law or married; were smokers (OR=3.68, 95%CI 1.52-8.92); had poor/fair general health (OR=2.91, 95% CI 1.46-5.82); or reported income insecurity (OR=2.99, 95%CI 1.25-6.92).

Finally, compared to those with social isolation (score of 4-6), individuals had higher odds of having social isolation and potential depression (score >6), if they were separated (OR=3.90, 95%CI 0.89-17.03), compared to common-law or married; were smokers (OR=3.04, 95%CI 1.31-7.06); had poor/fair health (OR=3.07, 95%CI 1.50-6.27); or reported income insecurity (OR=2.46, 95%CI 1.01-6.01).

Table 2: Binomial logistic regression of having self-reported social isolation in all participants

Variable		Socially Isolated (score of 4-6, n=203) versus Not Socially Isolated (score < 4, n=347)		Socially Isolated and Potentially Depressed (score > 6, n=74) versus Not Socially Isolated (score < 4, n=347)		Socially Isolated and Potentially Depressed (score > 6, n=74) versus Socially Isolated (score of 4-6, n=203)	
		OR (95% CI)	p value	OR (95% CI)	p value	OR (95% CI)	p value
Demographics							
Sex	Male	REF	-	REF	-	REF	-
	Female	1.09 (0.65, 1.82)	0.750	0.97 (0.42, 2.22)	0.935	0.70 (0.30, 1.65)	0.411
Age	<65	REF	-	REF	-	REF	-
	65-84	1.53 (0.85, 2.74)	0.156	2.32 (0.84, 6.37)	0.104	1.21 (0.41, 3.56)	0.728
	85+	3.05 (1.54, 6.06)	0.001	1.88 (0.53, 6.75)	0.331	0.45 (0.13, 1.65)	0.231
Ethnicity	White	REF	-	REF	-	REF	-
	Other	0.53 (0.31, 0.88)	0.014	1.03 (0.45, 2.39)	0.940	2.00 (0.81, 4.95)	0.136
Education	Any post-secondary	REF	-	REF	-	REF	-
	Highschool diploma	0.66 (0.39, 1.12)	0.125	1.00 (0.41, 2.42)	0.999	1.04 (0.42, 2.56)	0.936
	Some high school or less	0.46 (0.28, 0.74)	0.002	0.57 (0.26, 1.29)	0.179	1.38 (0.63, 3.06)	0.425
Marital status	Common-law or married	REF	-	REF	-	REF	-
	Divorced	2.36 (1.25, 4.49)	0.008	6.43 (2.11, 19.64)	0.001	2.36 (0.70, 7.97)	0.168
	Separated	4.64 (1.59, 13.52)	0.005	11.35 (2.56, 50.33)	0.001	3.90 (0.89, 17.03)	0.070
	Single, never married	1.88 (0.88, 3.98)	0.101	3.11 (0.83, 11.56)	0.091	1.45 (0.40, 5.24)	0.570
	Widowed	2.13 (1.20, 3.78)	0.010	2.16 (0.72, 6.55)	0.171	1.05 (0.32, 3.41)	0.942
With chronic disease							
TIA or stroke	No	REF	-	REF	-	REF	-
	Yes/not sure	0.89 (0.55, 1.47)	0.655	1.03 (0.46, 2.33)	0.94	0.79 (0.32, 1.97)	0.618
Heart attack	No/not sure	REF	-	REF	-	REF	-
	Yes	0.79 (0.44, 1.41)	0.420	0.92 (0.35, 2.42)	0.862	1.17 (0.41, 3.31)	0.766
Diabetes	No/not sure	REF	-	REF	-	REF	-
	Yes	1.07 (0.68, 1.67)	0.779	1.46 (0.68, 3.14)	0.330	1.86 (0.85, 4.07)	0.119
Health behaviours							
Physical activity	Yes	REF	-	REF	-	REF	-
	No	1.61 (1.07, 2.42)	0.023	1.68 (0.83, 3.40)	0.148	1.59 (0.77, 3.29)	0.208
Fruit and vegetable intake	Everyday	REF	-	REF	-	REF	-
	Not everyday	1.57 (1.01, 2.42)	0.044	1.76 (0.86, 3.58)	0.119	1.00 (0.48, 2.07)	0.992
Consumes high-fat/fast food	0 times/week	REF	-	REF	-	REF	-
	1-2 times/week	0.69 (0.46, 1.05)	0.083	0.51 (0.24, 1.07)	0.075	0.57 (0.28, 1.19)	0.136
	More than 2 times/week	0.63 (0.31, 1.28)	0.199	1.08 (0.39, 3.00)	0.883	1.03 (0.36, 2.93)	0.961

Alcohol drinker	No Yes	REF 1.00 (0.40, 2.55)	- 0.989	REF 2.40 (0.61, 9.44)	- 0.211	REF 0.99 (0.21, 4.53)	- 0.986
Smoking Status	Never/not anymore Yes	REF 1.14 (0.61, 2.13)	- 0.677	REF 3.68 (1.52, 8.92)	- 0.004	REF 3.04 (1.31, 7.06)	- 0.010
BMI	Normal Underweight Overweight/obese	REF 0.63 (1.13, 3.02) 1.09 (0.67, 1.76)	- 0.566 0.742	REF 0.83 (0.12, 5.82) 0.69 (0.30, 1.61)	- 0.855 0.391	REF 4.08 (0.50, 33.23) 0.55 (0.23, 1.31)	- 0.245 0.176
At risk for falling	No Yes	REF 1.31 (0.87, 1.97)	- 0.192	REF 1.73 (0.83, 3.60)	- 0.145	REF 0.84 (0.39, 1.83)	- 0.663
Has a family doctor	Yes No	REF 0.55 (0.27, 1.10)	- 0.091	REF 0.95 (0.30, 2.99)	- 0.933	REF 1.90 (0.53, 6.74)	- 0.323
Health status and quality-of-life							
General health	Good/very good/excellent Poor/fair	REF 1.02 (0.65, 1.59)	- 0.938	REF 2.91 (1.46, 5.82)	- 0.002	REF 3.07 (1.50, 6.27)	- 0.002
With mobility problems	No problems Any problems	REF 1.11 (0.70, 1.75)	- 0.652	REF 1.02 (0.45, 2.31)	- 0.965	REF 1.05 (0.44, 2.52)	- 0.918
With self-care problems	No problems Any problems	REF 0.77 (0.42, 1.41)	- 0.387	REF 2.24 (0.89, 5.64)	- 0.086	REF 2.62 (1.09, 6.27)	- 0.031
With problems doing usual activities	No problems Any problems	REF 2.03 (1.20, 3.45)	- 0.008	REF 1.89 (0.78, 4.61)	- 0.161	REF 0.87 (0.36, 2.07)	- 0.748
With pain or discomfort	None Moderate/extreme	REF 1.22 (0.81, 1.84)	- 0.348	REF 1.49 (0.70, 3.19)	- 0.300	REF 1.51 (0.68, 3.36)	- 0.309
Income insecurity	No Yes	REF 1.27 (0.64, 2.52)	- 0.499	REF 2.99 (1.25, 6.92)	- 0.013	REF 2.46 (1.00, 6.01)	- 0.049
Food insecurity	No Yes	REF 1.13 (0.38, 3.33)	- 0.828	REF 0.89 (0.25, 3.23)	- 0.864	REF 0.77 (0.22, 2.71)	- 0.684

Notes: OR = Odds ratio, CI = Confidence Interval

Discussion

This study with low-income older adults living in social housing found that nearly half were socially isolated, with 12.4% socially isolated and at risk of potential depression. Increased age, being separated, divorced, or widowed, and experiencing problems doing usual activities were significantly associated with increased odds of social isolation, while belonging to a non-white ethnicity and having a lower education level were protective against social isolation. In addition, experiencing income insecurity, being divorced or separated, reporting poor/fair health, and currently smoking were significant factors for social isolation and potential depression.

The rate of social isolation in low-income older adults living in social housing (45.8% for ages 55+ and 47.4% for ages 65+) was higher than the 19% observed in the general population aged 65 and over.⁵ Within the study population, income insecurity was significantly associated with greater odds of being socially isolated and potentially depressed. Low income can prevent individuals from engaging in social activities or limit their ability to develop and maintain social support.²¹ In previous studies, low-income participants identified inaccessibility of amenities and a lack of opportunities to connect with others through education and employment as key causes of social isolation.¹⁵ Lack of a vehicle or efficient public transportation often prevented lower-

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3 income individuals from accessing community activities.¹⁵ Similar structural factors likely
4 contribute to the increased rate of social isolation in our study population. For example, the
5 Ontario Non-Profit Housing Association reports that social housing sites, with high-rise
6 buildings and lack of proximity to amenities, are not well-suited for the needs of seniors.²² Thus,
7 senior tenants with mobility issues or limited transportation lack accessible opportunities for
8 social participation, with some reporting feeling confined to their units.²²⁻²³
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12 Since the negative relationship between social isolation and health is well-known,⁶ we might
13 expect those with fair/poor health or who currently smoked to be at greater odds for experiencing
14 social isolation. Social isolation is a risk factor for negative health consequences, ranging from
15 depression to coronary heart disease.⁷ These outcomes may then exacerbate social isolation, as
16 individuals with health concerns may struggle to visit friends and family or to engage in
17 community activities. Furthermore, socially isolated individuals have been found to be less likely
18 to exercise or consistently consume fruits and vegetables, and more likely to smoke, negative
19 health behaviours which may worsen experiences of isolation.²⁴ It has been theorized that social
20 relationships benefit health primarily through encouraging health-promoting behaviours, such as
21 exercise and adherence to therapeutic regimes, or by discouraging health-negative behaviours,
22 such as smoking.²⁵ In addition, social ties may also connect people to social networks that
23 facilitate access to resources supportive of health, such as medical referrals or job
24 opportunities.²⁶ This cycle of social isolation and health consequences may contribute to the high
25 rate of social isolation in our study population, which has previously been reported to have
26 poorer health outcomes and less social support.¹⁷
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34 Literature has also shown that perceived difficulty with activities of daily living is associated
35 with risk of social isolation,²⁷ which we have demonstrated here with the inability to perform
36 usual activities being a factor significantly associated with social isolation in this study.
37 Additionally, as consistent with previous research, our findings demonstrate that marital status is
38 significantly associated with social isolation.¹⁵ Older adults who are single, separated, divorced
39 or widowed are twice as likely to report social isolation or low social support, compared to their
40 partnered counterparts.²¹ Finally, in keeping with our findings, living alone has been
41 demonstrated to be associated with social isolation.²⁷ Previous research has found that lack of
42 social support is common among older adults who live alone, which in turn contributes to social
43 isolation.²⁸
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48 While some studies record marital status and living arrangement to measure social isolation, a
49 range of approaches have been used.¹⁶ Studies may assess the objective size of social networks
50 or utilize tools measuring loneliness, similar to ours, which assess perceived social isolation.
51 There is a general lack of consistency in the literature on how social isolation is measured.²⁹
52 These broad measures of social isolation might not fully capture the impacts of isolation on the
53 health of older adults, hindering the development of effective interventions. Therefore, future
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3 research should explore which aspects of social isolation are most important to include in
4 measurement tools, such as dimensions that most influence health outcomes.
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7 The health outcomes of social isolation are particularly important to low-income older adults in
8 social housing, given their health inequalities. Our work suggests that low-income older adults in
9 social housing are at heightened risk of social isolation and the negative consequences that
10 follow. Certain subgroups, such as those reporting income insecurity, are particularly vulnerable,
11 demonstrating the potential for targeting interventions to support these individuals. For example,
12 social prescribing is an emerging approach for loneliness and social isolation.¹³ It involves
13 referring individuals to community support and social programming, such as befriending
14 schemes or group lessons.³⁰ This approach could be very successful in lower-income older adults
15 in social housing, as previous literature suggests they value relationships with community
16 program providers.³¹ In addition, addressing social isolation in lower-income older adults in
17 social housing represents an opportunity to reduce health inequalities and healthcare costs.
18 Socially isolated seniors are four-to-five times more likely to be hospitalized than non-socially
19 isolated seniors.³² Thus, directing support to this group could curb rising healthcare spending
20 associated with an aging population.
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26 27 Limitations

28 The cross-sectional nature of our study limits our ability to ascertain the direction of the
29 relationship between social isolation and associated factors. There may have also been social
30 desirability bias, as participants may have underreported their experiences of social isolation.
31 Furthermore, participants might have previously met the paramedics who collected the data,
32 potentially contributing to self-reporting bias. Finally, the sampling method may have increased
33 the risk of self selection bias. Advertisements for CP@clinic were placed around the social
34 housing buildings, and participants chose whether they attended the program. Consequently,
35 individuals that elected to participate may have been healthier and more mobile than the general
36 population of low-income older adults living in social housing. Nonetheless, this study represents
37 the opportunity for valuable insight into a little-studied marginalized population.
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43 **Conclusion**

44 Canada's aging population is expected to create a large number of low-income older adults living
45 in social housing. We found that this population experiences increased rates of social isolation,
46 and are therefore at greater risk of the negative health consequences that follow. We found
47 several factors associated with increased odds of being socially isolated in our study population,
48 such as self-reported income insecurity. These findings should inform the development of
49 interventions to support vulnerable subgroups. While this study's strength is in addressing a gap
50 in the evidence base by assessing a hard-to-reach population, further longitudinal research is
51 needed on the causal links between social isolation and negative health outcomes in this group.
52 This research, and subsequent programs targeting social isolation in low-income older adults in
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social housing can help improve wellbeing, address health inequities, and reduce healthcare costs associated with Canada’s aging population.

Confidential

References

1. Ontario Ministry of Finance. Ontario population projections, 2018–2046 [Internet]. Oshawa: Ontario Ministry of Finance; 2019 Sep [cited Apr 6 2020]. Available from <https://www.fin.gov.on.ca/en/economy/demographics/projections/>
2. Ontario Non-Profit Housing Association. 2015 waiting lists survey [Internet]. Toronto: Ontario Non-Profit Housing Association; 2015 May 4 [cited 2020 Apr 6]. Available from http://www.onpha.on.ca/Content/PolicyAndResearch/Waiting_Lists_2015/2015_Waiting_Lists_Survey.aspx
3. Gierveld JD, Tilburg TV, Dykstra, PA. Loneliness and social isolation. In: Vangelisti AL, Perlman D, editors. *The Cambridge handbook of personal relationships* [Internet]. New York; Cambridge University Press; 2012 [cited 2020 July 6]. p. 485-500. Available from: <https://www.cambridge.org/core/books/cambridge-handbook-of-personal-relationships/loneliness-and-social-isolation/246AFB3CA8837959725B67497331E0A8> doi: 10.1017/CBO9780511606632.027
4. Government of Canada. Social isolation of seniors - Volume 1: Understanding the issue and finding solutions [Internet]. Ottawa: Government of Canada; 2017 [cited 2020 Apr 6]. Available from: <https://www.canada.ca/en/employment-social-development/corporate/partners/seniors-forum/social-isolation-toolkit-vol1.html>
5. Statistics Canada. Canadian community health survey - healthy aging (2008-2009) [Internet]. Ottawa: Statistics Canada; 2010 [cited 2020 Apr 6]. Available from: <https://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5146>
6. Courtin E, Knapp M. (2015). Social isolation, loneliness and health in old age: a scoping review. *Health Soc Care Community* [Internet]. 2015 Dec [cited 2020 Apr 6];25(3):799–812. doi: 10.1111/hsc.12311
7. Valtorta NK, Kanaan M, Gilbody S, Ronzi S, Hanratty B. Loneliness and social isolation as risk factors for coronary heart disease and stroke: systematic review and meta-analysis of longitudinal observational studies. *Heart* [Internet]. 2016 Apr [cited 2020 Apr 6];102(13):1009–16. doi: 10.1136/heartjnl-2015-308790
8. Heikkinen RL, Kauppinen M. Depressive symptoms in late life: a 10-year follow-up. *Arch Gerontol Geriatr* [Internet]. 2004 May-Jun [cited 2020 Apr 6];38(3):239–50. doi: 10.1016/j.archger.2003.10.004
9. Kuiper JS, Zuidersma M, Voshaar RC, Zuidema SU, Heuvel ER, Stolk RA, et al. Social relationships and risk of dementia: A systematic review and meta-analysis of longitudinal cohort studies. *Ageing Res Rev* [Internet]. 2015 Jul [cited 2020 Apr 6];22:39–57. doi: 10.1016/j.arr.2015.04.006
10. Holt-Lunstad J, Smith T, Layton J. Social relationships and mortality risk: A meta-analytic review. *SciVee* [Internet]. 2010 Jul [cited 2020 Apr 6]. doi: 10.4016/19865.01
11. Gibler KM. Aging subsidized housing residents: A growing problem in U.S. cities. *J Real Estate Res* [Internet]. 2003 [cited 2020 Apr 6];25(4):395–420. Available from: www.jstor.org/stable/24887938

12. Huguet N, Kaplan MS, Feeny D. Socioeconomic status and health-related quality of life among elderly people: Results from the Joint Canada/United States Survey of Health. *Soc Sci Med* [Internet]. 2008 Feb [cited 2020 Apr 6];66(4):803–10. doi: 10.1016/j.socscimed.2007.11.011
13. Stall NM, Savage RD, Rochon PA. Loneliness in older adults. *CMAJ* [Internet]. 2019 Apr [cited 2020 Apr 6];191(17). doi: 10.1503/cmaj.181655.
14. Shaw JG, Farid M, Noel-Miller C, Joseph N, Houser A, Asch SM, et al. Social isolation and Medicare spending: Among older adults, objective isolation increases expenditures while loneliness does not. *J Aging Health* [Internet]. 2017 Oct [cited 2020 Apr 6];29(7):1119–43. doi: 10.1177/0898264317703559
15. Stewart MJ, Makwarimba E, Reutter LI, Veenstra G, Raphael D, Love R. Poverty, sense of belonging and experiences of social isolation. *J Poverty* [Internet]. 2009 May [cited 2020 Apr 6];13(2):173–95. doi: 10.1080/10875540902841762
16. Menec VH, Newall NE, Mackenzie CS, Shoostari S, Nowicki S. Examining individual and geographic factors associated with social isolation and loneliness using Canadian Longitudinal Study on Aging (CLSA) data. *Plos One* [Internet]. 2019 Feb [cited 2020 Apr 6];14(2). doi: 10.1371/journal.pone.0211143
17. Agarwal G, Brydges M. Effects of a community health promotion program on social factors in a vulnerable older adult population residing in social housing. *BMC Geriatr* [Internet]. 2019 Apr [cited 2020 Apr 6];18(1). doi: 10.1186/s12877-018-0764-9
18. Agarwal, G., McDonough, B., Angeles, R., Pirrie, M., Marzanek, F., McLeod, B., & Dolovich, L. (2015). Rationale and methods of a multicentre randomised controlled trial of the effectiveness of a Community Health Assessment Programme with Emergency Medical Services (CHAP-EMS) implemented on residents aged 55 years and older in subsidised seniors housing buildings in Ontario, Canada. *BMJ Open*, 5(6). doi: 10.1136/bmjopen-2015-008110
19. Hughes M, Waite L, Hawkey L, Cacioppo J. A short scale for measuring loneliness in large surveys. *Res Aging* [Internet]. 2004 Nov [cited 2020 Apr 6];26(6):655-72. doi: 10.1177/0164027504268574
20. EuroQol Research Foundation. EQ-5D-3L user guide, 2018 [Internet]. Rotterdam: EuroQol Research Foundation; 2018 [cited 2020 Apr 6]. Available from: <https://euroqol.org/publications/user-guides>
21. Hawthorne G. Measuring social isolation in older adults: Development and initial validation of the Friendship Scale. *Soc Indic Res* [Internet]. 2006 Feb [cited 2020 Apr 6];77(3):521–48. doi: 10.1007/s11205-005-7746-y
22. Ontario Non-Profit Housing Association. Aging in place in social housing [Internet]. Toronto: Ontario Non-Profit Housing Association; 2016 Feb 11 [cited 2020 Apr 6]. Available from: <https://www.onpha.on.ca/Content/PolicyAndResearch/focusONs/Aging%20in%20place%20in%20social%20housing.aspx>

- 1
2
3 23. Ontario Non-Profit Housing Association. Strengthening social housing communities
4 [Internet]. Toronto: Ontario Non-Profit Housing Association; 2015 Nov 17 [cited 2020
5 Apr 6]. Available from:
6 [https://www.onpha.on.ca/Content/PolicyAndResearch/Other_Research/Stengthening%20](https://www.onpha.on.ca/Content/PolicyAndResearch/Other_Research/Stengthening%20social%20housing%20communities.aspx)
7 [social%20housing%20communities.aspx](https://www.onpha.on.ca/Content/PolicyAndResearch/Other_Research/Stengthening%20social%20housing%20communities.aspx)
8
9
- 10 24. Kobayashi LC, Steptoe A. Social isolation, loneliness, and health behaviors at older ages:
11 Longitudinal cohort study. *Ann Behav Med* [Internet]. 2018 Jan [cited 2020 Apr
12 6];52(7):582–93. doi: 10.1093/abm/kax033
13
- 14 25. House JS. Social isolation kills, but how and why? *Psychosom Med* [Internet]. 2001 Mar-
15 Apr [cited 2020 Apr 6];63(2):273–74. doi: 10.1097/00006842-200103000-00011
16
- 17 26. Berkman LF, Glass T. Social integration, social networks, social support, and health.
18 In: Berkman LF, Kawachi I, editors. *Social epidemiology*. New York: Oxford University
19 Press; 2000. p. 158-162.
- 20 27. Iliffe S, Kharicha K, Harari D, Swift C, Gillmann G, Stuck AE. Health risk appraisal in
21 older people 2: the implications for clinicians and commissioners of social isolation risk
22 in older people. *Br J Gen Pract* [Internet]. 2007 Apr [cited 2020 Apr 6];57(537):277–82.
23 Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2043334/>
24
- 25 28. Yeh SJ, Lo SK. Living alone, social support, and feeling lonely among the elderly. *Soc*
26 *Behav Pers* [Internet]. 2004 Mar [cited 2020 Apr 6];32(2):129–38. doi:
27 10.2224/sbp.2004.32.2.129
28
- 29 29. Valtorta N, Hanratty B. Loneliness, isolation and the health of older adults: do we need a
30 new research agenda? *J R Soc Med* [Internet]. 2013 Jan [cited 2020 Apr 6];105(12):518–
31 22. doi: 10.1258/jrsm.2012.120128
32
- 33 30. Alliance for Healthier Communities. Social prescribing in Ontario [Internet]. Toronto:
34 Alliance for Healthier Communities; [date unknown] [cited 2020 Apr 6]. Available from:
35 <https://www.allianceon.org/Rx-Community-Social-Prescribing-Ontario>
36
- 37 31. Brydges M, Denton M, Agarwal G. The CHAP-EMS health promotion program: a
38 qualitative study on participants' views of the role of paramedics. *BMC Health Serv Res*
39 [Internet]. 2016 Aug [cited 2020 Apr 6];16(1). doi: 10.1186/s12913-016-1687-9
40
- 41 32. National Seniors Council. Report on the social isolation of seniors [Internet]. Ottawa:
42 National Seniors Council; 2014 Oct [cited 2020 Apr 6]. Available from:
43 [https://www.canada.ca/en/national-seniors-council/programs/publications-](https://www.canada.ca/en/national-seniors-council/programs/publications-reports/2014/social-isolation-seniors.html)
44 [reports/2014/social-isolation-seniors.html](https://www.canada.ca/en/national-seniors-council/programs/publications-reports/2014/social-isolation-seniors.html)
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