



# Close Relations Matter: The Association Between Depression and Refugee Status in the Canadian Longitudinal Study on Aging (CLSA)

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## Abstract

This study examined the prevalence and social determinants of depression among refugee and non-refugee adults aged 45–85 in the Canadian Longitudinal Study on Aging. Bivariate analyses and multivariable binary logistic regression analyses were conducted. The prevalence of depression was higher in a sample of 272 refugees (22.1%) and 5059 non-refugee immigrants (16.6%), compared to 24,339 native-born Canadians (15.2%). The adjusted odds ratio (aOR) of depression for refugees were not attenuated when controlling factors such as, (1) socioeconomic status, (2) health conditions and behaviours, (3) social isolation and online social networking (aORs range from 1.61 to 1.70,  $p$ 's < 0.05). However, when social support representing close personal relationships was included, the odds of depression for refugees were reduced to non-significance (aOR = 1.30, 95% CI 0.97–1.74,  $p$  = 0.08). Refugees' excess vulnerability to depression is mainly attributable to lower levels of affectionate social support. Targeted interventions in nurturing supportive interpersonal relationships for refugees are warranted.

**Keywords** Canadian Longitudinal Study on Aging (CLSA) · Social determinants of mental health · Depression · Social support · Social isolation

## Introduction

Despite the increasing proportion of refugees resettled in economically developed western countries, little is known about the mental health of refugees in their middle and later

life. Although some contemporary Canadian studies have started to address this gap [1–3], a dearth of relevant epidemiological evidence about psychiatric morbidity of this vulnerable population is surprising given that many refugees and asylum seekers have experienced a myriad of traumatic life-course events [4]. These pre-migration trauma exposures (e.g., genocide, forced displacement, human trafficking, sexual assault, famine, and separation from family) exert long-lasting effects on refugee mental health [4, 5], which could be extended to their trajectories of growing old.

Refugees are particularly susceptible to isolation or loneliness as they often have to adapt relatively quickly to a new environment, both socio-culturally and geographically, in which they may encounter various post-displacement stressors such as language barriers, reduced social networks, racial discrimination and poverty [6–9]. Seeking support from friends and family is a coping strategy used frequently among refugees to combat challenges related to sociocultural integration during the resettlement period [10]. Many types of social capital are conducive to refugees' adaptation processes, including family members living in the host country, access to organizations with a similar ethnocultural

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background, close friends or acquaintances, and professionals such as social workers [11]. These formal and informal social networks could provide refugees with effective stress-buffering resources and foster greater levels of trust among family and community members [12], when refugees are facing financial, psychological and other health problems [13].

Previous studies have documented a strong linkage between social support and enhanced mental well-being among various refugee populations worldwide. Vietnamese refugees resettled in the US with greater support provided by their spouses and friends had increased life satisfaction and reduced depression [14]. Older Kurdish refugees in the US and Bosnian women refugees in Sweden were more likely to experience depression if they had lower levels of social support [15, 16]. In addition, social support was associated with lower post-traumatic stress disorder and other mental illnesses among refugees from Iran, Afghanistan, and Somalia settled in the Netherlands [17]. The advancements in digital technology further facilitate online social networking programs, which can serve as an important resource for social support among refugees. A recent study in the Netherlands reported increased language competency and better social bonding among refugees from Syria, Eritrea and Afghanistan who used online social networking [18].

Identifying modifiable risk and protective factors associated with refugees' depression is essential for informing appropriate evidence-based mental health services and refugee policy to improve the quality of life among these marginalized populations who are aging in a foreign land [19, 20]. Therefore, grounded in the framework of social determinants of mental health [8, 21], the current study sought to explore the relationship between depression and its determinants among Canadian adults in mid-to-later life by examining the following research questions:

1. Do both refugees and non-refugee immigrants have a higher prevalence and adjusted odds of depression than Canadian-born residents in middle and late life?
2. Which demographic, economic, health or social factors could potentially attenuate the association between depression and refugee/immigrant status?
3. What other social determinants of health are significantly associated with depression after accounting for refugee/immigrant status?

## Methods

### Study Population

The detailed methodology has been previously published [22]. In summary, this study used the comprehensive cohort data from the baseline Canadian Longitudinal Study on

Aging (CLSA), a 2012 population-based study of Canadians aged 45 to 85 who will be followed for 20 years [23]. Participants in the comprehensive sample ( $n=30,097$ ) were administered in-home interviews, physical assessments collected from dedicated data collection sites and telephone interviews at 18 months later to maintain contact. Most data in this study were from In-Home Questionnaire and Data Collection Site Questionnaire while some data (e.g. online social networks, pain) were from the Maintaining Contact Questionnaire. Those who did not report their depression, refugee/immigration status, marital status, multi-morbidities, social support availability assessed were excluded ( $n=427$ ) from this study, yielding a final sample size of 29,670. The excluded subjects did not have statistically significant demographic differences from the main group. Further details about the study protocol can be found at <https://www.clsa-elcv.ca>.

### Outcome Variable

*Depression* was a derived variable from CLSA measured by the Center for Epidemiological Studies Short Depression Scale (CES-D 10). This screening tool contains 10 items about depressive symptoms, such as feelings of depression, loneliness, hopefulness for the future, and restless sleep in the past 7 days [24]. This 10-item composite measure (range 0–30) was a 4-point scale from 0 (rarely or never), 1 (occasionally), 2 (some of the time), to 3 (all of the time). A cut-off score of 10 or more (overall CES-D 10 score  $\geq 10$ ) was applied to identify those who were depressed.

### Main Independent Variable

*Refugee/Immigrant Status:* As the CLSA did not specifically ask about refugee status, a proxy for the refugee/immigrant status (Canadian-born residents, non-refugee immigrants, refugees) was created based upon the self-report information of being an immigrant, country of birth, year of arrival in Canada, religion, cultural background and parental ethnic background to match the demographics of historic refugee cohorts (see Table 1). Among refugees ( $n=272$ ), the average time since arrival in Canada was 42 years (standard deviation=16.7 years). Only 7.7% of refugees ( $n=21$ ) had arrived in Canada in the past 20 years preceding the baseline CLSA survey and 35.3% ( $n=96$ ) had arrived 50 or more years before they were surveyed.

### Other Variables

In addition to refugee/immigrant status, other demographic covariates such as age, sex, and marital status were controlled as the core block because they influence the chances of being exposed to stressful events [20]. In addition to the

**Table 1** Refugee sample by regions of origin/ethnicity, in the baseline Canadian Longitudinal Study on Aging (n = 272)

Regions of origin/Ethnicity	Unweighted (n)
China (1940–1989)	48
Haiti (1971–present)	41
Hungary (1956–present)	41
Jews from Continental Europe (1932–1955)/Middle East and North Africa (1950 and 1970)/Soviet Union (1970–1990)	26
Chile (1970–1990)	23
Lebanon (1975–present)	21
Baltic origins (1945–1960)	17
Ukraine (1920–1952)	13
Vietnam (1970–1990)	11
South Asians from Uganda (the 1970s)	10
Iran (the 1970s–early 1980s)	5
Afghanistan (1979–present)	4
Bangladesh (1970–1990)	4
Yugoslavia (the 1990s)	< 4
Palestinian Arabs from Palestine or Israel (1945–present)	< 4
Cambodia (1970–1990)	< 4
Iraq (2003–present)	< 4
Total	272

Statistic Canada prohibits reporting actual numbers for cell sizes with fewer than 4 respondents

demographic correlates, four different clusters of potential confounders were then examined separately to determine the independent contribution of each additional block.

*The cluster of socioeconomic factors* encapsulated annual household income, education level, and subjective retirement status.

*The cluster of health status and behaviors*, in line with prior operationalization [22], measured multi-morbidities (no condition/one health condition/two health conditions/three or more health conditions), chronic pain (free of pain/have pain/no answer), drinking habits in the previous year (non-binge drinker/binge drinker/no answer), and physical activities in the previous seven days (never or seldom/sometimes or often/no answer).

*The cluster of social connections* captured both social isolation and online social networking. The social isolation index was derived from two indicators measuring social contacts within and outside of the household from the social networking questionnaire [25]. First, the responses were grouped into three isolation levels according to the time frame of last face-to-face contact with family members (children/siblings/other relatives), friends, and neighbours who live outside of the household, ranging from not isolated (have contacts in the past week or two); mildly isolated (have contacts in the past month but not in the past week or two); to extremely isolated (no contact in the past month). Second, these three isolation categories were divided into six groups stratified by their living arrangements (live alone or not) in the household: (1) not living alone, nor isolated;

(2) living alone, but not isolated; (3) not living alone, but mildly isolated; (4) living alone and mildly isolated; (5) not living alone, but extremely isolated; and (6) living alone and extremely isolated. Online social networking was based on the frequency of using social networking sites through the Internet to stay in touch or make plans with family or friends. It was classified into four groups: (1) active use (daily or weekly); (2) moderate use (monthly); (3) mild use (less than monthly); and (4) no answer.

*The cluster of social support availability* was measured by three binary items modified from the self-administered Medical Outcomes Study (MOS) Social Support Survey [26]. In the MOS, questions were asked regarding how often, when help was needed, someone was available: (1) to advise on a crisis; (2) to confide in or talk to, and (3) to shows love and affection. These three factors have been identified as key social support indicators for health outcomes by previous studies [27]. The response options were dichotomized into two levels: (1) none/a little/some of the time, and (2) most/all of the time.

## Statistical Analysis

All analyses were completed using SPSS Version 22. The weights provided by CLSA were normalized to produce population-representative estimates corrected for the sample size. Descriptive statistics and bivariate analyses were generated by chi-square tests using weighted means. Adjusted odds ratios (aORs) were calculated through binary logistic

regression to examine associations between refugee/immigration status and depression while adjusting for the covariates. The adjustments were performed in stepwise logistic regression models by entering five blocks of factors respectively. The first logistic regression had refugee/immigrant status, age, sex and marital status as the core block (Model 1), which was included in all the subsequent models. In separate clusters, socioeconomic factors (Model 2), health status and behaviours (Model 3), social isolation and online social networking (Model 4), and social support (Model 5) were also investigated. The final model was adjusted for all of the aforementioned variables (Model 6).

## Ethics Approval

The study protocol of the CLSA has been approved by 13 Research Ethics Boards across Canada. This paper's secondary analysis of CLSA data was approved by the University of Toronto's Health Sciences Research Ethics Board (Protocol number: 34065).

## Results

### Sample Description and Bivariate Analysis

As shown in Table 2, the sample mainly consisted of Canadians aged 45–55 years ( $n = 7530$ , 42.1%), in a relationship ( $n = 20,445$ , 76.1%), earning above C\$20,000/year ( $n = 26,264$ , 90.1%), and holding a post-secondary degree ( $n = 23,009$ , 79.4%). Information on the comparative distribution of these factors among native-born Canadians ( $n = 24,339$ , 82.1%), non-refugee immigrants ( $n = 5059$ , 16.9%), and refugees ( $n = 272$ , 1.0%) were provided. Chi-square statistics ( $\chi^2$ ) indicated that all demographic, socioeconomic and health-related factors were significantly correlated with depression ( $p$ 's  $< 0.05$ ).

### Multivariable Logistic Regression

As summarized in Table 2, both refugees (22.1%;  $\chi^2 = 15.77$ ,  $p < 0.001$ ) and non-refugee immigrants (16.6%;  $\chi^2 = 5.15$ ,  $p = 0.023$ ) had a significantly higher prevalence of depression, compared to native-born Canadians (15.2%). Table 3 contains the multivariable logistic regression analysis of the immigrant/refugee status and other confounders on depressive symptoms (CES-D). The demographically adjusted OR of depression among refugees (aOR = 1.70, 95% CI 1.29–2.24) and non-refugee immigrants (aOR = 1.19, 95% CI 1.09–1.29) were higher than Canadian-born respondents when controlling for age, sex, and marital status (Model 1).

According to six models of logistic regression from Table 3, the robust association between refugee status and

depression (Model 1, aOR = 1.70) was not substantially attenuated by the inclusion of socio-economic factors, health-related characteristics, social isolation nor online social networking. However, the inclusion of social support factors reduced the association between refugee and depression substantially from 1.70 to 1.30, to the point it was no longer statistically significant (Model 5, aOR = 1.30, 95% CI 0.97–1.74,  $p = 0.08$ ; Model 6, aOR = 1.30, 95% CI 0.96–1.78,  $p = 0.11$ ).

The aOR for depression among non-refugee immigrants was modestly elevated but consistently significant across all six models (range aORs = 1.14–1.26). None of the factors investigated, including social support, played a substantial attenuating role among non-refugee immigrants. After full adjustment (Model 6), the odds of depression for non-refugee immigrants was still 23% higher than native-born Canadians (aOR = 1.23, 95% CI 1.12–1.35).

As shown in the fully adjusted model in Table 3, significant associations were also observed among other social and health-related determinants, independent of refugee and immigrant status (Model 6). Middle-aged respondents (aged 45 to 65) were more likely to report depression compared to those aged 76 to 85 (aORs range from 1.48 to 1.92). Women, single and widowed/divorced respondents also had increased odds of depression compared to those who were male and married, respectively. Socioeconomic disadvantages were associated with depression, that is, those earning less than C\$20,000 and those whose educational level lower than high school were more likely to report depression than their counterparts in higher socioeconomic brackets. With respect to health-related indicators, respondents who had chronic pain and who were not physically active had higher odds of depression compared to those free of pain and physically active, respectively. A dose–response relationship was observed between the number of chronic health conditions and depression (aORs range from 1.39 to 3.73), with more health problems correlated with higher odds of depressive symptomatology.

Other attenuating effects on depression were also observed. Initially, in Model 4, the odds of depression were progressively higher with increasing levels of isolation (aORs range from 1.19 to 2.50). Older adults who rarely or never used the internet to contact friends had approximately 10% higher odds of depression compared to active users. Similarly, in Model 2, those who were fully retired were more likely to be depressed compared to those were working. However, in the final model which included social support with other covariates (Model 6), three variables (i.e., retirement status, online social networking and all but the one category of social isolation) were reduced to non-significance.

Older adults without someone who showed them love or in whom they could confide had approximately double the

**Table 2** Demographic characteristics by immigrant/refugee status and depressive symptom, in the baseline wave of the Canadian Longitudinal Study on Aging (n = 29,670)

Variables	Total n (%)	By immigrant/refugee status (%)			By assessment of depression (%)	
		Canadian-born n = 24,339	Immigrants/ Non-refugees n = 5059	Refugees n = 272	Depressed n = 4705	$\chi^2$ (df), p-value
<b>Demographics</b>						
<b>Immigration status</b>						
Canadian-born residents	24,339 (82.1)	–	–	–	15.2	15.77 (2), <0.001
Non-refugee immigrants	5059 (16.9)	–	–	–	16.6	
Refugees	272 (1.0)	–	–	–	22.1	
<b>Age groups</b>						
45–55	7530 (42.1)	42.6	39.6	44.0	15.9	10.16 (3), 0.017
56–65	9753 (29.8)	30.7	25.7	24.8	15.5	
66–75	7249 (17.1)	16.2	21.5	19.9	14.1	
76–85	5138 (10.9)	10.5	13.3	11.4	16.2	
<b>Sex</b>						
Male	14,532 (49.6)	48.8	53.1	53.3	12.7	173.44 (1), <0.001
Female	15,138 (50.4)	51.2	46.9	46.7	18.3	
<b>Marriage</b>						
Single/never married	2600 (8.3)	9.0	5.2	5.2	25.4	462.83 (2), <0.001
Married/with partner	20,445 (76.1)	75.2	80.2	80.7	13.0	
Widowed/divorced	6625 (15.6)	15.8	14.7	14.1	22.5	
<b>Socioeconomic status</b>						
<b>Income</b>						
< \$20,000	1503 (4.3)	4.4	3.5	8.2	38.3	604.30 (2), <0.001
\$20,000+	26,264 (90.1)	90.2	89.9	84.6	14.0	
No answer	1903 (5.6)	5.3	6.6	7.2	22.1	
<b>Education</b>						
< Secondary school	1610 (4.8)	5.3	2.6	2.6	25.2	154.65 (3), <0.001
High school graduate	5006 (15.6)	16.3	12.7	11.8	18.4	
Post-secondary degree	23,009 (79.4)	78.3	84.4	85.6	14.4	
No answer	45 (0.1)	0.1	0.3	0.0	15.4	
<b>Retirement</b>						
Not retired	13,135 (33.2)	56.8	57.1	61.1	15.3	39.34 (3), <0.001
Completely retired	3258 (9.5)	33.3	33.2	28.1	16.2	
Partly retired	13,172 (56.9)	9.6	9.2	10.5	14.0	
No answer	105 (0.4)	0.3	0.6	0.3	34.5	
<b>Health status and behaviors</b>						
<b>Multi-morbidities</b>						
No condition	5244 (19.9)	19.6	21.6	22.2	7.1	1353.10 (3), <0.001
One health condition	7686 (27.5)	27.2	28.8	29.7	9.9	
Two health conditions	6819 (22.5)	22.7	21.9	18.3	15.2	
Three health conditions	9921 (30.1)	30.6	27.6	29.7	26.6	
<b>Chronic pain</b>						
Free of pain	22,293 (76.6)	76.7	76.2	69.3	11.9	992.06 (2), <0.001
Have pain	5984 (19.4)	19.5	18.9	21.2	28.1	
No answer	1393 (4.0)	3.8	4.9	9.5	24.4	
<b>Binge drinking</b>						
Non-binge drinker	18,765 (59.1)	57.7	64.9	73.9	16.5	37.81 (2), <0.001
Binge drinker	10,191 (38.8)	40.7	30.4	18.3	13.9	
No answer	714 (2.2)	1.6	4.7	7.8	17.9	

**Table 2** (continued)

Variables	Total n (%)	By immigrant/refugee status (%)			By assessment of depression (%)	
		Canadian-born	Immigrants/ Non-refugees	Refugees	Depressed	$\chi^2$ (df), p-value
	n = 29,670	n = 24,339	n = 5059	n = 272	n = 4705	
<b>Physical activities</b>						
Never/seldom	25,350 (86.4)	86.6	85.4	82.7	15.4	78.26 (2), <0.001
Sometimes/often	3029 (9.8)	9.7	10.1	8.1	13.6	
No answer	1291 (3.8)	3.6	4.5	9.1	24.5	
<b>Social connection</b>						
<b>Social isolation</b>						
Not alone nor isolated	22,181 (80.9)	80.7	81.7	81.7	13.7	346.82 (5), <0.001
Living alone/not isolated	6487 (15.2)	15.7	12.7	8.5	23.8	
Not alone/mildly isolated	578 (2.5)	2.3	3.4	4.6	16.9	
Living alone/mildly isolated	117 (0.3)	0.3	0.2	0.3	31.5	
Not alone/very isolated	240 (1.0)	0.8	1.8	4.6	24.6	
Living alone/very isolated	67 (0.2)	0.2	0.2	0.3	37.7	
<b>Online networking</b>						
Use yearly/never	14,425 (15.3)	44.3	45.0	45.0	15.3	68.84 (3), <0.001
Use monthly	7009 (15.6)	28.4	25.9	24.1	15.6	
Use weekly/daily	6956 (14.5)	23.7	24.7	21.8	14.5	
No answer	1280 (24.1)	3.6	4.3	9.1	24.1	
<b>Social support when needed</b>						
<b>MOS: confide in</b>						
None/a little/some	5334 (16.5)	16.0	18.7	27.1	31.1	1092.05 (1), <0.001
Most/all of the time	24,336 (83.5)	84.0	81.3	72.9	12.4	
<b>MOS: advise crisis</b>						
None/a little/some	5117 (16.1)	15.6	17.7	27.1	29.2	811.05 (1), <0.001
Most/all of the time	24,553 (83.9)	84.4	82.3	72.9	12.9	
<b>MOS: show love</b>						
None/a little/some	2703 (7.7)	7.6	7.7	17.0	39.0	1046.32 (1), <0.001
Most/all of the time	26,967 (92.3)	92.4	92.3	83.0	13.6	

Canad. Canadian-born residents, *Immig.* non-refugee immigrants, *Refu.* refugees; *MOS*: Medical Outcomes Study (MOS) Social Support Survey

odds of depression, while those who did not have someone to turn to in a crisis had 55% higher odds of depression compared to those with better social support. Of all the clusters, Model 3 which included health conditions and chronic pain, followed by Model 5 which included the social support characteristics, provided the greatest explanatory value according to the Nagelkerke  $R^2$  statistics (13% and 10%, respectively).

## Discussion

Late-life depression is a serious, yet under-recognized and undertreated [28, 29], health issue that may lead to suicidal ideation [30]. The vulnerability for depression stems from trauma and stress across the life span [31, 32], both of which are more prevalent across refugees' different phases of the

migration process [33]. Consistent with previous research on refugee health [1, 3], this study found that both refugees and non-refugee immigrants had a significantly higher prevalence and demographically adjusted odds of depression compared to those who were Canadian-born. This vulnerability to depression among refugees and other immigrants may be due to the substantial stress faced by these groups during both pre- and post-migration periods, including potential downward socioeconomic mobility, higher levels of unemployment, language barriers, racial discrimination and reduced social networks [34–38].

The fact that social support only substantially attenuates the association between depression and refugees (rather than non-refugee immigrants) underlines the key factor for refugees is the presence of affectionate social support. The findings also suggest that refugees may be more prone to emotional isolation. Without longitudinal data, it is difficult

**Table 3** Adjusted odds ratios of depression among refugees and non-refugee respondents, the baseline Canadian Longitudinal Study on Aging

	Model 1 demographics (core block)		Model 2 socioeconomic status		Model 3 health status and behavior		Model 4 social connection		Model 5 social support		Model 6 complete model								
	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI							
Refugee status (ref. Canadian-born)																			
Non-refugee immigrants	1.19	1.09	1.29	1.22	1.13	1.33	1.26	1.15	1.37	1.18	1.09	1.29	1.14	1.04	1.24	1.23	1.12	1.35	
Refugees	1.70	1.29	2.24	1.64	1.24	2.18	1.69	1.26	2.25	1.61	1.22	2.13	1.30	0.97	1.74	1.30	0.96	1.78	
Age groups (ref. 76–85)																			
45–55	1.16	1.04	1.29	1.34	1.19	1.50	1.57	1.40	1.76	1.44	1.25	1.66	1.36	1.21	1.52	1.36	1.21	1.65	2.24
56–65	1.09	0.97	1.22	1.21	1.08	1.36	1.29	1.14	1.45	1.27	1.12	1.44	1.20	1.06	1.35	1.48	1.29	1.69	
66–75	0.92	0.82	1.05	0.98	0.86	1.11	0.99	0.87	1.12	0.98	0.86	1.11	0.99	0.87	1.13	1.09	0.95	1.24	
Female (ref. male)	1.44	1.35	1.54	1.41	1.32	1.50	1.26	1.18	1.35	1.45	1.35	1.55	1.67	1.56	1.78	1.44	1.34	1.55	
Marriage (ref. married/with partner)																			
Single/never married	2.25	2.04	2.48	1.85	1.66	2.05	2.12	1.91	2.35	1.96	1.73	2.22	1.53	1.37	1.70	1.31	1.14	1.51	
Widowed/divorced	1.87	1.72	2.04	1.58	1.45	1.72	1.69	1.55	1.85	1.68	1.51	1.88	1.46	1.33	1.59	1.21	1.07	1.36	
Household income (ref. \$20,000)																			
<\$20,000	-	-	-	2.48	2.17	2.82	-	-	-	-	-	-	-	-	-	-	1.65	1.43	1.91
No answer	-	-	-	1.55	1.37	1.75	-	-	-	-	-	-	-	-	-	-	1.44	1.26	1.65
Education (ref. post-secondary degree)																			
<Secondary school education	-	-	-	1.66	1.45	1.90	-	-	-	-	-	-	-	-	-	-	1.41	1.22	1.63
High school graduate or equivalent	-	-	-	1.27	1.17	1.39	-	-	-	-	-	-	-	-	-	-	1.19	1.09	1.30
Education non-answer	-	-	-	0.91	0.38	2.15	-	-	-	-	-	-	-	-	-	-	0.60	0.24	1.51
Retirement (ref. not retired)																			
Completely retired	-	-	-	1.22	1.10	1.35	-	-	-	-	-	-	-	-	-	-	1.00	0.90	1.11
Partly retired	-	-	-	1.05	0.93	1.19	-	-	-	-	-	-	-	-	-	-	0.93	0.81	1.06
No answer	-	-	-	2.65	1.77	3.97	-	-	-	-	-	-	-	-	-	-	1.63	1.04	2.54
Binge drinking (ref. non-binge drinker)																			
Regular binge drinker	-	-	-	-	-	-	1.05	0.96	1.15	-	-	-	-	-	-	-	1.08	0.98	1.18
No answer	-	-	-	-	-	-	1.10	0.88	1.36	-	-	-	-	-	-	-	0.94	0.75	1.18
Multi-morbidities (ref. no condition)																			
One health condition	-	-	-	-	-	-	1.37	1.21	1.56	-	-	-	-	-	-	-	1.39	1.22	1.57
Two health conditions	-	-	-	-	-	-	2.20	1.94	2.48	-	-	-	-	-	-	-	2.13	1.88	2.42
Three health conditions	-	-	-	-	-	-	3.92	3.50	4.40	-	-	-	-	-	-	-	3.73	3.32	4.20
Chronic pain (ref. free of pain)																			
Have pain, activities prevented	-	-	-	-	-	-	2.11	1.96	2.27	-	-	-	-	-	-	-	1.98	1.83	2.14
No answer	-	-	-	-	-	-	1.87	1.12	3.13	-	-	-	-	-	-	-	1.96	1.11	3.44

**Table 3** (continued)

	Model 1 demographics (core block)		Model 2 socioeconomic status		Model 3 health status and behavior		Model 4 social connection		Model 5 social support		Model 6 complete model		
	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI	
<b>Physical activities (ref. sometimes/often)</b>													
Never/seldom	-	-	-	-	<b>1.20</b>	<b>1.07</b>	<b>1.35</b>	-	-	-	-	<b>1.14</b>	<b>1.01</b>
No answer	-	-	-	-	1.25	0.73	2.14	-	-	-	-	<b>4.18</b>	<b>1.25</b>
<b>Social isolation (ref. not live alone nor isolated)</b>													
Live alone/not isolated	-	-	-	-	-	-	-	<b>1.19</b>	<b>1.06</b>	<b>1.33</b>	-	1.03	0.90
Not live alone/mildly isolated	-	-	-	-	-	-	-	<b>1.26</b>	<b>1.04</b>	<b>1.54</b>	-	1.20	0.97
Live alone/mildly isolated	-	-	-	-	-	-	-	<b>1.79</b>	<b>1.12</b>	<b>2.84</b>	-	1.19	0.72
Not live alone/extremely isolated	-	-	-	-	-	-	-	<b>1.99</b>	<b>1.51</b>	<b>2.62</b>	-	<b>1.53</b>	<b>1.13</b>
Live alone/extremely isolated	-	-	-	-	-	-	-	<b>2.50</b>	<b>1.42</b>	<b>4.39</b>	-	1.08	0.57
<b>Online networking (ref. weekly/daily)</b>													
Use yearly/never	-	-	-	-	-	-	-	<b>1.10</b>	<b>1.01</b>	<b>1.20</b>	-	1.05	0.95
Use monthly	-	-	-	-	-	-	-	<b>1.11</b>	<b>1.01</b>	<b>1.21</b>	-	1.07	0.97
No answer	-	-	-	-	-	-	-	<b>1.75</b>	<b>1.50</b>	<b>2.05</b>	-	<b>0.24</b>	<b>0.90</b>
MOS: confide in none (ref. mostly)	-	-	-	-	-	-	-	-	-	-	<b>2.02</b>	<b>1.85</b>	<b>2.21</b>
MOS: advise crisis none (ref. mostly)	-	-	-	-	-	-	-	-	-	-	<b>1.69</b>	<b>1.55</b>	<b>1.85</b>
MOS: show love none (ref. mostly)	-	-	-	-	-	-	-	-	-	-	<b>2.15</b>	<b>1.93</b>	<b>2.39</b>
Nagelkerke R <sup>2</sup>	-	-	<b>0.03</b>	-	-	-	-	-	-	-	<b>0.13</b>	-	<b>0.10</b>

Statistics that reach the 0.05 level of significance are bolded; MOS: Medical Outcomes Study (MOS) Social Support Survey



to determine the direction of the association; the relationship may be bidirectional. Because pre-displacement exposure to human rights violations and systematic violence can lead to disruption in refugees' ability to trust and interact with others [39], this can result in long-term psychosocial difficulties in forming close relationships [1, 2]. Alternatively, the social dislocation faced by refugees may mean that these individuals lost or were geographically distanced from their life-long friends and family. The gap in their social circle left by their earlier traumas may have resulted in social isolation.

The attenuating effects of social support on the linkage between the frequency of social contacts (i.e., social isolation, online social networking) and depression imply that it is the quality of relationships rather than the quantity of the associations that matters most to refugees' mental health. It may be that these variables were just serving as proxies for level of social support, and therefore the inclusion of the actual social support variables made the other measures redundant in the model. The findings indicate that several other factors, independent of refugee and immigrant status, were also associated with depression. In line with earlier studies, Canadian adults who were younger, female, single, divorced or widowed [34, 40], and those who had lower income or lower education [41], more comorbid health conditions, lower levels of physical activity, or those who experienced greater social isolation and chronic pain were more likely to be depressed.

### Implications for Practice and Policy

This study highlights the importance of developing early mental health interventions that are aimed at nurturing supportive interpersonal relationships among refugees and asylum seekers in their families, neighbourhoods, and communities. The results of this study resonate with a qualitative study about refugee clients who received treatment for depression that emphasized the need for strong group-based social support [42]. Effective mental health interventions focusing on engendering belongingness should be implemented in a group setting.

The findings also have substantial policy implications. In the context of the Canadian refugee policy, two different sponsorship programs are currently in place. Government-assisted refugees (GARs) get basic financial aid and assistance offered by professionals to assist with the settlement process. Privately sponsored refugees (PSRs) are extensively supported by a network of volunteers, often members of a church, mosque or synagogue. These volunteers are very engaged and available to provide extensive assistance with negotiating all kinds of settlement issues including housing, health needs and job searching. According to recent studies on Syrian refugees in Canada [43], PSRs reported having more help in daily errands, fewer unmet needs and a higher

employment rate than GARs. Hence, PSRs may be more likely to thrive post-migration because of a stronger social support network. Longitudinal research is needed to verify if the amount of social support received by PSRs upon arrival in Canada differs from GARs, and if so, whether this substantial social support yields a positive effect on long-term mental health outcomes.

### New Contributions to the Literature and Limitations

By using population-based data, this study illuminates the unique role of social support in reducing the association between refugee status and depression for middle-aged and older refugees in Canada. However, the study has some limitations which warrant caution in the interpretation of the findings. First, the causal relationship between depression and the various measures cannot be inferred as the data were cross-sectional. Second, the data were based solely upon self-report; future research would benefit from more objective sources of information. Third, due to the constraints of secondary data analysis, neither formal refugee status nor the type of sponsorship was available. Future investigations are required to understand the causality of depression by analyzing the longitudinal data and the heterogeneity among diverse refugee groups.

### Conclusion

Refugees resettled in Canada had a significantly higher prevalence of depression than their Canadian-born counterparts in middle and late adulthood. The odds of depression for refugees remained significant when adjustment was made for 12 risk factors for depression including age, gender, marital status, income, education, retirement status, number of comorbid health conditions, presence of chronic pain, level of physical activity, social isolation and online network use. However, the elevated odds of depression among refugees were reduced to non-significance when social support availability representing close relations was taken into account. Future interventions and policy efforts should consider the presence of close interpersonal relations and their potential role in alleviating depression among refugee populations.

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