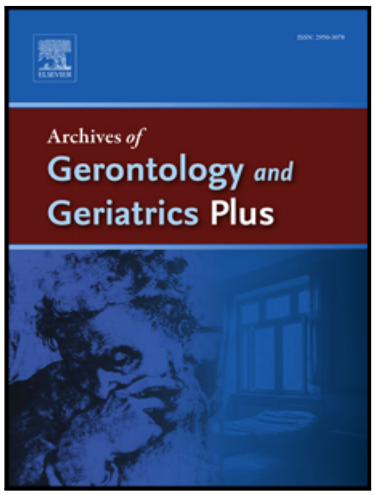

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ZhiDi Deng B.Sc, PharmD , Grace Li PhD , Maria E. Rowsell MSW, RSW , Dorina Cadar , Esme Fuller-Thomson PhD

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Exploring the Impact of the COVID-19 Pandemic on Depression in middle-aged and older Canadians with Diabetes: Insights on Incidence, Recurrence, and Risk Factors from the Canadian Longitudinal Study on Aging

ZhiDi Deng B.Sc PharmD[1], Grace Li, PhD[2], Maria E. Rowsell, MSW, RSW[3], Dorina Cadar[4], Esme Fuller-Thomson PhD[5,6,*]

[1]Faculty of Medicine and Dentistry, University of Alberta, 8440 112 St. NW, Edmonton, AB T6G 2R7, Canada
[2]Department of Sociology, University of Victoria, Victoria, BC, V8W 3P5, Canada
[3]Institute for Life Course and Aging, University of Toronto, 246 Bloor St W, Toronto, ON M5S 1V4, Canada
[4]Centre for Dementia Studies, Department of Neuroscience, Brighton and Sussex Medical School, Trafford Centre, BN1 9RY, UK
[5]Factor-Inwentash Faculty of Social Work, University of Toronto, 246 Bloor St W, Toronto, ON M5S 1V4, Canada
[6]Institute for Life Course and Aging, University of Toronto, 246 Bloor St W, Toronto, ON M5S 1V4, Canada
[*]Corresponding Author: Esme Fuller-Thomson, PhD, Director of the Institute for Life Course & Aging, Factor-Inwentash Faculty of Social Work, Cross-appointed to the Faculty of Medicine, University of Toronto, 246 Bloor St. W., Toronto, ON M5S 1V4, Canada
Email: esme.fuller.thomson@utoronto.ca. Phone Number: (416) 978-3269

ABSTRACT

Purpose: Individuals with diabetes have an elevated risk of depression. The occurrence of the COVID-19 pandemic may have further impacted the mental health of patients living with diabetes. This study aims to examine: 1) factors associated with the development of depression during the COVID-19 pandemic among individuals with diabetes without a history of depression; and 2) factors associated with the persistence or recurrence of depression during the pandemic among those with diabetes, and a pre-pandemic history of depression.

Methods: Secondary analysis of four waves of the Canadian Longitudinal Study on Aging surveys. Canadian residents between the ages of 45-85 were recruited in 2012-2015 and subsequently completed three follow-up surveys. A total of 2,730 individuals with diabetes were included in this study.

Results: Among those without a prior history of depression, the incidence of new depression was 12.9% (95% CI 11.3-14.4%) during the pandemic. Among those with a history of depression, approximately half (48.5%; 95% CI 45.4-51.7%) were depressed during the pandemic. Factors associated with increased risk of incident and recurrent depression during the pandemic among older adults with diabetes include being female, greater educational attainment, higher income/savings, functional limitations, loneliness/social isolation, chronic pain, family conflict, and difficulties accessing health care.

Conclusion: Among Canadians living with diabetes, both the incidence and recurrence of depression increased during the pandemic. Even as the widespread pandemic response draws to a close, continued efforts to support the psychological well-being of this population are needed.

Keywords: Diabetes, Depression, CLSA, COVID-19, older adults

1. INTRODUCTION

Diabetes Mellitus is a chronic health condition that affects approximately 5.7 million individuals in Canada.[1] Living with diabetes can be extremely stressful for patients. First, untreated or poorly managed diabetes can lead to detrimental effects on an individual's health. This includes medical complications such as blindness, chronic kidney disease, foot ulcers, coronary artery disease, and stroke.[2] Second, the management of diabetes often involves changes that are challenging to enact and difficult to adhere to. For instance, patients may need to engage in frequent blood glucose monitoring, sustain changes to nutrition and physical activity, and potentially inject medication daily.[3] Thus, unsurprisingly, previous research has reported a strong association between diabetes and

depression.[4-6] A recent meta-analysis of twenty studies found that those living with diabetes had 33% higher odds of depression compared to those without diabetes.[4]

The occurrence of the COVID-19 pandemic may have further impacted the mental health of patients living with diabetes. Early in the pandemic, health authorities identified that individuals living with diabetes had an increased risk for COVID-19 related hospitalization, intensive care unit admission, and mortality.[7, 8] Consequently, those with diabetes were strongly encouraged to adopt social distancing measures and follow lockdown policies. For many individuals, this may have led to feelings of isolation, loneliness, and depression. Additionally, healthcare consultations saw a shift from in-person to virtual visits during the pandemic.[9] This change in care delivery could further reduce the sense of support and increase stress among patients with diabetes.[10]

A recent Canadian study showed that individuals with a history of depression have a four-fold increased risk of having depression during the pandemic when compared to their counterparts without previous depression.[11] In light of this finding, it is important to examine how the pandemic has influenced the incidence and recurrence of depression among individuals living with diabetes. This study utilizes data from the Canadian Longitudinal Study on Aging (CLSA) to identify in individuals with diabetes: 1) factors associated with the development of depression during the COVID-19 pandemic among those without a history of depression; 2) factors associated with persistence or recurrence of depression during the pandemic among those with a pre-pandemic history of depression.

2. METHODS

2.1. Data source and population

As has been described elsewhere,[11, 12] this study used data from the Canadian Longitudinal Study on Aging (CLSA) comprehensive cohort that was obtained as part of the Baseline, Follow-up 1, COVID Spring 2020, and COVID Autumn 2020 questionnaires. The CLSA is a large, national study that follows Canadian residents aged 45 to 85 at time of recruitment for at least 20 years or until the time of death.[13] In the comprehensive cohort, a total of 30,091 community-dwelling men and women were recruited by the CLSA between 2012-2015 (Baseline). 27,737 participants completed the 3-year follow-up between 2015-2018 (Follow-up 1). To collect data on the impact of the COVID-19 pandemic on older Canadians, the CLSA also conducted two additional follow-up waves in 2020. In the comprehensive cohort, 18,530 and 15,544 respondents completed the COVID-19 Spring 2020 and Autumn 2020 questionnaires, respectively (Spring 2020 and Autumn 2020). Participants who were lost to follow-up or were missing key covariate data were excluded from the analysis.

The sample consisted of individuals who had self-reported diabetes in either the Baseline or Follow-up 1 questionnaire (n=2,730). Self-reported diabetes was measured by the question, "Has a doctor ever told you that you have diabetes, borderline diabetes or that your blood sugar is high?" (Yes/No). Among the 2,730 diabetes patients included in this study, 973 had a previous history of depression, while 1,757 had no previous history of depression. Respondents without chronic illnesses are defined as those who did not report any of the following chronic or major diseases at follow-up 1: diabetes, heart disease, peripheral vascular disease (poor circulation in limbs), dementia or Alzheimer's disease, multiple sclerosis, epilepsy, migraine headaches, intestinal or stomach ulcers, bowel disorders, asthma, COPD, stroke, glaucoma, kidney disease, macular degeneration,

ministroke or TIA, Parkinson's disease, or cancer. Out of the 4,392 individuals without chronic illnesses, 909 had previously experienced depression, whereas 3,483 had not.

2.2. Measures

Depression was defined as a score of ten or more on the Centre for Epidemiologic Studies–Depression (CES-D-10) scale or an affirmative reply to the question "Has a doctor ever told you that you suffer from clinical depression?"[14] If respondents scored lower than ten on the CES-D-10 and answered no to the previous question in both Baseline and Follow-up 1 questionnaires, then they were classified to have no pre-pandemic depression. However, if respondents screened positive in either of the above measures during the Baseline or Follow-up 1 questionnaires, then they were classified as having a pre-pandemic history of depression.

We gathered other demographic information from the Baseline and Follow-up 1 questionnaires, including age, sex, immigration status (Canadian-born vs. immigrant), and race/ethnicity (white vs. non-white). Marital status was categorized into married/common-law, separated/divorced/widowed, and single/never married or common-law. Education was categorized based on the highest level of degree achieved (less than secondary school, secondary school/some post-secondary, and post-secondary degree/diploma). Income and wealth were assessed through total household income (<$50,000, $50,000–$99,999, $100,000 or more, and not answered), home ownership (rent, own with mortgage, own without mortgage), total savings (<$50,000, $50,000–$99,999, ≥$100,000, and not answered), and whether income satisfies basic needs (0=with some difficulty/not very well/totally inadequate; 1=very well/adequately).

Information around health was also gathered in the two earlier questionnaires. Body mass index or BMI was divided into underweight or normal weight (BMI<25), overweight (BMI 25-29.9), and obese (BMI≥30). Presence of chronic pain, chronic conditions (diabetes, heart disease, peripheral vascular disease or poor circulation in limbs, dementia or Alzheimer's disease, multiple sclerosis, epilepsy, migraine headaches, intestinal or stomach ulcers, bowel disorder, stroke or cerebrovascular accident, glaucoma, kidney disease, macular degeneration, ministroke or transient ischemic attack, Parkinson's Disease, and cancer), and multimorbidity (zero, one, two, three or more chronic conditions or missing information) were also assessed.

Follow-up 1 questionnaire also assessed adverse childhood experiences. Responses to questions regarding the presence of childhood physical or sexual abuse, childhood exposure to intimate partner violence, and past neglect by parents or caregivers, were scored. Loneliness was measured in this survey with a series of questions, including: 1) "How often do you feel that you lack companionship?"; 2) "How often do you feel left out?"; and 3) "How often do you feel isolated from others?". Respondents who answered "hardly ever" were coded as having answered "No" to the question, and those who answered "some of the time" or "often" were coded as having answered "Yes" to the question.

Compared to the Baseline and Follow-up 1, additional information was gathered in the Spring 2020 and Autumn 2020 questionnaires. Similar to the Follow-up 1 survey, the Spring 2020 survey also evaluated respondents' feelings of loneliness with the question "How often do you feel lonely" (Rarely/never or Some of the time vs. Occasionally/All of the time). Beyond this, information on types of dwelling (house, apartment or other), living arrangements (living alone or with others), excursions outside of home during the past

month were also gathered. Later, the Autumn 2020 questionnaire was conducted. This survey asked direct questions around the impact of COVID-19. Participants were asked if, during the COVID-19 pandemic, they experienced: 1) Health stressors (Yes/No to "You were ill", "People close to you were ill", and/or "Death of a person close to you"); 2) Struggles with income or accessing resources (Yes/No to "Loss of income" and/or "Unable to access necessary supplies or food"); 3) Family conflict (Yes/No to "Increased verbal or physical conflict" and/or "Breakdown in family/marital relationships"); 4) Other family-related issues (Yes/No to "Separation from family", "Increased time caregiving", and/or "Unable to care for people who require assistance due to health condition or limitation"; 5) Concerns with health care access (Yes/No to "Unable to access my usual healthcare"); and 6) Concerns with access to medication (Yes/No to "Unable to get my usual prescription medications and treatments").

2.3. Statistical Analysis

We compared the characteristics of participants in the CLSA who had diabetes and no pre-pandemic history of depression with those who had diabetes and a pre-pandemic history of depression. We provided means and standard deviations for continuous variables and frequencies and percentages for categorical variables. To assess the statistical differences between these two groups, we employed Chi-square tests for categorical variables and independent t-tests for continuous variables. Additionally, we conducted two sensitivity analyses. The first compared the incidence and recurrence of depression among older adults with diabetes during the Follow-up 1 questionnaire and the COVID-19 pandemic. The second compared the incidence and recurrence of depression between diabetes patients and individuals without any chronic illness during the COVID-19

pandemic. Finally, we used multivariate logistic regression models to examine the predictors of depression for individuals with diabetes, both with and without a history of depression. For each predictor, we reported adjusted odds ratios and 95% Confidence Intervals (CIs). All hypothesis tests were two-sided, and we considered a significance level of alpha=0.05. To evaluate the goodness-of-fit of logistic models, we reported Nagelkerke R square. We also calculated the variance inflation factor to assess the multicollinearity among the independent variables in the logistic regression analysis, and no potential problems were detected. All analyses were performed using R version 4.1.3.

3. RESULTS

Table 1 provides the sample characteristics of the participants. A total of 2,730 respondents with diabetes were included in this analysis. Among the overall sample, 973 respondents had a pre-pandemic history of depression and 1,757 respondents did not. Compared to those without a history of depression, a higher proportion of those who had a history of depression were women, single or separated/divorced/widowed, and renting or paying off the mortgage. Those with a history of depression also had lower household income, less total savings, and were less able to satisfy their needs with their income prior to the pandemic. Additionally, individuals with a pre-pandemic history of depression had a greater prevalence of obesity, chronic pain, comorbid conditions, and loneliness.

Table 2 presents changes in depression prevalence among those with diabetes during the pandemic. Sensitivity analyses were conducted to examine differences in the incident and recurrent depression among individuals with diabetes during the time between Baseline to Follow-up 1 and between Follow-up 1 to the Autumn 2020 survey. Among those with no history of depression, the incidence of depression between Baseline

and Follow-up 1 was 6.5% (95%CI 5.2-7.7%). During the relatively similar time lapse from Follow-up 1 to the COVID-19 pandemic (Autumn 2020), the incidence of new depression was 12.9% (95%CI 11.3-14.4%). Among those with a history of depression, 36.8% (95%CI 33.1-40.5%) had recurrence or persistence of depression between Baseline to Follow-up 1 as compared to 48.6% (95%CI 45.4-51.7%) between Follow-up 1 to Autumn 2020.

A second sensitivity analysis compared individuals with diabetes to those with no chronic illnesses. Among individuals with a history of depression, the recurrence of depression during COVID-19 was 48.6% (95% CI: 45.4-51.7%) among diabetes patients and 39.3% (95% CI: 36.1-42.4%) among those with no chronic illnesses (p<.001). Although those with diabetes who had no history of depression had slightly higher incidence of depression during COVID-19 (12.9%; 95% CI: 11.3-14.4%) than individuals with no chronic illness and no history of depression (11.2%;95% CI: 10.2-12.3%), this difference did not reach statistical significance (p-value = 0.09).

The association between various risk factors and incident depression during the pandemic among individuals with diabetes and no pre-pandemic depression is presented in Table 3. Males had lower odds of developing depression as compared to females (OR 0.62; 95%CI 0.44-0.87; p<0.01). Compared to those who did not attain a secondary school diploma, those who had obtained a post-secondary degree/diploma had slightly higher odds of depression during the pandemic (OR 2.64; 95%CI 1.03-6.77; p=0.044). Similarly, individuals with a household income of $50,000-$99,999 (OR 2.16; 95%CI 1.33-3.51; p<0.01) and $100,000 or more (OR 2.21; 95%CI 1.24-3.93; p<0.01) had higher odds of reporting depression as compared to individuals with less than $50,000 household income. Those with functional limitations (OR 2.13; 95%CI 1.48-3.06; p<0.01) or who reported

occasional or constant feelings of loneliness during the pandemic (OR 3.06; 95%CI 2.03-4.63; p<0.01) had higher odds of incident depression during the Autumn 2020 survey as compared those who did not. Additionally, during the pandemic, individuals who experienced COVID-19-related health stressors (OR 1.42; 95%CI 1.03-1.96; p=0.032), struggled with income (OR 1.59; 95%CI 1.06-2.38; p=0.025), family conflict (OR 4.64; 95%CI 2.95-7.29; p<0.01), and difficulties with accessing health care (OR 1.48; 95%CI 1.04-2.11; p=0.031) had higher odds of reporting depression than those who did not. The likelihood ratio test statistic for the logistic regression is 224. The Nagelkerke R-squared value is 0.22, suggesting that 22% of the variance in the dependent variable can be explained by the independent variables included in the model.

Table 4 presents the association between risk factors and recurrent depression during the pandemic among individuals with diabetes and a pre-pandemic history of depression. Male sex (OR 0.61; 95%CI 0.44-0.83; p<0.01) and separated/divorced/widowed marital status (OR 0.42; 95%CI 0.26-0.68; p<0.01) were associated with lower odds of recurrent depression during the pandemic. Immigrants had higher odds of recurrent depression (OR 1.69; 95%CI 1.09-2.62; p=0.020). Compared to those who did not obtain a secondary school degree, those with some post-secondary education (OR 4.37; 95%CI 2.12-9.01; p<0.01) and those who obtained a post-secondary degree/diploma (OR 4.00; 95%CI 2.05-7.79; p<0.01) had higher odds of depression. Individuals who had total savings of $50,000-$99,999 had higher odds of recurrent depression than individuals with savings of less than $49,999 (OR 1.66; 95%CI 1.01-2.73; p=0.046). However, those who reported prior to the pandemic that their income satisfied basic needs had lower odds of recurrent depression than those who reported that their

income did not satisfy their needs (OR 0.40; 95%CI 0.25-0.64; p<0.01). Individuals with chronic pain (OR 1.59; 95%CI 1.18-2.14; p<0.01) or functional limitations (OR 1.62; 95%CI 1.17-2.23; p<0.01) had higher odds of recurrent depression in Autumn 2020 than those who did not experience these conditions. In terms of loneliness/isolation, participants who reported that they felt isolated from others (OR 2.99; 95%CI 1.24-7.20; p=0.014), lonely occasionally or all the time (OR 2.43; 95%CI 1.69-3.49; p<0.01) or lived alone during the pandemic (OR 1.79; 95%CI 1.13-2.85; p=0.014) had higher odds of recurrent depression. In contrast, those who participated often in church or religious activities prior to the pandemic had lower odds of recurrent depression during the pandemic than those who did not (OR 0.66; 95%CI 0.45-0.96; p=0.030). Additionally, individuals who experienced difficulties accessing health care (OR 1.50; 95%CI 1.08-2.09; p=0.017), family conflict (OR 3.32; 95%CI 2.09-5.25; p<0.01) or other family-related issues (OR 1.48; 95%CI 1.08-2.02; p=0.015) had higher odds of recurrent depression than those who reported otherwise. The Nagelkerke R-squared value of 0.295 indicates a stronger model fit compared to Table 3.

4. DISCUSSION

This study examined the incidence and recurrence of depression during the COVID-19 pandemic among individuals with diabetes. Our study suggests that both the incidence and recurrence of depression increased during the pandemic among older adults with diabetes. Among those without a prior history of depression, the incidence of new depression rose from 6.5% (95%CI 5.2-7.7%) between the 2012-2015 Baseline and 2015-2018 Follow-up 1 surveys to 12.9% (95%CI 11.3-14.4%) between Follow-up 1 and the Autumn 2020 surveys. Among those with a history of depression, the rate of depression persistence/recurrence also increased from 36.8% (95%CI 33.1-40.5%) between Baseline

to Follow-up 1 to 48.5% (95%CI 45.4-51.7%) between Follow-up 1 to Autumn 2020. Despite a slightly shorter time lapse between Follow-up 1 to Autumn 2020, the rates of the incident and recurrent depression were much higher during this time as compared to the period between Baseline to Follow-up 1.

The elevated prevalence of depression during the pandemic is unsurprising. Individuals with diabetes were declared to be at higher risk for morbidity and mortality from COVID-19 at the start of the pandemic.[7, 8] This information, coupled with the need to physically isolate and take additional precautionary measures, may have contributed to increased mental and emotional stress as well as declines in psychological wellbeing. Indeed, our analysis showed that those who experienced feelings of loneliness or disruptions to healthcare access had increased odds of both incident and recurrent depression. Those who reported feelings of loneliness or isolation during the pandemic had approximately triple the risk of incident and recurrent depression. This is expected because loneliness is a well-documented risk factor for depression and poor health.[15, 16] Unfortunately, the prevalence of social isolation and loneliness has increased significantly among older adults[17] and patients with diabetes[18] since the start of the pandemic, and efforts should be mobilized to support the social and psychological well-being of these populations. Moreover, among individuals with diabetes, experiencing disruptions in healthcare access was associated with approximately 50% higher odds of depression incidence and recurrence. During the pandemic, many medical clinics shifted from traditional in-person appointments to virtual care. While telehealth services can help increase accessibility, it is by no means a perfect solution. Patients, especially older adults, may not be adept with technology, and some may not have reliable internet access. As such,

these factors may lead to delayed care, diabetes complications, and mental stressors for patients.

Consistent with existing literature, our study identified several other risk factors related to depression. The presence of functional limitations[19] and family conflict[20] during the pandemic was associated with increased odds of both incident and recurrent depression. Immigrants[21] and older adults with chronic pain[22] also had increased odds of recurrent depression during the pandemic. Finally, male respondents exhibited approximately 40% lower odds of incident and recurrent depression during the pandemic as compared to female respondents.[23]

We also identified several surprising findings. First, our study found that those who were separated, divorced, or widowed had lower odds of recurrent depression during the pandemic as compared to those who were married or in common-law relationships (OR 0.42; 95%CI 0.26-0.68; p<0.01). This contrasts with research conducted prior to the pandemic, which found that individuals who are married have a lower risk of depression than those who are single, widowed, separated, or divorced.[24, 25] One explanation is that, during the pandemic, lockdowns and quarantines required partners to stay in close physical proximities for extended periods of time. As a result, relationship conflicts may arise more easily in confinement with a heightened awareness of unresolved issues and the appearance of new problems.[26] Furthermore, emotions and conflicts may also be exacerbated by other stressors associated with the pandemic, such as personal safety worries, job loss and financial insecurity, and isolation from friends. Indeed, a small longitudinal analysis of American adults showed that, during the pandemic, there were increased disagreements and fighting among couples.[27] As such, separation, divorce, or

widowhood may remove individuals from pandemic-exacerbated family conflict and thus benefit their mental health.

The second unexpected finding relates to income and education. Our study identified that those with higher income/savings and education attainment exhibited higher odds of incident and recurrent depression during the pandemic. This finding appears surprising as it is well documented in the literature prior to the pandemic that individuals of higher socioeconomic status have lower odds of depression.[28, 29] One factor that may partially explain our observation is psychological resilience. It has been hypothesized that individuals with lower socioeconomic status may possess greater psychological resilience because they have dealt with more stressors in their lives.[30, 31] As such, they may be better equipped to endure sudden adversities and thus be protected from the new onset of negative mental health sequalae. However, we simultaneously found that individuals who reported prior to the pandemic that their income satisfied basic needs had lower odds of recurrent depression than those who reported otherwise. The factors underlying these seemingly contradictory findings are unclear. One possible explanation relates to perceived financial strain. Previous studies have shown that subjective perception of financial strain can be a greater predictor of mental health outcomes than actual income.[32, 33] The survey question of "How well do you think that your income currently satisfies your basic needs" selects for individuals who are content and satisfied with their current state of living, even if they do not have a high income. As such, the question may be a reflection not only of participants' actual socioeconomic status, but also their perceived financial and mental well-being. Another possible explanation is that the Canadian Emergency Response Benefit (CERB) had a protective impact on the mental

health of low-income Canadians. CERB provided Canadians who lost employment during the pandemic with a $2000 monthly income. For some low-income individuals and households, this would actually increase their monthly income, thereby reducing financial-related stress among this population. Further research is needed to explore the possible mechanisms that may underlie these unexpected findings related to marital status and socioeconomic status.

Our study highlights the importance of ensuring continuity of care for people with chronic illness, such as diabetes, during a pandemic, while also providing additional mental health support to combat pandemic-related challenges. The mental health declines observed among this population are unsurprising given the unique stressors faced by older adults with diabetes early in the pandemic, such as increased risk of COVID-19 related hospitalization and mortality, increased periods of loneliness and social isolation, and increases in stress due to shifts from in-person support to virtual care.[7-10] Transitions from in-person to virtual care can be challenging for patients, and thus it is important to provide additional support to ensure that patients are receiving adequate support in the absence of in-person services.[9,10] Additionally, it is important to improve access to mental health services for people with diabetes, particularly during periods of increased stress, such as the pandemic. Interventions that have shown promising results to support the mental health of individuals with comorbid depression and diabetes include cognitive behavioural therapy and psychoeducation, and these have demonstrated effectiveness in both in-person and web-based settings.[34,35]

4.1. Limitations

There are several limitations to this study. First, the assessment of depression was based upon the CES-D-10 tool and/or self-report of a depression diagnosis, as opposed to a clinical interview or documented diagnosis by a health care professional. This assessment of depression also does not account for severity or duration of depressive episodes. Second, our measure of diabetes was based on self-report of a diagnosis, rather than a clinical assessment, and therefore may be subject to recall bias. Third, our analysis relied on a sample of participants who voluntarily responded to multiple surveys over time. It is possible that those with the most severe physical and/or mental health issues would decline to participate, thus excluding a particularly vulnerable subset of the population. Fourth, the time lapse between surveys prevented accurate identification of the specific time points at which depression occurred. For instance, for patients who did not report depression at the Follow-up 1 survey (2015-2018) and reported depression in the Spring and Autumn 2020 surveys, it is difficult to identify whether their depression occurred during the pandemic or just prior to the pandemic. Fifth, among individuals with a documented history of depression, it is difficult to assess if reports of depression during the Spring 2020 and Autumn 2020 surveys represent continued unmanaged depression or recurrence of symptoms due to the pandemic. Sixth, the disease severity and the management strategies employed by participants were not documented. Depending on disease severity, the management of diabetes may range from solely lifestyle modifications to multiple daily insulin injections with regular glucose monitoring. As such, we were unable to assess how the mental well-being of individuals with diabetes varied with disease severity during the pandemic. While the models provide insights into the factors associated with depression outcomes, it is important to note that the relatively low

Nagelkerke R-squared values (both analyses <0.30) indicate that the majority of the variance in depression outcomes remains unexplained by the included variables. Future studies should include additional variables that were not available in the CLSA dataset, such as mental health-related variables (e.g., coping mechanisms, resilience, medication use, therapy, etc.) and diabetes-related variables (e.g., disease severity, treatment regimens, glycemic control, etc.). Further, additional research should employ alternative modeling approaches (e.g., machine learning algorithm) to uncover complex interactions and improve predictive accuracy.[36]

5. Conclusion

Despite these limitations, to our knowledge, this study is the first analysis of the incidence and recurrence of depression among older Canadian adults living with diabetes using a large longitudinal sample. Overall, we found that among Canadians living with diabetes, both the incidence and recurrence of depression increased during the pandemic. Loneliness/isolation, difficulties accessing healthcare resources, chronic pain, family conflict, and immigrant status were among the risk factors associated with higher odds of depression in this population. Contrary to previous research, our study identified that individuals who were separated, divorced or widowed, as well as those who had lower income and educational attainment, had lower odds of depression. The COVID-19 pandemic negatively impacted the mental health of individuals living with diabetes. As the widespread pandemic response draws to a close, efforts to support the psychological well-being of this population are needed.

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 de-identified CLSA data.

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TABLES

Table 1. Characteristics of CLSA respondents with Diabetes (n = 2,730)

	Overall sample of respondents with diabetes (n=2730)	Respondents with diabetes with no pre-pandemic history of depression (n=1,757)	Respondents with diabetes with a pre-pandemic history of depression (n=973)	p-value	Source of data
% had pre-COVID depression	36%			<0.001	
Age (Mean, SD)	70.21 (8.94)	70.80 (9.00)	69.15 (8.73)	<0.001	CLSA Autumn 2020
Sex				<0.001	CLSA Baseline
Female	1,272 (40.2%)	701 (39.9%)	571 (58.7%)		
Male	1,458 (53.4%)	1,056 (60.1%)	402 (41.3%)		

Marital status				<0.001	CLSA Follow-up 1
Married/Common-law	1,870 (68.5%)	1,301 (74.0%)	569 (58.5%)		
Separated/Divorced/Widowed	593 (21.7%)	318 (18.1%)	275 (28.3%)		
Single	267 (9.8%)	138 (7.9%)	129 (13.3%)		
Immigrant Status				0.012	CLSA Baseline
No	2,273 (83.3%)	1,439 (81.9%)	834 (85.7%)		
Yes	457 (16.7%)	318 (18.1%)	139 (14.3%)		
Visible Minority Status				0.580	CLSA Baseline
No	2,591 (94.9%)	1664 (94.7%)	927 (85.3%		
Yes	139 (5.1%)	93 (5.3%)	46 (4.7%)		
Education				0.024	CLSA Baseline
Less than secondary school	153 (5.6%)	83 (4.7%)	70 (7.2%)		

Some post-secondary school	515 (18.9%)	339 (19.3%)	176 (18.1%)		
Post-secondary degree/diploma	2,062 (75.5%)	1,335 (76.0%)	727 (74.7%)		
Household income				<0.001	CLSA Follow-up 1
Less than $50,000	730 (26.7%)	389 (22.1%)	341 (35.0%)		
$50,000– Less than $100,000	1028 (37.7%)	665 (37.8%)	363 (37.3%)		
$100,000 or more	836 (30.6%)	614 (34.9%)	222 (22.8%)		
Missing	136 (5.0%)	89 (5.1)	47 (4.8)		
House ownership				<0.001	CLSA Follow-up 1
Rent	443 (16.2%)	247 (14.1%)	196 (20.1%)		
Own with mortgage	734 (26.9%)	440 (25.0%)	294 (30.2%)		
Own without mortgage	1,493 (54.7%)	1,038 (59.1%)	455 (46.8%)		
Missing	60 (2.2%)	32 (1.8%)	28 (2.9 %)		
Total savings				<0.001	CLSA Follow-up 1
Less than $49,999	571 (20.9%)	303 (17.2%)	268 (27.5%)		

$50,000–$99,999	389 (14.2%)	244 (13.9%)	145 (14.9%)		
$100,000 or more	1,548 (56.7%)	1,062 (60.4%)	486 (49.9%)		
Missing	60 (2.2%)	148 (8.4%)	74 (7.6%)		
Whether income satisfies needs				<0.001	CLSA Baseline
No	239 (8.8%)	90 (5.1%)	149 (15.3%)		
Yes	2,491 (91.2%)	1,667 (94.9%)	824 (84.7%)		
BMI				<0.001	CLSA Follow-up 1
Underweight or normal weight	400 (14.7%)	274 (15.6%)	126 (12.9%)		
Overweight	1,012 (37.1%)	698 (39.7%)	314 (32.3%)		
Obese	1,318 (48.3%)	785 (44.7%)	533 (54.8%)		
Chronic pain				<0.001	CLSA Follow-up 1

No	1,694 (62.1%)	1,209 (68.8%)	485 (49.8)		
Yes	1,036 (37.9%)	548 (31.2%)	488 (50.2)		
Multimorbidity				<0.001	CLSA Follow-up 1
0	787 (28.8%)	576 (32.8%)	211 (21.7%)		
1	852 (31.2%)	582 (33.1%)	270 (27.7%)		
2	501 (18.4%)	289 (16.4%)	212 (21.8%)		
3+	471 (17.3%)	245 (13.9%)	226 (23.2%)		
Missing	119 (4.4%)	65 (3.7%)	54 (5.5%)		
Feel they lack companionship				<0.001	CLSA Follow-up 1
No	2,564 (93.9%)	1,718 (97.8%)	846 (86.9%)		
Yes	166 (6.1%)	39 (2.2%)	127 (13.1%)		
Feel left out				<0.001	CLSA Follow-up 1
No	2,649	1,737 (98.9%)	912 (93.7%)		

	(97.0%)				
Yes	81 (3.0%)	20 (1.1%)	61 (6.3%)		
Feel isolated from others				<0.001	CLSA Follow-up 1
No	2,663 (97.5%)	1,747 (99.4%)	916 (94.1%)		
Yes	67 (2.5%)	10 (0.6%)	57 (5.9%)		
Church or religious activities				0.215	CLSA Follow-up 1
Rare	1,903 (69.7%)	1,210 (68.9%)	693 (71.2%)		
Often	827 (30.3%)	547 (31.1%)	280 (28.8%)		
Religious activities at home				0.048	CLSA Follow-up 1
Rare	1,339 (49.0%)	887 (50.5%)	452 (46.5%)		
Often	1,391 (51.0%)	870 (49.5%)	521 (53.5%)		
Adverse childhood experience	0.26 (0.62)	0.17 (0.50)	0.42 (0.78)	<0.0`01	CLSA Follow-up 1

(Mean, SD)					
Left home in the past one month during COVID				0.021	CLSA Spring 2020
No	221 (8.1%)	126 (7.2%)	95 (9.8%)		
Yes	2,509 (91.9%)	1,631 (92.8%)	878 (90.2%)		
How often do you feel lonely during COVID				<0.001	CLSA Spring 2020
Rarely or never/Some of the time	2,285 (83.7%)	1,569 (89.3%)	716 (73.6%)		
Occasionally/All of the time	445 (16.3%)	188 (10.7%)	257 (26.4%)		
Type of dwelling				<0.001	CLSA Spring 2020
House	2,204 (74.1%)	1,357 (77.2%)	667 (68.6%)		
Apartment	599 (21.9%)	336 (19.1%)	263 (27.0%)		
Others	107 (3.9%)	64 (3.6%)	43 (4.4%)		

Living alone during the COVID-19 pandemic				<0.001	CLSA Spring 2020
No	2,004 (73.4%)	1,376 (78.3%)	628 (64.5%)		
Yes	726 (26.6%)	381 (21.7%)	345 (35.5%)		
Functional limitations				<0.001	CLSA Autumn 2020
No	1,830 (67.0%)	1,281 (72.9%)	549 (56.4%)		
Yes	900 (33.0%)	476 (27.1%)	424 (43.6%)		
COVID _ Infected				<0.001	CLSA Autumn 2020
No	1,795 (65.8%)	1,206 (68.6%)	589 (60.5%)		
Yes	935 (34.2%)	551 (31.4%)	384 (39.5%)		
COVID _ Income				0.002	CLSA Autumn

					2020
No	2,290 (83.9%)	1,503 (85.5%)	787 (80.9%)		
Yes	440 (16.1%)	254 (14.5%)	186 (19.1%)		
COVID _ Family conflict				<0.001	CLSA Autumn 2020
No	2468 (90.4%)	1,633 (92.9%)	835 (85.8%)		
Yes	262 (9.6%)	124 (7.1%)	138 (14.2%)		
COVID _ Other family Issues				<0.001	CLSA Autumn 2020
No	1,268 (46.4%)	863 (49.1%)	405 (41.6%)		
Yes	1,462 (53.6%)	894 (50.9%)	568 (58.4%)		
COVID _ Health care				<0.001	CLSA Autumn 2020

No	1,989 (72.9%)	1,329 (75.6%)	660 (67.8%)		
Yes	741 (27.1%)	428 (24.4%)	313 (32.2%)		
COVID _ Medications				0.014	CLSA Autumn 2020
No	2,542 (93.1%)	1,652 (94.0%)	890 (91.5%)		
Yes	188 (6.9%)	105 (6.0%)	83 (8.5%)		

Table 2. Cumulative incidence and recurrence of depression by CLSA Autumn 2020 among older adults with diabetes

	Diabetes patients with no history of depression		**p-value**	**Diabetes patients with a history of depression**		**p-value**
	No depression in Autumn 2020	**Depression in Autumn 2020**		**No depression in Autumn 2020**	**Depression in Autumn 2020**	
	(n=1531)	**(n=226)**		**(n=500)**	**(n=473)**	
History of depression prior to			<0.001			<0.001

pandemic						
No history of Depression	1531 (87.1%)	226 (12.9%)		---	---	
Any history of Depression				500 (51.4%)	473 (48.6%)	
Depressed at baseline and follow-up				54 (24.2%)	169 (75.8%)	
Depressed at follow-up				87 (46.5%)	100 (53.5%)	
Depressed at baseline				134 (56.3%)	104 (43.7%)	
Reported diagnosed by a health professional but not depression at baseline or follow-up 1				225 (69.2%)	100 (30.8%)	
Age	70.89 (9.01)	70.19 (8.97)	0.280	69.15 (8.77)	69.14 (8.69)	0.982
Sex			<0.001			<0.001
Male	954 (90.3%)	102 (9.7%)		237 (59.0%)	165 (41.0%)	
Female	577 (82.3%)	124 (17.7%)		263 (46.1%)	308 (53.9%)	
Marital status			<0.001			0.795

Married/Common-law	1162 (89.3%)	139 (10.7%)		288 (50.6%)	281 (49.4%)	
Separated/Divorced/Widowed	252 (79.2%)	66 (20.8%)		146 (53.1%)	129 (46.9%)	
Single	117 (84.8%)	21 (15.2%)		66 (51.2%)	63 (48.8%)	
Immigrant status			0.656			0.006
No	1251 (86.9%)	188 (13.1%)		444 (53.2%)	390 (46.8%)	
Yes	280 (88.1%)	38 (11.9%)		56 (40.3%)	83 (59.7%)	
Visible minority status			0.270			0.967
No	1446 (86.9%)	218 (13.1%)		477 (51.5%)	450 (48.5%)	
Yes	85 (91.4%)	8 (8.6%)		23 (50.0%)	23 (50.0%)	
Education			0.341			0.001
Less than secondary school	76 (91.6%)	7(8.4%)		50 (71.4%)	20 (28.6%)	
Some post-secondary school	299 (88.2%)	40 (11.8%)		79 (44.9%)	97 (55.1%)	
Post-secondary degree/diploma	1156 (86.6%)	179 (13.4%)		371 (51.0%)	356 (49.0%)	
Household income			0.224			0.980

Less than $50,000	341 (87.7%)	48 (12.3%)		175 (51.3%)	166 (48.7%)	
$50,000–$99,999	575 (86.5%)	90 (13.5%)		186 (51.2%)	177 (48.8%)	
$100,000 or more	543 (88.4%)	71 (11.6%)		116 (52.3%)	106 (47.7%)	
Missing	72 (80.9%)	17 (19.1%)		23 (48.9%)	24 (51.1%)	
House ownership			0.001			0.533
Rent	201 (81.4%)	46 (18.6%)		92 (46.9%)	104 (53.1%)	
Own with mortgage	382 (86.8%)	58 (13.2%)		151 (51.4%)	143 (48.6%)	
Own without mortgage	925 (89.1%)	113 (10.9%)		242 (53.2%)	213 (46.8%)	
Missing	23 (71.9%)	9(28.1)		15 (53.6%)	13 (46.4%)	
Total saving			0.001			0.402
Less than $49,999	257 (84.8%)	46 (15.2%)		145 (54.1%)	123 (45.9%)	
$50,000–$99,999	206 (84.4%)	38 (15.6%)		67 (46.2%)	78 (53.8%)	
$100,000 or more	951 (89.5%)	111 (10.5%)		253 (52.1%)	233 (47.9%)	
Missing	117 (79.1%)	31 (20.9%)		35 (47.3%)	39 (52.7%)	
Whether income satisfies needs			0.112			<0.001
No	73 (81.1%)	17 (18.9%)		51 (34.2%)	98 (65.8%)	

Yes	1458 (87.5%)	209 (12.5%)		449 (54.5%)	375 (45.5%)	
BMI			0.097			0.537
Underweight or normal weight	239 (87.2%)	35 (12.8%)		70 (55.6%)	56 (44.4%)	
Overweight	622 (89.1%)	76 (10.9%)		156 (49.7%)	158 (50.3%)	
Obese	670 (85.4%)	115 (14.6%)		274 (51.4%)	259 (48.6%)	
Chronic pain			0.001			<0.001
No	1075 (88.9%)	134 (11.1%)		288 (59.4%)	197 (40.6%)	
Yes	456 (83.2%)	92 (16.8%)		212 (43.4%)	276 (56.6%)	
Multimorbidity			0.052			0.025
0	518 (89.9%)	58 (10.1%)		122 (57.8%)	89 (42.2%)	
1	507 (87.1%)	75 (12.9%)		136 (50.4%)	134 (49.6%)	
2	241 (83.4%)	48 (16.6%)		116 (54.7%)	96 (45.3%)	
3+	207 (84.5%)	38 (15.5%)		97 (42.9%)	129 (57.1%)	
Missing	58 (89.2%)	7 (10.8%)		29 (53.7%)	25 (46.3%)	
Feel that lack companionship			0.008			0.015

No	1503 (87.5%)	215 (12.5%)		448 (53.0%)	398 (47.0%)	
Yes	28 (71.8%)	11 (28.2%)		52 (40.9%)	75 (59.1%)	
Feel left out			0.533			<0.001
No	1515 (87.2%)	222 (12.8%)		483 (53.0%)	429 (47.0%)	
Yes	16 (80.0%)	4 (20.0%)		17 (27.9%)	44 (72.1%)	
Feel isolated from others			0.840			<0.001
No	1523 (87.2%)	224 (12.8%)		488 (53.3%)	428 (46.7%)	
Yes	8 (80.0%)	2 (20%)		12 (21.1%)	45 (78.9%)	
Church or religious activities			1.000			0.281
Rare	1054 (87.1%)	156 (12.9%)		348 (50.2%)	345 (49.8%)	
Often	477 (87.2%)	70 (12.8%)		152 (54.3%)	128 (45.7%)	
Religious activities at home			0.098			0.423
Rare	785 (88.5%)	102 (11.5%)		239 (52.9%)	213 (47.1%)	
Often	746 (85.7%)	124 (14.3%)		261 (50.1%)	260 (49.9%)	
Adverse childhood experience	0.17 (0.49)	0.24 (0.55)	0.037	0.34 (0.70)	0.51 (0.85)	0.001
Left home in the past one month			0.845			0.072

during COVID						
No	111 (88.1%)	15 (11.9%)		40 (42.1%)	55 (57.9%)	
Yes	1420 (87.1%)	211 (12.9%)		460 (52.4%)	418 (47.6%)	
How often do you feel lonely during COVID			<0.001			<0.001
Rarely or never/Some of the time	1403 (89.4%)	166 (10.6%)		418 (58.4%)	289 (41.6%)	
Occasionally/All of the time	128 (68.1%)	60 (31.9%)		82 (31.9%)	175 (68.1%)	
Type of dwelling			0.018			0.263
House	1197 (88.2%)	160 (11.8%)		350 (52.5%)	317 (47.5%)	
Apartment	284 (84.5%)	52 (15.5%)		125 (47.5%)	138 (52.5%)	
Others	50 (78.1%)	12 (21.9)		25 (58.1%)	18 (41.9%)	
Living alone during the COVID-19 pandemic			<0.001			0.024
No	1222 (88.8%)	154 (11.2%)		340 (54.1%)	288 (45.9%)	
Yes	309 (81.1%)	72 (18.9%)		160 (46.4%)	185 (53.6%)	

Functional limitation			<0.001			<0.001
No	1152 (89.9%)	129 (10.1%)		319 (58.1%)	230 (41.9%)	
Yes	379 (79.6%)	97 (20.4%)		181 (42.7%)	243 (57.3%)	
COVID _ Infected			<0.001			0.092
No	1077 (89.3%)	129 (10.7%)		316 (53.7%)	273 (46.3%)	
Yes	454 (82.4%)	97 (17.6%)		184 (47.9%)	200 (52.1%)	
COVID _ Income			<0.001			<0.001
No	1333 (88.7%)	170 (11.3%)		428 (54.4%)	359 (45.6%)	
Yes	198 (78.0%)	56 (22.0%)		72 (38.7%)	114 (61.3%)	
COVID _ Family conflict			<0.001			<0.001
No	1452 (88.9%)	181 (11.1%)		463 (55.4%)	372 (44.6%)	
Yes	79 (63.7%)	45 (36.3%)		37 (26.8%)	101 (73.2%)	
COVID _ Other family Issues			<0.001			<0.001
No	782 (90.6%)	81 (9.4%)		245 (60.5%)	160 (39.5%)	
Yes	749 (83.8%)	145 (16.2%)		255 (44.9%)	313 (55.1%)	
COVID _ Health care			<0.001			<0.001

No	1187 (89.3%)	142 (10.7%)		373 (56.5%)	287 (43.5%)	
Yes	344 (80.4%)	84 (19.6%)		127 (40.6%)	186 (59.4%)	
COVID _ Medications			0.003			0.003
No	1450 (87.8%)	202 (12.2%)		471 (52.9%)	419 (47.1%)	
Yes	81 (77.1%)	24 (22.9%)		29 (34.9%)	54 (65.1%)	

Table 3. Logistic regression results for incident depression during Autumn 2020 among respondents with diabetes and no pre-pandemic history of depression (n =1,757)

	Odds Ratio	95% Confidence Interval	p-value
Age	0.99	[0.97; 1.01]	0.286
Sex			
Female (ref.)			
Male	0.62**	[0.44; 0.87]	<0.01
Marital status			
Married/Common-law (ref.)			
Separated/Divorced/Widowed	1.62	[0.99; 2.65]	0.056
Single	1.02	[0.52; 1.98]	0.957

Immigrant status			
No (ref.)			
Yes	1.16	[0.76; 1.77]	0.491
Visible minority status			
No (ref.)			
Yes	0.70	[0.31; 1.60]	0.398
Education			
Less than secondary school (ref.)			
Secondary and some post-secondary	2.22	[0.83; 5.96]	0.113
Post-secondary degree/diploma	2.64*	[1.03; 6.77]	0.044
Household income			
Less than $50,000 (ref.)			
$50,000–$99,999	2.16**	[1.33; 3.51]	<0.01
$100,000 or more	2.21**	[1.24; 3.93]	<0.01
Missing	1.34	[0.62; 2.87]	0.459
Dwelling ownership			

Rent (ref.)			
Own with mortgage	0.59	[0.34; 1.04]	0.069
Own without mortgage	0.65	[0.39; 1.09]	0.104
Missing	1.89	[0.73; 4.90]	0.192
Total saving			
Less than $49,999 (ref.)			
$50,000–$99,999	1.30	[0.75; 2.24]	0.347
$100,000 or more	0.73	[0.45;1.19]	0.208
Missing	1.76	[0.93; 3.35]	0.084
Whether income satisfies needs			
No (Ref.)			
Yes	0.78	[0.40; 1.49]	0.449
BMI			
Underweight or normal weight (ref.)			
Overweight	0.90	[0.56; 1.45]	0.676
Obese	0.89	[0.56; 1.42]	0.634

Chronic pain			
No (ref.)			
Yes	1.21	[0.87; 1.68]	0.261
Multimorbidity			
0 (ref.)			
1	1.22	[0.82; 1.81]	0.337
2	1.56	[0.98; 2.49]	0.060
3+	1.11	[0.66; 1.86]	0.693
Missing	1.33	[0.55; 3.21]	0.524
Feel that lack companionship			
No (ref.)			
Yes	1.30	[0.51; 3.29]	0.579
Feel left out			
No (ref.)			
Yes	0.83	[0.18; 3.86]	0.815
Feel isolated from others			

No (ref.)			
Yes	1.32	[0.20; 8.83]	0.777
Church or religious activities			
Rare (ref.)			
Often	0.92	[0.61; 1.39]	0.696
Religious activities at home			
Rare (ref.)			
Often	0.97	[0.66; 1.42]	0.879
Adverse childhood experience	1.07	[0.81;1.41]	0.653
Left home in the past one month during COVID			
No (ref.)			
Yes	1.44	[0.77; 2.69]	0.257
How often do you feel lonely during COVID			
Rarely or never/Some of the time (ref.)			
Occasionally/All of the time	3.06***	[2.03; 4.63]	<0.01
Type of dwelling			

House (ref.)			
Apartment	1.01	[0.64; 1.57]	0.979
Others	1.47	[0.67; 3.23]	0.343
Living along during the COVID-19 pandemic			
No (ref.)			
Yes	1.10	[0.67; 1.79]	0.709
Functional limitation scale			
No (ref.)			
Yes	2.13***	[1.48; 3.06]	<0.01
COVID _ Infected			
No (ref.)			
Yes	1.42*	[1.03; 1.96]	0.032
COVID _ Income			
No (ref.)			
Yes	1.59*	[1.06; 2.38]	0.025
COVID _ Family conflict			

No (ref.)			
Yes	4.64***	[2.95; 7.29]	<0.01
COVID _ Other family Issues			
No (ref.)			
Yes	1.29	[0.93; 1.80]	0.134
COVID _ Health care			
No (ref.)			
Yes	1.48*	[1.04; 2.11]	0.031
COVID _ Medications			
No (ref.)			
Yes	1.29	[0.73; 2.30]	0.382
Likelihood ratio test statistic	224.18***		
Nagelkerke R square	0.224		

*Note: p<0.05

**p<0.01

***p<0.001

Table 4. Logistic regression results for recurrent depression during Autumn 2020 among respondents with diabetes and a pre-pandemic history of depression (n=973)

	Odds Ratio	95% Confidence Interval	p-value
Age	1.02	[0.99; 1.04]	0.136
Sex			
Female (ref.)			
Male	0.61**	[0.44; 0.83]	<0.01
Marital status			
Married/Common-law (ref.)			
Separated/Divorced/Widowed	0.42***	[0.26; 0.68]	<0.01
Single	0.63	[0.36; 1.10]	0.104
Immigrant status			
No (ref.)			
Yes	1.69*	[1.09; 2.62]	0.020
Visible minority status			
No (ref.)			

Yes	0.77	[0.38; 1.55]	0.467
Education			
Less than secondary school (ref.)			
Secondary and some post-secondary	4.37***	[2.12; 9.01]	<0.01
Post-secondary degree/diploma	4.00***	[2.05; 7.79]	<0.01
Household income			
Less than $50,000 (ref.)			
$50,000–$99,999	1.26	[0.85; 1.88]	0.256
$100,000 or more	1.13	[0.68; 1.88]	0.628
Missing	1.20	[0.55; 2.61]	0.653
Dwelling ownership			
Rent (ref.)			
Own with mortgage	0.91	[0.55; 1.51]	0.728
Own without mortgage	0.72	[0.44; 1.19]	0.206
Missing	0.72	[0.27; 1.87]	0.497
Total saving			

Less than $49,999 (ref.)			
$50,000–$99,999	1.66*	[1.01; 2.73]	0.046
$100,000 or more	1.36	[0.90;2.06]	0.149
Missing	1.48	[0.27; 1.87]	0.497
Whether income satisfies needs			
No (Ref.)			
Yes	0.40***	[0.25; 0.64]	<0.01
BMI			
Underweight or normal weight (ref.)			
Overweight	1.29	[0.80; 2.09]	0.292
Obese	0.99	[0.63; 1.58]	0.980
Chronic pain			
No (ref.)			
Yes	1.59**	[1.18; 2.14]	<0.01
Multimorbidity			
0 (ref.)			

1	0.68	[0.20; 2.26]	0.525
2	0.75	[0.22; 2.54]	0.646
3+	0.67	[0.20; 2.28]	0.524
Missing	0.62	[0.15; 2.54]	0.508
Feel that lack companionship			
No (ref.)			
Yes	0.98	[0.58; 1.64]	0.925
Feel left out			
No (ref.)			
Yes	1.14	[0.51; 2.57]	0.753
Feel isolated from others			
No (ref.)			
Yes	2.99*	[1.24; 7.20]	0.014
Church or religious activities			
Rare (ref.)			
Often	0.66*	[0.45; 0.96]	0.030

Religious activities at home			
Rare (ref.)			
Often	1.10	[0.78; 1.55]	0.580
Adverse childhood experience	1.22	[1.00;1.49]	0.052
Left home in the past one month during COVID			
No (ref.)			
Yes	0.63	[0.38; 1.06]	0.085
How often do you feel lonely during COVID?			
Rarely or never/Some of the time (ref.)			
Occasionally/All of the time	2.43***	[1.69; 3.49]	<0.01
Type of dwelling			
House (ref.)			
Apartment	1.07	[0.72; 1.57]	0.740
Others	0.53	[0.24; 1.19]	0.123
Living alone during the COVID-19 pandemic			
No (ref.)			

Yes	1.79*	[1.13; 2.85]	0.014
Functional limitation scale			
No (ref.)			
Yes	1.62**	[1.17; 2.23]	<0.01
COVID Infected			
No (ref.)			
Yes	0.96	[0.71; 1.30]	0.790
COVID Income			
No (ref.)			
Yes	1.33	[0.89; 1.99]	0.167
COVID Family conflict			
No (ref.)			
Yes	3.32***	[2.09; 5.25]	<0.01
COVID Other family Issues			
No (ref.)			
Yes	1.48*	[1.08; 2.02]	0.015

COVID Health care			
No (ref.)			
Yes	1.50*	[1.08; 2.09]	0.017
COVID Medications			
No (ref.)			
Yes	1.22	[0.69; 2.14]	0.497
Likelihood ratio test statistic	243.54***		
Nagelkerke R square	0.295		

*Note: p<0.05

**p<0.01

***p<0.001

Declarations of interest
none.