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The Mental Health Toll of the COVID-19 Pandemic on Older Adults with Migraine: A Prospective Analysis of Depression Using the Canadian Longitudinal Study on Aging

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Background: Individuals with migraine are recognized to have a heightened risk of depression compared to the general population. The COVID-19 pandemic and associated public health restrictions exacerbated several known risk factors for depression, but limited longitudinal research has examined the impact of the pandemic on the mental health of people with migraine.

Aim: To examine the cumulative incidence of depression and recurrent depression among older adults with migraine, and to identify factors associated with depression among older adults with migraine during the pandemic.

Methods: Data came from four waves of the Canadian Longitudinal Study on Aging's comprehensive cohort (n=2181 with migraine). The outcome of interest was a positive screen for depression based on the CES-D-10 during the autumn of 2020. Bivariate and multivariate logistic regression analyses were conducted.

Results: Older adults with migraine, both with and without a history of depression, experienced increases in depression when compared to pre-pandemic levels, and when compared to older adults without migraine. The risk of incident and recurrent depression was higher among those who felt lonely and those who experienced an increase in family conflict during the pandemic. The risk of incident depression only was higher among those who experienced difficulty accessing healthcare and those who experienced other family challenges, such as increased caregiving responsibilities. The risk of recurrent depression only was higher among those who felt left out socially, those with functional limitations, and those whose income did not satisfy their basic needs.

Conclusion: Targeted interventions are needed to support the mental health of older adults with migraine.

Keywords: migraine, depression, COVID-19, older adults, CLSA

Introduction

Migraine is a leading cause of disability worldwide, affecting an estimated 14% of the global population.[1] The 2019 Global Burden of Diseases, Injuries, and Risk Factors Study found that migraine ranked second out of 369 conditions for years of healthy life lost due to disability (YLDs), accounting for 7.3% of all-cause YLDs.[2] Migraine is characterized by an intense, throbbing or pulsing headache, and is often accompanied by nausea, vomiting, phonophobia, and photophobia. Individuals with migraine experience severely impaired daily functioning and reduced quality of life when compared to those without migraine.[3] Migraine is also associated with a substantial personal and societal economic burden due to impaired ability to work during migraine episodes, high healthcare service and emergency department utilization, and considerable healthcare costs from prescriptions.[4,5]

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A large body of research has demonstrated that migraine has a high comorbidity with psychiatric disorders, including depressive disorders, anxiety disorders, and post-traumatic stress disorder.[6] When compared to the general population, depression occurs approximately two to four times more frequently among those with migraine.[7,8] Longitudinal research indicates that the relationship between depression and migraine is bidirectional, in that depression increases the risk for migraine and vice versa.[9] Although the exact mechanisms underlying the high comorbidity between migraine and depression are unclear, there are several neurological, genetic, and environmental factors that appear to impact this relationship.[9–11] Some of these factors include dysfunction in the serotonergic and dopaminergic systems, shared underlying gene variants,[9,10] smaller brain tissue volumes,[12] distinct developmental trajectories in the thalamus and fusiform,[13] alterations in the expression of sex hormones,[9] and chronic stress.[14] The high comorbidity between depression and migraine is recognized as a major concern among patients and clinicians, as these individuals experience higher medical costs, worsened physical and mental health, greater disability, and poorer treatment outcomes than those who experience migraine without comorbid depression.[7,15]

The COVID-19 pandemic and associated public health measures, such as lockdowns and physical distancing limitations, exacerbated the mental health burden on a global scale.[16] Many individuals with migraine experienced unique pandemic-related stressors, which may have further compromised their vulnerable mental health status. People with migraine reported increases in migraine frequency during the COVID-19 pandemic in comparison to their pre-pandemic frequency.[17,18] The frequency of migraines is a well-established risk factor for depression.[7,19] Many people with migraine also experienced disruptions to care during the pandemic, such as challenges with access to healthcare providers, disruptions to prescription medication access, and cancellations of Botox and steroid injection treatments.[17,20,21] People with migraine also reported increased use of analgesics to cope with migraine pain during the pandemic.[17,21] Acute medication overuse has been found to be associated with depression among those with migraine.[22]

When considering the high vulnerability to adverse mental health outcomes among individuals with migraine prior to the pandemic, combined with the unprecedented stressors during the pandemic, it is apparent that there is a need for longitudinal research to examine the impact of COVID-19 on the mental health of this population. To date, most research on the mental health of people with migraine during the pandemic has been limited to cross-sectional research, inhibiting the identification of temporal trends, or limited to small clinical samples of people with migraine. Furthermore, longitudinal research is needed to differentiate between people with migraine who have a lifetime history of depression and those who developed depression for the first time during the COVID-19 pandemic. To address this gap in the literature, the current study uses a large Canadian longitudinal panel study of older adults to: (1) determine the cumulative incidence of depression and recurrent depression in Autumn 2020 among those with migraine, in comparison to the period prior to the COVID-19 pandemic and in comparison to those without migraine; (2) identify factors associated with incident depression during the COVID-19 pandemic among older adults with migraine and no history of depression; and (3) identify factors associated with recurrent depression during the pandemic among older adults with migraine and a history of depression.

Materials and Methods

Data Source

As has been described in similar research,[23–27] this analysis utilizes data from the Canadian Longitudinal Study on Aging (CLSA). The CLSA is a large national study that collects information on various medical, psychological, social, and economic aspects of aging among Canadians.[28] Between 2011 and 2015, 30,907 participants were recruited from the Canadian population across 10 provinces (Minimum age=45; Maximum age=85) for the Baseline comprehensive cohort.[28,29] Between 2015 and 2018, 27,737 of these participants completed the follow-up wave of data collection (hereafter Follow-up 1). To better understand the impact of the COVID-19 pandemic on older adults in Canada, CLSA participants were invited to participate in COVID questionnaires between April 15 to May 30, 2020 (hereafter COVID Spring 2020) and between September 29 to December 29, 2020 (hereafter COVID Autumn 2020). The current study is

a secondary analysis of data from participants in these four waves of the comprehensive cohort of the CLSA (Baseline, Follow-up 1, COVID Spring 2020, COVID Autumn 2020).

Exclusion criteria for participation in the CLSA included residing in one of Canada's three territories (Yukon, Northwest Territories, Nunavut), living on a reserve or other Aboriginal settlement, full-time members of the Canadian Armed Forces, people who were unable to respond in one of Canada's official languages (ie, English or French), people living in long-term care institutions that provide 24-hour nursing care, and people with severe cognitive impairment at the time of recruitment. Further detail on the CLSA methodology is described elsewhere.[28,29]

Sample

Our study sample was comprised of respondents who had migraine at either Baseline or Follow-up 1 waves of data collection, prior to the COVID-19 pandemic. Migraine status was determined by self-report, based on the following question: "Has a doctor ever told you that you have migraine headaches?" (1 = yes; 0 = no). This resulted in a sample of 2181 respondents with migraine. We also analyzed two subsamples among respondents with migraine: those without a history of depression prior to the COVID-19 pandemic (n=1243) and those with a history of depression prior to the COVID-19 pandemic (n=938). In our analyses, we excluded respondents who were lost to follow-up at any point between the baseline and the Autumn 2020 wave of data collection, as well as respondents who had missing data on any covariates included in the current study.

The CLSA questionnaires have all been approved by research ethics boards at all collaborating Canadian institutions. The CLSA was conducted in accordance with the ethical standards of each institutional research committee, as well as with the Declaration of Helsinki. The Research Ethics Board at the University of Toronto (Protocol #41167) approved this study.

Measures

Outcome Variable: Depression

The Center for Epidemiologic Studies Short Scale of Depression (CES-D-10) was used to measure the outcome variable: depression status during the COVID-19 pandemic in Autumn 2020. The CES-D-10 is a short form screening tool of the original Center for Epidemiological Studies Depression Scale (CES-D). The CES-D-10 consists of 10 Likert scale items examining various dimensions of depressive symptoms, including feelings of depression, irritability, concentration, hopelessness, loneliness, fearfulness, restless sleep, and more. Respondents are asked about the frequency of these depressive symptoms within the previous week. A score is determined by totaling all 10 items. The total range of scores is 0 to 30, with higher scores indicating a greater degree of depressed mood. As established, a score of 10 or more was used to indicate a positive screen for depression.[30] The CES-D-10 is recognized as a reliable and valid measure of depression among diverse populations of community-dwelling older adults.[30]

History of Depression

Two measures of depression were utilized to identify a pre-pandemic history of depression among respondents. First, CES-D-10 scores were measured at both Baseline and Follow-up 1, with a score of 10 or more indicating a positive screen for depression. In addition to CES-D-10 scores, a self-report of a previous diagnosis of depression was also utilized to screen for depression. This was based on the question: "Did your doctor ever tell you that you had clinical depression?" (yes vs no). If either of the above measures indicated a positive screen for depression at Baseline or Follow-up 1 (CES-D-10 score $\geq$10 and/or an affirmative response to a previous diagnosis), participants were classified as having a pre-pandemic history of depression.

Sociodemographics

The following sociodemographic variables were included in the analysis from the Baseline wave of data collection: sex (female vs male), immigrant status (yes vs no), visible minority status (non-white vs white), education (less than secondary school vs some post-secondary school vs post-secondary degree/diploma), and whether income satisfies needs (with some difficulty/not very well/totally inadequate vs very well/adequately). From Follow-up 1, we included

data on marital status (single vs married/common-law vs separated/divorced/widowed), household income (less than $50,000 vs $50,000–$99,999 vs $100,000 or more vs missing), home ownership status (rent vs own with mortgage vs own without mortgage), and total savings (less than $49,999 vs $50,000–$99,999 vs $100,000 or more vs missing). Age was also included, measured at the COVID Autumn 2020 questionnaire.

Health Status

Several health-related variables from Follow-up 1 were included in the analysis: Body Mass Index (BMI), chronic pain, and multimorbidity. BMI was categorized into three groups: underweight or normal weight (BMI<25), overweight (BMI = 25.0–29.9), and obese (BMI ≥30.0). The presence of chronic pain was measured based on the question: "Are you usually free of pain or discomfort?" (yes vs no). Multimorbidity was measured based on the number of chronic health conditions reported by individuals (no chronic health conditions vs one chronic health condition vs two chronic health conditions vs three or more chronic health conditions vs missing). Chronic health conditions measured in the current study included: diabetes, cardiovascular disease, peripheral vascular disease or poor circulation in the extremities, dementia or Alzheimer's disease, multiple sclerosis, epilepsy, intestinal or gastric ulcers, intestinal disorders, asthma, chronic obstructive pulmonary disease, stroke or cerebrovascular accident, mini-stroke or transient ischemic attack, glaucoma, kidney disease, macular degeneration, Parkinson's disease, and cancer.

Social Support and Isolation

We also included variables on social isolation and religious participation during Follow-up 1. Social isolation was based on two variables: whether participants "feel they lack companionship" (almost never/part of the time = no vs often = yes) and whether participants "feel left out" (almost never/part of the time = no vs often = yes). Religiosity was based on two variables: participation in church or religious activities (more than once per month = often vs less than once per month = rare) and participation in religious activities at home (more than once per month = often vs less than once per month = rare).

Adverse Childhood Experiences

Adverse Childhood Experiences (ACEs) were assessed by totaling the cumulative score of exposure to four adversities during childhood: physical abuse, sexual abuse, exposure to intimate partner violence (IPV), and neglect (range = 0–4). These variables were measured at Follow-up 1 and were based on recollection of events that occurred prior to age 16. Respondents were categorized as having experienced childhood physical abuse if they were kicked, bit, punched, choked, burned or physically attacked in some other way at least once. Respondents were categorized has having experienced childhood sexual abuse if they reported that an adult forced them or attempted to force them into any sexual activity by threatening them, holding them down, or hurting them in some way at least once. Exposure to IPV in childhood was present if respondents reported seeing or hearing physical or verbal violence between parents, step-parents or guardians more than 10 times. Respondents were categorized as having experienced neglect if they reported their parents or guardians not having taken care of their basic needs one or more times.

Functional Limitations

Functional limitations were measured based on three self-reported indicators of physical functioning at the COVID Autumn 2020 wave of data collection. Respondents were asked if they had any difficulty standing up after sitting in a chair, walking alone up and down a flight of stairs, and walking two to three neighborhood blocks. Respondents who reported having difficulty with any of these three measures were categorized as having functional limitations.

COVID-19 Factors

Several COVID-19 specific variables were also included in the current study from the COVID Spring 2020 questionnaire. Respondents were asked if they had left home in the previous month (yes vs no). Loneliness during COVID-19 was measured based on how often respondents reported feeling lonely during the pandemic (rarely or never/some of the time vs occasionally/all of the time). During the COVID-19 Spring 2020 questionnaire, respondents were also asked what type of dwelling they were currently living in (house vs apartment vs other). Finally, respondents were also asked if they were living alone at the beginning of the pandemic (yes vs no).

Stressors related to the COVID-19 pandemic were also included in the analysis, and were measured at the Autumn 2020 questionnaire. There were six categories of COVID-19 related stressors: illness, income, family conflict, other family issues, healthcare access, and medication access. Illness stressors included: "You were ill", "People close to you were ill", and/or "Death of a person close to you" Income stressors included: "Loss of income" and/or "Unable to access necessary supplies or food". Family conflict measures included: "Increased verbal or physical conflict" and/or "Breakdown of family/marital relationship". Other family issues included: "Separation from family", "Increased time caregiving", and/or "Unable to care for people who require assistance due to health condition or limitation". Healthcare access issues were measured by: "Unable to access my usual healthcare" and medication access issues were measured by: "Unable to get my usual prescription drugs and treatments". Participants who responded "yes" to any of the statements in a given category were classified as having experienced the corresponding COVID stressor. Participants who responded "no" to all of the measures in a category were classified as not having experienced the stressor.

Statistical Analyses

The analyses were conducted in several stages. First, we calculated the prevalence of incident and recurrent depression during the COVID Autumn 2020 questionnaire among participants with and without migraine. Next, we performed a sensitivity analysis estimating the prevalence of incident and recurrent depression among those with and without migraine at Follow-up 1, based on their self-reported depression at Baseline.

The sample was then restricted to respondents with migraine (n=2181). We used descriptive statistics to describe respondents with migraine, and to compare those with and without a pre-pandemic history of depression. Descriptive statistics were also used to compare the distribution of various risk and protective factors among older adults with migraine and no history of depression who did and did not develop depression during the pandemic, as well as among older adults with migraine and a history depression who did and did not develop depression in this period. We used Chi-square tests and independent *t*-tests at the bivariate level to identify differences between groups.

We then used multivariate logistic regression models to examine predictors of incident depression among respondents with migraine who had no pre-pandemic history of depression (n=1243). Subsequently, we performed an additional multivariate logistic regression for respondents who had migraine and a pre-pandemic history of depression (n=938). We reported adjusted odds ratios (ORs) and confidence intervals (95% CI) for all predictors. All hypothesis tests were two-sided and p-values less than 0.05 were considered statistically significant. To evaluate the goodness-of-fit of the logistic models, the Nagelkerke R square was reported. We calculated the variance inflation factor (VIF) to assess the multi-collinearity among the independent variables in the logistic regression models, and we did not find any potential issues. All analyses were conducted using R version 4.2.1.

Results

Sensitivity Analysis

Table 1 presents the results of the sensitivity analyses. Among respondents who had no history of depression, the cumulative incidence of depression was significantly higher among those with migraine during Autumn 2020 (incidence = 14.9%; 95% CI = [12.9%, 16.9%]) compared to those without migraine (incidence = 11.8%; 95% CI = [11.1%,

Table 1 Sensitivity Analysis

	The Incidence of New Depression at Follow-up 1	The Recurrence of Depression at Follow-up 1	The Incidence of New Depression at COVX	The Recurrence of Depression at COVX
Individuals without migraine	5.1% with 95% CI [4.6%, 5.5%]	29.3% with 95% CI [27.5%, 31.0%]	11.8% with 95% CI [11.1%, 12.5%]	42.4% with 95% CI [40.6%, 44.2%]
Individuals with migraine	7.3% with 95% CI [5.8%, 8.8%]	34.4%with 95% CI [30.8%, 37.9%]	14.9% with 95% CI [12.9%, 16.9%]	48.0% with 95% CI [44.8%, 51.2%]
p-value	0.001	0.010	0.002	0.003

12.5%]). Similarly, among respondents who had a history of depression, the recurrence of depression was significantly higher among those with migraine during Autumn 2020 (prevalence = 48.0%; 95% CI = [44.8%, 51.2%]) compared to those without migraine (prevalence = 42.4%; 95% CI = [40.6%, 44.2%]). We then conducted a sensitivity analysis comparing incident and recurrent depression during Autumn 2020 to incident and recurrent depression observed during Follow-up 1, prior to the COVID-19 pandemic. Both incident and recurrent depression was significantly higher in Autumn 2020 than it was during pre-pandemic Follow-up 1 wave, highlighting the increase in depression among those with migraine during the pandemic.

Descriptive Statistics

Table 2 presents sample characteristics of individuals with migraine by pre-pandemic depression status. A higher proportion of respondents with a history of pre-pandemic depression were female, unmarried, had a household income less than $50,000, rented their accommodation, were obese, had total savings less than $49,999, had insufficient income to meet needs, had chronic pain, had 2 or 3+ multimorbidities, felt a lack of companionship, felt left out, felt lonely occasionally/all of the time during the pandemic, lived in an apartment and alone, had functional limitations, and experienced stressors related to COVID.

Table 3 shows the characteristics of respondents with migraine with and without a history of depression during the pandemic. Among respondents with migraine and no history of pre-pandemic depression, 15.0% developed depression for the first time during the pandemic. Among respondents with migraine and a history of pre-pandemic depression, 48.0% developed depression during the pandemic. Three-quarters (75.5%) of respondents who screened positive for depression based on CES-D-10 scores at both Baseline and Follow-up 1 were depressed during the pandemic. Among those who screened positive for depression at Follow-up 1, but not at Baseline, based on CES-D-10 scores, a little over half (56.0%), were depressed during the pandemic. Among those who screened positive for depression at Baseline, but not at Follow-up 1, according to CES-D-10 scores, approximately two fifths (43.3%) experienced depression during the pandemic. Among respondents who did not screen positive for depression based on CES-D-10 scores at Baseline or Follow-up 1, but reported they had been diagnosed with depression by a healthcare professional in their lifetime, approximately one third (30.7%) experienced depression during the pandemic.

Multivariate Logistic Regression

Table 4 presents the associations between various predictors and depression status at Autumn 2020 for older adults with a history of migraine and no history of depression. Respondents who felt lonely occasionally/all of the time (3–7 days per week) had substantially higher odds of incident depression than those who felt lonely rarely or never/some of the time (0–2 days per week) during the COVID-19 pandemic (OR = 3.13, 95% CI [1.97;4.97], p<0.001). Older adults with migraine who had increased family conflict during the COVID-19 pandemic had higher odds of developing depressive symptoms (OR=5.47, 95% CI [3.23;9.27], p<0.001). In addition, older adults with migraine who experienced other family issues during the pandemic, such as increased caregiving responsibilities, had approximately double the odds of depression (OR = 1.97, 95% CI [1.35;2.90], p <0.001). Individuals with migraine who were unable to access their usual healthcare services also had double the odds of depressive symptoms (OR=1.97; 95% CI [1.29;2.99], p = 0.002) compared to those who were able to access usual healthcare. The Nagelkerke R square for this model was 0.251.

Table 5 provides the association between various predictors prior to the pandemic and depression status at the Autumn 2020 wave among respondents with migraine and a pre-pandemic history of depression. Individuals with migraine whose income met their needs had a lower risk of recurrent depressive symptoms than those whose income did not meet their needs (OR = 0.54, 95% CI [0.34;0.86], p = 0.009). Those who felt left out were 2.32 times more likely to be depressed than their counterparts (95% CI [1.09;4.91], p = 0.029). Older respondents with migraine who often attended church or religious activities were less likely to develop depression than those who rarely attended religious activities (OR = 0.58, 95% CI [0.39;0.85], p = 0.009). Respondents who often felt lonely during the first few months of the COVID-19 pandemic were significantly more likely to have recurrent depressive symptoms (OR = 3.00, 95% CI [2.07;4.34], p =0.006). Older adults with migraine with functional limitations had a higher risk for depressive symptoms compared to their counterparts without such limitations (OR = 2.23, 95% CI [1.55; 3.20], p < 0.001). Respondents who

Table 2 Characteristics of CLSA Individuals with Migraine (n=2181)

	Overall Sample of Individuals with Migraine (n=2181)	Individuals with Migraine and No Pre-Pandemic History of Depression (n=1243)	Individuals with Migraine and a Pre-Pandemic History of Depression (n=938)	p-value	Source of Data
Depression during autumn 2020 (Mean, SD)				<0.001	COVID Autumn 2020
No	1545 (70.8%)	1057 (85.0%)	488 (52.0%)		
Yes	638 (29.2%)	186 (15.0%)	450 (48.0%)		
Age (Mean, SD)	61.13 (9.04)	61.23 (9.22)	61.01 (8.80)	0.565	Autumn 2020
Sex				<0.001	Baseline
Female	1632 (74.8%)	879 (70.7%)	753 (80.3%)		
Male	549 (25.2%)	364 (29.3%)	185 (19.7%)		
Marital status				<0.001	Follow-up 1
Married/Common-law	1484 (68.0%)	913 (73.5%)	571 (60.9%)		
Separated/Divorced/Widowed	517 (23.7%)	251 (20.2%)	266 (28.4%)		
Single	180 (8.3%)	79 (6.4%)	101 (10.8%)		
Immigrant status				0.648	Baseline
No	1829 (83.9%)	1038 (83.5%)	791 (84.3%)		
Yes	352 (16.1%)	205 (16.5%)	147 (15.7%)		
Visible minority status				0.847	Baseline
No	2120 (97.2%)	1207 (96.4%)	913 (97.3%)		
Yes	61 (2.8%)	36 (2.9%)	25 (2.7%)		
Education				0.062	Baseline
Less than secondary school	90 (4.1%)	41 (3.3%)	49 (5.2%)		
Some post-secondary school	313 (14.4%)	174 (14.0%)	139 (14.8%)		
Post-secondary degree/diploma	1778 (81.5%)	1028 (82.7%)	750 (80.0%)		
Household income				<0.001	Follow-up 1
Less than $50,000	539 (24.7%)	255 (20.5%)	284 (30.3%)		
$50,000–$99,999	741 (34.0%)	412 (33.1%)	329 (35.1%)		
$100,000 or more	807 (37.0%)	526 (42.3%)	281 (30.0%)		
Missing	94 (4.3%)	50 (4.0%)	44 (4.7%)		
House ownership				<0.001	Follow-up 1
Rent	332 (15.2%)	136 (10.9%)	196 (20.9%)		
Own with mortgage	640 (29.3%)	332 (26.7%)	308 (32.8%)		
Own without mortgage	1178 (54.0%)	756 (60.8%)	422 (45.0%)		
Missing	31 (1.4%)	19 (1.5%)	12 (1.3%)		

(*Continued*)

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Table 2 (Continued).

	Overall Sample of Individuals with Migraine (n=2181)	Individuals with Migraine and No Pre-Pandemic History of Depression (n=1243)	Individuals with Migraine and a Pre-Pandemic History of Depression (n=938)	p-value	Source of Data
Total saving				<0.001	Follow-up 1
Less than $49,999	410 (18.8%)	184 (14.8%)	226 (24.1%)		
$50,000–$99,999	305 (14.0%)	156 (12.6%)	149 (15.9%)		
$100,000 or more	1298 (59.5%)	805 (64.8%)	493 (52.6%)		
Missing	168 (7.7%)	98 (7.9%)	70 (7.5%)		
Whether income satisfies needs				<0.001	Baseline
No	187 (8.6%)	48 (3.9%)	139 (14.8%)		
Yes	1994 (91.4%)	1195 (96.1%)	799 (85.2%)		
BMI				<0.001	Follow-up 1
Underweight or normal weight	681 (31.2%)	415 (33.4%)	266 (28.4%)		
Overweight	831 (38.1%)	508 (40.9%)	323 (34.4%)		
Obese	669 (30.7%)	320 (25.7%)	349 (37.2%)		
Chronic pain				<0.001	Follow-up 1
No	1255 (57.5%)	811 (65.2%)	444 (47.3%)		
Yes	926 (42.5%)	432 (34.8%)	494 (52.7%)		
Multimorbidity				<0.001	Follow-up 1
0	626 (28.7%)	412 (33.1%)	214 (22.8%)		
1	660 (30.3%)	391 (31.5%)	269 (28.7%)		
2	445 (20.4%)	232 (18.7%)	213 (22.7%)		
3+	376 (17.2%)	168 (13.5%)	208 (22.2%)		
Missing	74 (3.4%)	40 (3.2%)	34 (3.6%)		
Feel they lack companionship				<0.001	Follow-up 1
No	2034 (93.3%)	1209 (97.3%)	825 (88.0%)		
Yes	147 (6.7%)	34 (2.7%)	113 (12.0%)		
Feel left out				<0.001	Follow-up 1
No	2112 (96.8%)	1233 (99.2%)	879 (93.7%)		
Yes	69 (3.2%)	10 (0.8%)	59 (6.3%)		
Church or religious activities				0.035	Follow-up 1
Rarely	1528 (70.1%)	848 (68.2%)	680 (72.5%)		
Often	653 (29.9%)	395 (31.8%)	258 (27.5%)		
Religious activities at home				0.608	Follow-up 1
Rarely	971 (44.5%)	547 (44.0%)	424 (45.2%)		
Often	1210 (55.5%)	696 (56.0%)	514 (54.8%)		
Adverse childhood experience (Mean, SD)	0.30 (0.65)	0.22 (0.54)	0.40 (0.76)	<0.001	Follow-up 1

Left home in the past one month during COVID				0.461	COVID Spring 2020
No	138 (6.3%)	74 (6.0%)	64 (6.8%)		
Yes	2043 (93.7%)	1169 (94.0%)	874 (93.2%)		
How often do you feel lonely during COVID				<0.001	COVID Spring 2020
Rarely or never/Some of the time	1804 (82.7%)	1104 (88.8%)	700 (74.6%)		
Occasionally/All of the time	377 (17.3%)	139 (11.2%)	238 (25.4%)		
Type of dwelling				<0.001	COVID Spring 2020
House	1690 (77.5%)	1015 (81.7%)	675 (72.0%)		
Apartment	435 (19.9%)	208 (16.7%)	227 (24.2%)		
Others	56 (2.6%)	20 (1.6%)	36 (3.8%)		
Living alone during the COVID-19 pandemic				<0.001	COVID Spring 2020
No	1623 (74.4%)	971 (78.1%)	652 (69.5%)		
Yes	558 (25.6%)	272 (21.9%)	286 (30.5%)		
Functional limitation				<0.001	COVID Autumn 2020
No	1635 (75.0%)	1014 (81.6%)	621 (66.2%)		
Yes	546 (25.0%)	229 (18.4%)	317 (33.8%)		
COVID_Illness					COVID Autumn 2020
No	1343 (61.6%)	816 (65.6%)	527 (56.2%)	<0.001	
Yes	838 (38.4%)	427 (34.4%)	411 (43.8%)		
COVID_Income				0.032	COVID Autumn 2020
No	1758 (80.6%)	1022 (82.8%)	736 (78.5%)		
Yes	423 (19.4%)	221 (17.8%)	202 (21.5%)		
COVID_Family conflict				<0.001	COVID Autumn 2020
No	1939 (88.9%)	1156 (93.0%)	783 (83.5%)		
Yes	242 (11.1%)	87 (7.0%)	155 (16.5%)		
COVID_Other family issues				0.768	COVID Autumn 2020
No	811 (37.2%)	466 (37.5%)	345 (36.8%)		
Yes	1370 (62.8%)	777 (62.5%)	593 (63.2%)		
COVID_Healthcare access				0.001	COVID Autumn 2020
No	1560 (71.5%)	923 (74.3%)	637 (67.9%)		
Yes	621 (28.5%)	320 (25.7%)	301 (32.1%)		
COVID_Medication access				<0.001	COVID Autumn 2020
No	2023 (92.8%)	1178 (94.8%)	845 (90.1%)		
Yes	158 (7.2%)	65 (5.2%)	93 (9.9%)		

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Table 3 Cumulative Incidence of Depression by CLSA Autumn 2020 Among Individuals with Migraine

	Individuals with Migraine and No History of Depression Who Did Not Develop Depression (n=1057)	Individuals with Migraine and No History of Depression Who Developed Depression (n=186)	p-value	Individuals with Migraine and a History of Depression Who Did Not Develop Depression (n=488)	Individuals with Migraine and a History of Depression Who Developed Depression (n=450)	p-value
History of depression prior to pandemic			<0.001			<0.001
No history of depression	1057 (85.0%)	186 (15.0%)				
Any history of depression				488 (52.0%)	450 (48.0%)	
Reported diagnosed by a health professional but not depressed at baseline or follow-up 1	–	–		237 (69.3%)	105 (30.7%)	
Depressed at baseline	–	–		127 (56.7%)	97 (43.3%)	
Depressed at follow-up	–	–		74 (44.0%)	94 (56.0%)	
Depressed at baseline and follow-up	–	–		50 (24.5%)	154 (75.5%)	
Age	61.40 (9.23)	60.28 (9.10)	0.127	61.37 (8.73)	60.61 (8.87)	0.188
Sex			0.023			0.304
Male	323 (88.7%)	41 (11.3%)		103 (55.7%)	82 (44.3%)	
Female	734 (83.5%)	145 (16.5%)		385 (51.1%)	368 (48.9%)	
Marital status			0.099			0.386
Married/Common-law	788 (86.3%)	125 (13.7%)		304 (53.2%)	267 (46.8%)	
Separated/Divorced/Widowed	206 (82.1%)	45 (17.9%)		129 (48.5%)	137 (51.5%)	
Single	63 (79.7%)	16 (20.3%)		55 (54.5%)	46 (45.5%)	
Immigrant status			0.860			0.860
No	884 (85.2%)	154 (14.8%)		413 (52.2%)	378 (47.8%)	
Yes	173 (84.4%)	32 (15.6%)		75 (51.0%)	72 (49.0%)	
Visible minority status			0.674			1.000
No	1025 (84.9%)	182 (15.1%)		475 (52.0%)	438 (48.0%)	
Yes	-*	-*		13 (52.0%)	12 (48.0%)	
Education			0.479			0.938
Less than secondary school	36 (87.8%)	5 (12.2%)		26 (53.1%)	23 (46.9%)	
Secondary and some post-secondary	143 (82.2%)	31 (17.8%)		74 (53.2%)	65 (46.8%)	
Post-secondary degree/diploma	878 (85.4%)	150 (14.6%)		388 (51.7%)	362 (48.3%)	
Household income			0.759			0.410
Less than $50,000	218 (85.5%)	37 (14.5%)		141 (49.6%)	143 (50.4%)	
$50,000–$99,999	350 (85.0%)	62 (15.0%)		179 (54.4%)	150 (45.6%)	
$100,000 or more	444 (84.4%)	82 (15.6%)		149 (53.0%)	132 (47.0%)	
Missing	45 (90.0%)	5 (10.0%)		19 (43.2%)	25 (56.8%)	

House ownership			0.037			0.667
Rent	112 (82.1%)	24 (17.6%)		97 (49.5%)	99 (50.5%)	
Own with mortgage	283 (85.2%)	49 (14.8%)		159 (51.6%)	149 (48.4%)	
Own without mortgage	650 (86.0%)	106 (14.0%)		227 (53.8%)	195 (46.2%)	
Missing	12 (63.2%)	7 (36.8%)		5 (41.7%)	7 (58.3%)	
Total saving			0.370			0.059
Less than $49,999	155 (84.2%)	29 (15.8%)		112 (49.6%)	114 (50.4%)	
$50,000–$99,999	129 (82.7%)	27 (17.3%)		74 (49.7%)	75 (50.3%)	
$100,000 or more	694 (86.2%)	111 (13.8%)		274 (55.6%)	219 (44.4%)	
Missing	79 (80.6%)	19 (19.4%)		28 (40.0%)	42 (60.0%)	
Whether income satisfies needs			0.171			<0.001
No	37 (77.1%)	11 (22.9%)		49 (35.3%)	90 (64.7%)	
Yes	1020 (85.4%)	175 (14.6%)		439 (54.9%)	360 (45.1%)	
BMI			0.192			0.415
Underweight or normal weight	361 (87.0%)	54 (13.0%)		147 (55.3%)	119 (44.7%)	
Overweight	433 (85.2%)	75 (14.8%)		161 (49.8%)	162 (50.2%)	
Obese	263 (82.2%)	57 (17.8%)		180 (51.6%)	169 (48.4%)	
Chronic pain			0.002			<0.001
No	709 (87.4%)	102 (12.6%)		261 (58.8%)	183 (41.2%)	
Yes	348 (80.6%)	84 (19.4%)		227 (46.0%)	267 (54.0%)	
Multimorbidity			0.061			0.032
0	365 (88.6%)	47 (11.4%)		126 (58.9%)	88 (41.1%)	
1	328 (83.9%)	63 (16.1%)		146 (54.3%)	123 (45.7%)	
2	187 (80.6%)	45 (19.4%)		102 (47.9%)	111 (52.1%)	
3+	141 (83.9%)	27 (16.1%)		94 (45.2%)	114 (54.8%)	
Missing	-*	-*		20 (58.8%)	14 (41.2%)	
Feel they lack companionship			0.002			0.001
No	1035 (85.6%)	174 (14.4%)		447 (54.2%)	378 (45.8%)	
Yes	22 (64.7%)	12 (35.3%)		41 (36.3%)	72 (63.7%)	
Feel left out			0.997			<0.001
No	1049 (85.1%)	184 (14.9%)		474 (53.9%)	405 (46.1%)	
Yes	-*	-*		14 (23.7%)	45 (76.3%)	
Church or religious activities			0.431			0.003
Rarely	716 (84.4%)	132 (15.6%)		333 (49.0%)	347 (51.0%)	
Often	341 (86.3%)	54 (13.7%)		155 (60.1%)	103 (39.9%)	

(*Continued*)

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Table 3 (Continued).

	Individuals with Migraine and No History of Depression Who Did Not Develop Depression (n=1057)	Individuals with Migraine and No History of Depression Who Developed Depression (n=186)	p-value	Individuals with Migraine and a History of Depression Who Did Not Develop Depression (n=488)	Individuals with Migraine and a History of Depression Who Developed Depression (n=450)	p-value
Religious activities at home			0.591			0.905
Rarely	469 (85.7%)	78 (14.3%)		222 (52.4%)	202 (47.6%)	
Often	588 (84.5%)	108 (15.5%)		266 (51.8%)	248 (48.2%)	
Adverse childhood experience	0.24 (0.55)	0.23 (0.50)	0.048	0.30 (0.63)	0.52 (0.87)	<0.001
Left home in the past one month during COVID			0.230			0.043
No	67 (90.5%)	7 (9.5%)		25 (39.1%)	39 (60.9%)	
Yes	990 (84.7%)	179 (15.3%)		463 (53.0%)	411 (47.0%)	
How often do you feel lonely during COVID			<0.001			<0.001
Rarely or never/Some of the time	969 (87.8%)	135 (12.2%)		418 (59.7%)	282 (40.3%)	
Occasionally/All of the time	88 (63.3%)	51 (36.7%)		70 (29.4%)	168 (70.6%)	
Type of dwelling			0.146			0.231
House	871 (85.8%)	144 (14.2%)		361 (53.5%)	314 (46.5%)	
Apartment	168 (80.8%)	40 (19.2%)		107 (47.1%)	120 (52.9%)	
Others	-*	-*		20 (55.6%)	16 (44.4%)	
Living alone during the COVID-19 pandemic			0.004			0.042
No	841 (86.6%)	130 (13.4%)		354 (54.3%)	298 (45.7%)	
Yes	216 (79.4%)	56 (20.6%)		134 (46.9%)	152 (53.1%)	
Functional limitation			0.012			<0.001
No	875 (86.3%)	139 (13.7%)		370 (59.6%)	251 (40.4%)	
Yes	182 (79.5%)	47 (20.5%)		118 (37.2%)	199 (62.8%)	
COVID_Illness			0.001			0.016
No	715 (87.6%)	101 (12.4%)		293 (55.6%)	234 (44.4%)	
Yes	342 (80.1%)	85 (19.9%)		195 (47.4%)	216 (52.6%)	
COVID_Income			<0.001			<0.001
No	891 (87.2%)	131 (12.8%)		411 (55.8%)	325 (44.2%)	
Yes	166 (75.1%)	55 (24.9%)		77 (38.1%)	125 (61.9%)	
COVID_Family conflict			<0.001			<0.001
No	1010 (87.4%)	146 (12.6%)		454 (58.0%)	329 (42.0%)	
Yes	47 (54.0%)	40 (46.0%)		34 (21.9%)	121 (78.1%)	

COVID_Other family issues			<0.001			<0.001
No	425 (91.2%)	41 (8.8%)		210 (60.9%)	135 (39.1%)	
Yes	632 (81.3%)	145 (18.7%)		278 (46.9%)	315 (53.1%)	
COVID_Healthcare access			<0.001			<0.001
No	819 (88.7%)	104 (11.3%)		359 (56.4%)	278 (43.6%)	
Yes	238 (74.4%)	82 (25.6%)		129 (42.9%)	172 (57.1%)	
COVID_Medication access			0.002			0.009
No	1011 (85.8%)	167 (14.2%)		452 (53.5%)	393 (46.5%)	
Yes	46 (70.8%)	19 (29.2%)		36 (38.7%)	57 (61.3%)	

Note: *In rows where any cell size is less than 5, the percent of respondents' with or without depression are not reported due to CLSA minimum cell size requirements for reporting.

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Table 4 Logistic Regression Results for Incident Depression Among Individuals with Migraine and No History of Depression (n=1243)

	Odds Ratio	95% Confidence Interval	p-value
Age	0.99	[0.96; 1.02]	0.474
Sex			
Female (ref.)			
Male	0.75	[0.48; 1.17]	0.202
Marital status			
Married/Common-law (ref.)			
Separated/Divorced/Widowed	1.05	[0.57; 1.91]	0.886
Single	0.98	[0.42; 2.26]	0.954
Immigrant status			
No (ref.)			
Yes	1.41	[0.88; 2.27]	0.152
Visible minority status			
No (ref.)			
Yes	0.36	[0.10; 1.25]	0.108
Education			
Less than secondary school (ref.)			
Secondary and some post-secondary	2.36	[0.62; 9.09]	0.210
Post-secondary degree/diploma	1.69	[0.46; 6.21]	0.429
Household income			
Less than $50,000 (ref.)			
$50,000–$99,999	1.42	[0.81; 2.48]	0.217
$100,000 or more	1.88	[0.99; 3.60]	0.055
Missing	0.48	[0.14; 1.56]	0.221
Dwelling ownership			
Rent (ref.)			
Own with mortgage	0.54	[0.27; 1.09]	0.087
Own without mortgage	0.72	[0.37; 1.38]	0.323
Missing	2.50	[0.71; 8.71]	0.152
Total saving			
Less than $49,999 (ref.)			
$50,000–$99,999	1.13	[0.58; 2.21]	0.713
$100,000 or more	0.67	[0.37; 1.21]	0.184
Missing	1.68	[0.74; 3.84]	0.217
Whether income satisfies needs			
No (ref.)			
Yes	1.10	[0.45; 2.70]	0.839
BMI			
Underweight or normal weight (ref.)			
Overweight	1.07	[0.70; 1.64]	0.749
Obese	1.33	[0.83; 2.12]	0.232
Chronic pain			
No (ref.)			
Yes	1.31	[0.90; 1.90]	0.154
Multimorbidity			
0 (ref.)			
1	1.26	[0.80; 1.99]	0.323
2	1.64	[0.98; 2.75]	0.062
3+	1.33	[0.72; 2.44]	0.362
Missing	0.73	[0.22; 2.45]	0.610

(*Continued*)

Table 4 (Continued).

	Odds Ratio	95% Confidence Interval	p-value
Feel they lack companionship			
No (ref.)			
Yes	2.06	[0.68; 6.21]	0.201
Feel left out			
No (ref.)			
Yes	0.43	[0.06; 3.05]	0.398
Church or religious activities			
Rarely (ref.)			
Often	0.75	[0.47; 1.19]	0.220
Religious activities at home			
Rarely (ref.)			
Often	1.15	[0.75; 1.76]	0.512
Adverse childhood experience	0.98	[0.72; 1.33]	0.892
Left home in the past one month during COVID			
No (ref.)			
Yes	1.60	[0.63; 4.05]	0.324
How often do you feel lonely during COVID			
Rarely or never/Some of the time (ref.)			
Occasionally/All of the time	3.13***	[1.97; 4.97]	<0.001
Type of dwelling			
House (ref.)			
Apartment	1.42	[0.83; 2.43]	0.196
Others	0.29	[0.04; 1.98]	0.206
Living alone during the COVID-19 pandemic			
No (ref.)			
Yes	1.43	[0.79; 2.59]	0.237
Functional limitation scale			
No (ref.)			
Yes	1.20	[0.75; 1.92]	0.448
COVID_Illness			
No (ref.)			
Yes	1.43	[1.00; 2.06]	0.051
COVID_Income			
No (ref.)			
Yes	1.50	[0.97; 2.32]	0.071
COVID_Family conflict			
No (ref.)			
Yes	5.47***	[3.23; 9.27]	<0.001
COVID_Other family issues			
No (ref.)			
Yes	1.97**	[1.29; 2.99]	0.002
COVID_Healthcare access			
No (ref.)			
Yes	1.97***	[1.35; 2.90]	<0.001
COVID_Medication access			
No (ref.)			
Yes	1.16	[0.58; 2.32]	0.667
Likelihood ratio test statistic	192.35***		
Nagelkerke R square	0.251		

Note: **=p<0.01 ***=p<0.001.

Table 5 Logistic Regression Results for Depression Among Individuals with Migraine and a History of Depression (n=938)

	Odds Ratio	95% Confidence Interval	p-value
Age	0.98	[0.96; 1.00]	0.066
Sex			
Female (ref.)			
Male	0.97	[0.65; 1.43]	0.867
Marital status			
Married/Common-law (ref.)			
Separated/Divorced/Widowed	0.85	[0.54; 1.34]	0.486
Single	0.61	[0.33; 1.13]	0.116
Immigrant status			
No (ref.)			
Yes	0.98	[0.65; 1.50]	0.936
Visible minority status			
No (ref.)			
Yes	0.84	[0.33; 2.12]	0.712
Education			
Less than secondary school (ref.)			
Secondary and some post-secondary	1.61	[0.71; 3.64]	0.251
Post-secondary degree/diploma	1.80	[0.85; 3.81]	0.128
Household income			
Less than $49,999 (ref.)			
$50,000–$99,999	1.07	[0.70; 1.64]	0.740
$100,000 or more	1.23	[0.74; 2.02]	0.421
Missing	1.35	[0.63; 2.89]	0.441
Dwelling ownership			
Rent (ref.)			
Own with mortgage	1.00	[0.61; 1.65]	0.994
Own without mortgage	1.34	[0.81; 2.23]	0.251
Missing	1.15	[0.29; 4.60]	0.845
Total saving			
Less than $50,000 (ref.)			
$50,000–$99,999	1.18	[0.71; 1.95]	0.532
$100,000 or more	0.91	[0.59; 1.41]	0.671
Missing	1.44	[0.73; 2.85]	0.292
Whether income satisfies needs			
No (ref.)			
Yes	0.54**	[0.34; 0.86]	0.009
BMI			
Underweight or normal weight (ref.)			
Overweight	1.14	[0.78; 1.67]	0.490
Obese	0.81	[0.55; 1.21]	0.308
Chronic pain			
No (ref.)			
Yes	1.19	[0.87; 1.62]	0.284
Multimorbidity			
0 (ref.)			
1	1.00	[0.66; 1.52]	0.967
2	1.24	[0.79; 1.95]	0.361
3+	1.08	[0.67; 1.74]	0.781
Missing	0.79	[0.33; 1.84]	0.560

(*Continued*)

Table 5 (Continued).

	Odds Ratio	95% Confidence Interval	p-value
ACE	1.22	[0.99; 1.50]	0.072
Feel they lack companionship			
No (ref.)			
Yes	1.05	[0.62; 1.79]	0.856
Feel left out			
No (ref.)			
Yes	2.32*	[1.09; 4.91]	0.029
Church or religious activities			
Rarely (ref.)			
Often	0.58**	[0.39; 0.85]	0.006
Religious activities at home			
Rarely (ref.)			
Often	1.14	[0.81; 1.61]	0.454
Left home in the past one month during COVID			
No (ref.)			
Yes	0.59	[0.32; 1.11]	0.102
How often do you feel lonely during COVID			
Rarely or never/Some of the time (ref.)			
Occasionally/All of the time	3.00***	[2.07; 4.34]	<0.001
Type of dwelling			
House (ref.)			
Apartment	1.40	[0.92; 2.12]	0.116
Others	0.93	[0.39; 2.22]	0.869
Living alone during the COVID-19 pandemic			
No (ref.)			
Yes	1.36	[0.86; 2.15]	0.193
Functional limitation scale			
No (ref.)			
Yes	2.23***	[1.55; 3.20]	<0.001
COVID_Illness			
No (ref.)			
Yes	1.07	[0.79; 1.45]	0.676
COVID_Income			
No (ref.)			
Yes	1.37	[0.93; 2.00]	0.109
COVID_Family conflict			
No (ref.)			
Yes	3.64***	[2.32; 5.72]	<0.001
COVID_Other family issues			
No (ref.)			
Yes	1.33	[0.97; 1.83]	0.074
COVID_Healthcare access			
No (ref.)			
Yes	1.18	[0.84; 1.66]	0.337
COVID_Medication access			
No (ref.)			
Yes	1.18	[0.68; 2.04]	0.556
Likelihood ratio test statistic	228.17***		
Nagelkerke R square	0.288		

Note: *=p<0.05 **=p<0.01 ***=p<0.001.

had increased verbal or physical family conflict during the pandemic had 3.64 times higher odds of having depressive symptoms (95% CI [2.32; 5.72], p<0.001). The Nagelkerke R square for this model was 0.288.

Discussion

The current study examined incident and recurrent depression and its associated predictors among older adults with migraine during the COVID-19 pandemic. We found that older adults with migraine, both with and without a lifetime history of depression, experienced increased levels of depression during the pandemic when compared to older adults without migraine, based on the CES-D-10 measure. Furthermore, the cumulative incidence of depression among older adults with migraine and no history of depression (14.9%) and recurrent depression among those with a history of depression (48.0%) was significantly higher than that observed prior to the pandemic among older adults with migraine (7.3% and 34.4%, respectively). Our findings highlight the substantial toll of the COVID-19 pandemic on the mental health of many older adults with migraine in Canada, and align with existing research that observed increases in depression during the COVID-19 pandemic,[31] particularly among older adults[32] and among people with migraine.[17]

While the COVID-19 pandemic and accompanying guidelines, such as shelter-in-place policies and physical distancing limitations, severely impacted the mental health of the general population globally,[16] older adults with migraine are a vulnerable subset of the population who experienced unique stressors. In particular, many people with migraine encountered major disruptions to their healthcare services and medication access early in the pandemic, increasing stress among this population.[17,20,21] Older adults also faced disproportionate stressors during the pandemic, such as greater pressure to adhere to physical distancing limitations and higher levels of loneliness and social isolation than younger age groups.[33,34] When considered in conjunction with the fact that individuals with migraine already face a higher risk of depression than the general population,[6–8] it is unsurprising that our study found that older adults with migraine experienced declines in their mental health during the pandemic.

In addition to identifying incident and recurrent depression among older adults with migraine, the current study also examined predictors for depression, which can be used to inform targeted interventions for subpopulations who may have a heightened risk of depression. The current study found that among those with a history of migraine, feeling lonely at the beginning of the pandemic was associated with an approximately three-fold risk of both incident and recurrent depression. This aligns with existing research that has found feelings of loneliness to be a predisposing factor for depression in older adults,[35–37] and particularly among people with migraine.[38] One of the hypothesized mechanisms by which loneliness may predispose individuals to depression is through lack of a sense of belonging and connection to others.[36] During the pandemic, many individuals were forced to spend extended periods of time in social isolation or with a severely reduced social network, resulting in major increases in social isolation and loneliness, particularly among older adults.[33,39]

Family conflict was also associated with a more than five-fold risk of incident depression and a more than three-fold risk of recurrent depression among older adults with migraine in our study. For many families, the stress of the COVID-19 pandemic exacerbated discord and conflict,[40,41] while simultaneously eroding access to coping mechanisms outside the home that might mitigate familial stress, such as time spent at work, socialization with friends, and physical activity. This finding supports previous research on predictors for depression in older adulthood that has found conflictual interpersonal relationships, particularly with one's spouse, to be associated with depression.[42,43] Furthermore, those with migraine may be particularly vulnerable to family conflict. A recent study on the effects of migraine on various aspects of daily life found that approximately 20% of people with migraine described their condition as having a detrimental effect on their family life and interpersonal relationships.[44] In addition, they found that the burden of migraine on families and relationships was consistently greater among those with chronic migraine (≥15 headache days/month) compared to those with episodic migraine (<14 headache days/month).[44] Many individuals with migraine reported increased episodes and severity of migraine during the pandemic,[17,18] which may in turn exacerbate the effects of migraine on family conflict and interpersonal relationships.

Other pandemic-related stressors that were associated with incident depression among older adults with migraine included experiencing difficulty accessing healthcare and other family challenges, such as increased time spent caregiving and/or challenges with caregiving. Both of these factors approximately doubled the risk of incident depression.

Access to comprehensive healthcare services have been identified as a major issue for people with migraine prior to the COVID-19 pandemic.[45–47] Many of these issues worsened during the pandemic, as people with migraine reported reduced contact with neurologists, avoidance of hospital visits due to fear of contracting COVID-19, and frequent cancellations of migraine treatments.[17,21] These issues with care access may exacerbate stress levels and pain management among this population, ultimately worsening their mental health. Similarly, research prior to the pandemic indicates that individuals with migraine already encounter challenges with caregiving.[44] When considering that the COVID-19 pandemic exacerbated caregiving responsibilities and increased depression among caregivers,[48] it is unsurprising that we found older adults with migraine experienced declines in mental health related to caregiving stress.

While a large body of research has established the connection between migraine and depression, our study highlights the particular challenges faced by many people with migraine during the COVID-19 pandemic. Our findings emphasize the importance of maintaining access to care for people with migraine during periods of disruption. For example, continuity of care can be supported with telemedicine, which has demonstrated effectiveness for supporting people with migraine[49,50] and depression.[51] Additionally, our findings underscore the importance of continued depression screening for people with migraine, as many migraine patients have untreated or inadequately treated depression.[52]

Future research should continue to explore depression among people with migraine after the COVID-19 pandemic, as this will help us identify if the observed increases were a temporary occurrence due to pandemic-related stressors, or if these trends have persisted after the pandemic.

Limitations

The findings of this study should be considered in light of some limitations. First, the current study utilized a standardized measure of depression rather than a clinical evaluation by a medical professional. Although the CES-D-10 is a valid and reliable tool for measuring depression among community-dwelling older adults,[30] it would have been preferable to have a chart review and/or clinical evaluation. Second, respondents who were living in institutional settings, such as long-term care homes, at the time of the Baseline data collection, were not included in the study. This may have resulted in the underrepresentation of an extremely vulnerable subset of older adults at risk for depression, as lockdown measures in these settings were very restrictive during the pandemic. Additionally, individuals who were not fluent in English or French were excluded from the CLSA, thereby limiting the generalizability of these findings. This may have excluded a vulnerable subset of older adults who already experience challenges with healthcare access due to language barriers.[53] Finally, we did not have any information on the severity or frequency of migraine among respondents, including whether or not their migraine was episodic or chronic, or the type of treatment respondents were currently utilizing, all of which can impact mental health outcomes among people with migraine.[7,8]

Conclusion

The challenges associated with comorbid migraine and depression have been long recognized as a major concern for patients, healthcare providers, and society.[7] The COVID-19 pandemic created unique stressors for older adults with migraine, potentially heightening vulnerability to depression among this population. To elucidate this issue and better understand the mental health of people with migraine during the pandemic, this study utilized a large, longitudinal sample of Canadian older adults with migraine to identify the cumulative incidence of depression and recurrent depression, as well as predictors associated with depression among those with and without a pre-pandemic history of depression. Our results indicate that older adults with migraine experienced increases in depression when compared to pre-pandemic levels and when compared to older adults without migraine. We found that this was strongly associated with COVID-19 related stressors, including increased loneliness, family conflict, disruptions to healthcare access, and caregiving stress. Healthcare providers should continue to screen their patients with migraine for depression and facilitate specialist care for those who may be struggling with comorbid depression.

Data Sharing Statement

Data for this analysis came from the Canadian Longitudinal Study on Aging. The authors have approval to use this data. 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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Disclosure

The authors have no conflicts of interest to disclose in this work.

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