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ORIGINAL RESEARCH

Pandemic-Induced Depression Among Older Adults with a History of Cancer During the COVID-19 Pandemic: Findings from the Canadian Longitudinal Study on Aging

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Purpose: The objectives of this study were to identify the prevalence of, and factors associated with, incident and recurrent depression in a sample of older adults with a history of cancer during the COVID-19 pandemic.

Materials and Methods: Data were drawn from four waves of the Canadian Longitudinal Study on Aging Comprehensive Cohort (n=2486 with cancer). The outcome of interest was a positive screen for depression based on the CES-D-10 during the autumn of 2020.

Results: Among older adults with cancer and no pre-pandemic history of depression (n=1765), 1 in 8 developed first onset depression during the pandemic. Among respondents with cancer and a history of depression (n=721), 1 in 2 experienced a recurrence of depression. The risk of both incident and recurrent depression was higher among those who were lonely, those with functional limitations, and those who experienced an increase in family conflict during the pandemic. The risk of incident depression only was higher among older women, those who did not engage in church or religious activities, those who experienced a loss of income during the pandemic, and those who became ill or had a loved one become ill or die during the pandemic. The risk of recurrent depression only was higher among those who felt isolated from others and those whose income did not satisfy their basic needs.

Conclusion: Health care providers should continue to screen and provide mental health support to their cancer patients and those with a lifetime history of cancer, with consideration for those with the aforementioned vulnerabilities.

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

Introduction

Cancer is the leading cause of death in Canada and the second leading cause of death in the United States, accounting for 21% and 28% of all deaths, respectively.[1] There is robust literature indicating that those with cancer are more likely to experience depression than those without cancer.[2–4] According to a recent meta-analysis, approximately one in five cancer patients experience comorbid depression.[5] Cancer patients with depression are more vulnerable to many adverse outcomes when compared to cancer patients without depression, including decreased immune function,[6] lower quality of life,[7] increased emergency department use, longer hospitalizations,[8] and higher mortality.[9] Recent research has emphasized the importance of addressing comorbid depression to support the physical and mental well-being of cancer patients.[10]

The relationship between cancer and depression is of particular concern during the COVID-19 pandemic. The pandemic and associated lockdowns have had detrimental impacts on numerous areas of life, including job losses and reduced economic security, disruptions to healthcare access, and increased social isolation. It is unsurprising that this global disruption of activities was associated with a rise in depression in the general population.[11] Simultaneously, individuals

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with cancer have also had to navigate the stress of being particularly vulnerable to severe COVID-19 related morbidity and mortality.[12] While strict adherence to lockdowns was an important step for many cancer patients to minimize their risk of COVID-19 infection, for many individuals this also meant forgoing social support, which is an important source of strength during cancer treatment and recovery.[13] Furthermore, many cancer patients faced potentially life-threatening delays and barriers to healthcare access due to medical systems being overwhelmed by COVID-19 patients.[11]

When considering the elevated risk of depression among cancer patients prior to the pandemic, combined with the unprecedented pandemic-related stressors for cancer patients during the past few years, it is evident that there is an urgent need for longitudinal research to examine mental health during the pandemic of individuals with a history of cancer. The current study addresses this gap by analyzing data from the Canadian Longitudinal Study on Aging (CLSA) to achieve the following objectives: (1) to examine the prevalence of incident and recurrent depression during the COVID-19 pandemic among adults aged 50 and older with a history of cancer; and (2) to identify factors associated with incident and recurrent depression among these individuals during the pandemic.

Materials and Methods

Data Source

As has been described elsewhere,[14,15] the CLSA is a large, prospective study that recruited Canadians aged 45 to 85 years in 10 provinces between 2011 and 2015.[16,17] Participation in the CLSA cohort is voluntary and all individuals provided written informed consent.[16] The baseline comprehensive cohort recruited 30,097 participants and 27,737 participants went on to complete Follow-up 1. To assess the impact of COVID-19 on older adults, CLSA participants were invited to participate in the COVID Spring and COVID Autumn questionnaires. We analyzed data from participants recruited in the Baseline (conducted between 2011 and 2015), Follow-up 1 (conducted between 2015 and 2018), COVID Spring 2020 (conducted between April 15 to May 30, 2020), and COVID Autumn 2020 (conducted between September 29 to December 29, 2020) waves of the comprehensive cohort of Canadian Longitudinal Study on Aging (CLSA). The detailed CLSA methodology are described elsewhere.[16,17]

All Canadian Longitudinal Study on Aging (CLSA) waves of data collection have been approved by research ethics boards at all collaborating Canadian institutions. The CLSA was conducted in accordance with the 1964 Helsinki declaration and its later amendments, and with the ethical standards of each institutional research committee. The current study was approved by the University of Toronto's Research Ethics Board (Protocol #41167; approved June 4, 2021).

Sample

The Baseline and Follow-up 1 data of the CLSA identified respondents with cancer prior to the COVID-19 pandemic (n = 2486). Self-reported cancer was defined by the question "Has a doctor ever told you that you had cancer?" (1 = yes; 0 = no). Respondents who were lost to follow-up or had missing data on key covariates were excluded from the analysis.

Measures

To determine the history of depression prior to the pandemic, the 10-item Center for Epidemiologic Studies Depression Scale (CES-D-10) and self-report of a medical diagnosis of depression were used at both Baseline and Follow-up 1. The CES-D-10 contains 10 items on depressive symptoms such as feelings of depression, loneliness, hope for the future, and restless sleep in the past 7 days. This reliable and validated tool is widely used to screen for depressive symptoms.[18] The total score ranges from 0 to 30, with higher scores indicating higher severity. A score of 10 or more (CES-D 10 total score $\geq$10) was used to identify those with depression. Moreover, at Baseline and Follow-up 1, respondents were also asked: "Did your doctor ever tell you that that you had clinical depression?". Respondents were categorized as not having pre-pandemic depression if, at both waves of data collection, they had scores less than 10 on the CES-D-10 and they reported they had never been diagnosed with clinical depression by a medical professional. If at least one of the four measures above indicated depression, the respondent was classified as having pre-pandemic depression.

We included the following sociodemographic variables: age at the Autumn 2020 wave, sex (female; male), marital status (married/common-law; separated/divorced/widowed; single), immigrant status (yes; no), visible minority status (non-white;

white), education (less than secondary school; some post-secondary school; post-secondary degree/diploma), annual household income (less than $50,000; $50,000 - $99,999; $100,000 or more; missing), house ownership (rent; own with mortgage; own without mortgage), and total savings (less than $50,000; $50,000 - $99,999, $100,000 or more, missing).

Health-related variables included Body Mass Index (BMI), chronic pain, and multimorbidity. BMI was divided into three categories: underweight or normal weight (BMI < 25), overweight (BMI = 25.0–29.99), obese (BMI ≥30.0). Chronic pain was measured by the question: "Are you usually free of pain or discomfort?" (yes; no). Multimorbidity was defined as having multiple chronic conditions (0; 1; 2; 3 or more; missing), including 1) Diabetes, (2) Heart disease (3) peripheral vascular disease or poor circulation in the extremities, (4) Dementia or Alzheimer's disease, (5) Multiple sclerosis, (6) Epilepsy, (7) Migraine headache, (8) Intestinal or gastric ulcers, (9) Intestinal disorders, (10) Asthma, (11) COPD, (12) Stroke or CVA (cerebrovascular accident), (13) Glaucoma, (14) Kidney disease, (15) Macular degeneration, (16) Mini-stroke or TIA (transient ischemic attack), and (17) Parkinson's disease.

Respondents were queried about the frequency of experiencing emotions related to lacking companionship, feeling left out, and feeling isolated from others. The response options included 1 = hardly ever, 2 = some of the time, and 3 = often. To simplify the analysis, categories 1 and 2 were merged and recoded as "no", indicating the absence of such emotions, while category 3 was recoded as "yes", indicating the presence of these emotions.

Religiosity was measured by asking respondents how often they participated in church or religious or spiritual activities at home or in any other location. The variable assessing church activities is derived from the following question: "Over the last 12 months, how frequently did you engage in church or religious activities, such as services, committees, or choirs?" The response options ranged from 1 = at least once a day, 2 = at least once a week, 3 = at least once a month, 4 = at least once a year, to 5 = never. For analysis purposes, we combined categories 1, 2, and 3 into the "often" category, while categories 4 and 5 were merged into the "rare" category. The variable measuring religious or spiritual activities at home was constructed based on the following question: "Within the last 12 months, how frequently did you participate in religious or spiritual activities (such as prayer, meditation) either at home or in any other location?" The response options consist of six categories: 1 = at least once a day, 2 = at least once a week, 3 = at least once a month, 4 = at least 3 times a year, 5 = once or twice a year, 6 = not at all. To simplify the analysis, categories 1, 2, and 3 are grouped together and referred to as "often", while categories 4, 5, and 6 are combined and referred to as "rare".

We collected retrospective data on Adverse Childhood Experiences (ACEs), which were evaluated by computing a cumulative score based on childhood physical abuse, childhood sexual abuse, childhood exposure to intimate partner violence, and neglect. Childhood physical abuse was present if respondents reported being kicked, bit or punched, or chocked, burned or physically attacked in some other way one or more times. Childhood sexual abuse was present if respondents reported that an adult forced them or attempted to force them into any unwanted sexual activity by threatening them, holding them down, or hurting them in some way one or more times. Childhood exposure to intimate partner violence was present if respondents reported seeing or hearing parents, stepparents or guardians hitting each other more than 10 times. Respondents who reported that their parents or guardians had not taken care of their basic needs such as keeping clean or providing food or clothing one or more times were defined as "neglected". Each of these experiences was coded as either 0 or 1, resulting in an ACE score ranging from 0 to 4.

At the beginning of the COVID-19 pandemic, respondents were asked in the Spring 2020 questionnaire if they had left home in the past month (yes; no). Respondents were also asked if they felt lonely (rarely or never/some of the time [0–2 days per week] vs occasionally/all the time [3–7 days per week]). Respondents' type of dwelling was categorized as house, apartment, and other. Respondents were also asked if they lived alone at the start of the COVID-19 pandemic.

We developed the functional limitation scale based on three questions: "Do you have any difficulty standing up after sitting in a chair?", "Do you have any difficulty walking alone up and down a flight of stairs?", and "Do you have any difficulty walking 2 to 3 neighborhood blocks?" Each question had four response categories: 1 = yes, 2 = no, 3 = unable to do, and 4 = Do not do on doctor's advice. We recoded the categories 1, 3, 4 as "yes", and the category 2 as "no" for each question. If respondents answered all three questions as 0, then the functional limitation scale variable was coded as 0. Otherwise, if they answered "yes" to any of the questions, the functional limitation scale variable was coded as 1.

Stressors associated with the COVID-19 were measured at the Autumn 2020 wave, and they were categorized into five composite indicators. Experiences were categorized as yes if participants responded yes to at least one experience in

a given category and categorized as no if they responded no to all questions in that category. Health-related questions included: "You were ill", "People close to you were ill", and/or "Death of a person close to you". Questions related to difficulties in accessing resources included: "Loss of income" and/or "Unable to access necessary supplies or food". Questions related to family conflict included "Increased verbal or physical conflict" and/or "Breakdown of family/marital relationship". Problems related to 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". Problems related to health care included "Unable to access to my usual health care". Problems related to medication included "Unable to get my usual prescription drugs and treatments".

Statistical Analyses

The analysis was conducted in several steps. First, we compared the characteristics of CLSA participants with a cancer history, but without a pre-pandemic history of depression to those with a cancer history and a pre-pandemic history of depression. Means and standard deviations were reported for continuous variables and frequencies and percentages for categorical variables. Statistical differences between these two groups were tested using Chi-square tests and independent *t*-tests. Second, we examined the predictors of incident depression and recurrent depression at Autumn 2020 using logistic regression models. For all predictors, we reported adjusted odds ratios and 95% Confidence Intervals (CIs). Finally, we performed a sensitivity analysis to examine the prevalence of incident and recurrent depression at the pre-pandemic Follow-up 1 questionnaire compared to the Autumn 2020 questionnaire. This was done to examine differences in depression before and during the pandemic. Additionally, we conducted this sensitivity analysis among individuals with a history of cancer in comparison to those without a history of cancer nor several other serious health conditions (ie, peripheral vascular disease or poor circulation in the extremities, epilepsy, intestinal or gastric ulcers, intestinal disorders, asthma, COPD, glaucoma, macular degeneration, mini-stroke, or TIA (transient ischemic attack). This was done to examine how the COVID-19 pandemic specifically impacted individuals with cancer in comparison to older adults without cancer and other serious health conditions. All hypothesis tests were two-sided and statistical significance was assessed using alpha = 0.05. We reported Nagelkerke R square to evaluate the goodness-of-fit of logistic models. We calculated the variance inflation factor (VIF) to assess the multicollinearity among the independent variables in the logistic regression analyses, and we did not find any potential problems. All analyses were conducted using R version 4.1.3.

Results

Approximately 1 in 8 older adults (11.8%, 95% CI [10.3%; 13.3%]) with cancer and no pre-pandemic history of depression developed depression for the first time during the COVID-19 pandemic, while almost 1 in 2 older adults (45.8%, 95% CI [42.2%; 49.5%]) with cancer and a history of depression experienced a recurrence of depression during the pandemic. Table 1 displays the characteristics of the study sample, comparing individuals with a history of cancer but no pre-pandemic history of depression to those with a history of both cancer and a pre-pandemic depression. The results indicate that a higher proportion of individuals with cancer and a history of pre-pandemic depression were female, unmarried (separated/divorced/widowed/single), renting their homes, had obesity, had total savings less than $49,999, lacked sufficient income to meet their needs, experienced chronic pain, reported feeling lonely occasionally/all the time during the pandemic, lived in an apartment and alone, had functional limitations, and were more likely to experience stressors related to COVID.

Table 2 presents the characteristics of respondents according to their pre-pandemic history of depression, as well as their depression status during the COVID-19 pandemic. The results show that respondents with a history of cancer and a history of pre-pandemic depression had a much higher rate of depression (45.8%) during Autumn 2020 than those without a history of pre-pandemic depression (11.8%). Furthermore, more than 76.6% of the respondents who had screened positive for depression based on CES-D-10 scores both at Baseline and Follow-up 1 were depression during the pandemic. More than half (53.5%) of those who screened positive for depression at Follow-up 1 based on CES-D-10 scores, but not at Baseline, experienced recurrent depression during the pandemic. Nearly 50% who were depressed at Baseline according to CES-D-10 scores, but not at Follow-up 1, experienced depressive symptoms during the pandemic. Among those who had reported that they had been diagnosed by a health professional with depression at some point in their lives but had not been depressed according to the CES-D-10 scores at Baseline or Follow-up 1, approximately 1 in 4 (22.8%) screened positive for depression based on CES-D-10 scores in the autumn of 2020.

Table 1 Characteristics of CLSA Respondents with a History of Cancer (n=2486) by Pre-Pandemic History of Depression

	Overall Sample of Respondents with Cancer History (n=2486)	Respondents with Cancer History and No Pre-Pandemic History of Depression (n=1765)	Respondents with Cancer History and a Pre-Pandemic History of Depression (n=721)	p-value	Source of Data
Age (Mean, SD)	72.87 (8.76)	73.24 (8.74)	71.98 (8.76)	0.001	CLSA Autumn 2020
Sex				<0.001	CLSA Baseline
Female	1287 (51.8%)	817 (46.3%)	470 (65.2%)		
Male	1199 (48.2%)	948 (53.7%)	251 (34.8%)		
Marital status				<0.001	CLSA Follow-up 1
Married/Common-law	1738 (69.9%)	1321 (74.8%)	417 (57.8%)		
Separated/Divorced/Widowed	566 (22.8%)	341 (19.3%)	225 (31.2%)		
Single	182 (7.3%)	103 (5.8%)	79 (11.0%)		
Immigrant status				0.47	CLSA Baseline
No	2049 (82.4%)	1448 (82.0%)	601 (83.4%)		
Yes	437 (17.6%)	317 (18.0%)	120 (16.6%)		
Visible minority status				1.00	CLSA Baseline
No	2423 (97.8%)	1727 (97.8%)	705 (97.8%)		
Yes	54 (2.2%)	38 (2.2%)	16 (2.2%)		
Education				0.039	CLSA Baseline
Less than secondary school	120 (4.8%)	73 (4.1%)	47 (6.5%)		
Some post-secondary school	390 (15.7%)	282 (16.0%)	108 (15.0%)		
Post-secondary degree/diploma	1976 (79.5%)	1410 (79.9%)	566 (78.5%)		
Household income				<0.001	CLSA Follow-up 1
Less than $50,000	579 (23.3%)	344 (19.5%)	235 (32.6%)		
$50,000–$99,999	950 (38.2%)	683 (38.7%)	267 (37.0%)		
$100,000 or more	832 (33.5%)	647 (36.7%)	185 (25.7%)		
Missing	125 (5.0%)	91 (5.2%)	34 (4.7%)		
House ownership				<0.001	CLSA Follow-up 1
Rent	343 (13.8%)	199 (11.3%)	144 (20.0%)		
Own with mortgage	506 (20.4%)	316 (17.9%)	190 (26.4%)		
Own without mortgage	1595 (64.2%)	1227 (69.5%)	368 (51.0%)		
Missing	42 (1.7%)	23 (1.3%)	19 (2.6%)		
Total saving				<0.001	CLSA Follow-up 1
Less than $50,000	358 (14.4%)	189 (10.7%)	169 (23.4%)		
$50,000–$99,999	317 (12.8%)	231 (13.1%)	86 (11.9%)		
$100,000 or more	1601 (64.4%)	1207 (68.4%)	394 (54.6%)		
Missing	210 (8.4%)	138 (7.8%)	72 (10.0%)		
Whether income satisfies needs				<0.001	CLSA Baseline
No	165 (6.6%)	67 (3.8%)	98 (13.6%)		
Yes	2321 (93.4%)	1698 (96.2%)	623 (86.4%)		
BMI				<0.001	CLSA Follow-up 1
Underweight or normal weight	738 (29.7%)	569 (32.2%)	169 (23.4%)		
Overweight	1037 (41.7%)	749 (42.4%)	288 (39.9%)		
Obese	711 (28.6%)	447 (25.3%)	264 (36.6%)		
Chronic pain				<0.001	CLSA Follow-up 1
No	1662 (66.9%)	1273 (72.1%)	389 (54.0%)		
Yes	824 (33.1%)	492 (27.9%)	332 (46.0%)		
Multimorbidity				<0.001	CLSA Follow-up 1
0	814 (32.7%)	645 (36.5%)	169 (23.4%)		
1	753 (30.3%)	545 (30.9%)	208 (28.8%)		

(*Continued*)

Table 1 (Continued).

	Overall Sample of Respondents with Cancer History (n=2486)	Respondents with Cancer History and No Pre-Pandemic History of Depression (n=1765)	Respondents with Cancer History and a Pre-Pandemic History of Depression (n=721)	p-value	Source of Data
2	460 (18.5%)	296 (16.8%)	164 (22.7%)		
3+	371 (14.9%)	216 (12.2%)	155 (21.5%)		
Missing	88 (3.5%)	63 (3.6%)	25 (3.5%)	<0.001	
Feel that lack companionship					CLSA Follow-up 1
No	2377 (95.6%)	1725 (97.7%)	652 (90.4%)		
Yes	109 (4.4%)	40 (2.3%)	69 (9.6%)		
Feel left out				<0.001	CLSA Follow-up 1
No	2430 (97.7%)	1748 (99.0%)	682 (94.6%)		
Yes	56 (2.3%)	17 (1.0%)	39 (5.4%)		
Feel isolated from others				<0.001	CLSA Follow-up 1
No	2444 (98.3%)	1753 (99.3%)	691 (95.8%)		
Yes	42 (1.7%)	12 (0.7%)	30 (4.2%)		
Church or religious activities				0.80	CLSA Follow-up 1
Rarely	1644 (66.1%)	1164 (65.9%)	480 (66.6%)		
Often	842 (33.9%)	601 (34.1%)	241 (33.4%)		
Religious activities at home				0.038	CLSA Follow-up 1
Rarely	1186 (47.7%)	866 (49.1%)	320 (44.4%)		
Often	1300 (52.3%)	899 (50.9%)	401 (55.6%)		
Adverse childhood experience (Mean, SD)	0.21 (0.55)	0.16 (0.47)	0.33 (0.69)	<0.001	CLSA Follow-up 1
Left home in the past one month during COVID				0.022	CLSA Spring 2020
No	189 (7.6%)	120 (6.8%)	69 (9.6%)		
Yes	2297 (92.4%)	1645 (93.2%)	652 (90.4%)		
How often do you feel lonely during COVID				<0.001	CLSA Spring 2020
Rarely or never/Some of the time	2098 (84.4%)	1559 (88.3%)	539 (74.8%)		
Occasionally/All of the time	388 (15.6%)	206 (11.7%)	182 (25.2%)		
Type of dwelling				<0.001	CLSA Spring 2020
House	1841 (74.1%)	1349 (76.4%)	492 (68.2%)		
Apartment	556 (22.4%)	367 (20.8%)	189 (26.2%)		
Others	89 (3.6%)	49 (2.8%)	40 (5.5%)		
Living alone during the COVID-19 pandemic				<0.001	CLSA Spring 2020
No	1798 (72.3%)	1342 (76.0%)	456 (63.2%)		
Yes	688 (27.7%)	423 (24.0%)	265 (36.8%)		
Functional limitation				<0.001	CLSA Autumn 2020
No	1797 (72.3%)	1357 (76.9%)	440 (61.0%)		
Yes	689 (27.7%)	408 (23.1%)	281 (39.0%)		
COVID _ Infected					CLSA Autumn 2020
No	1615 (65.0%)	1192 (67.5%)	423 (58.7%)	<0.001	
Yes	871 (35.0%)	573 (32.5%)	298 (41.3%)		

(*Continued*)

Table 1 (Continued).

	Overall Sample of Respondents with Cancer History (n=2486)	Respondents with Cancer History and No Pre-Pandemic History of Depression (n=1765)	Respondents with Cancer History and a Pre-Pandemic History of Depression (n=721)	p-value	Source of Data
COVID _ Income				<0.001	CLSA Autumn 2020
No	2153 (86.6%)	1561 (88.4%)	592 (82.1%)		
Yes	333 (13.4%)	204 (11.6%)	129 (17.9%)		
COVID _ Family conflict				<0.001	CLSA Autumn 2020
No	2269 (91.3%)	1659 (94.0%)	610 (84.6%)		
Yes	217 (8.7%)	106 (6.0%)	111 (15.4%)		
COVID _ Other family Issues				0.16	CLSA Autumn 2020
No	1031 (41.5%)	748 (42.4%)	283 (39.3%)		
Yes	1455 (58.5%)	1017 (57.6%)	438 (60.7%)		
COVID _ Health care				<0.001	CLSA Autumn 2020
No	1878 (75.5%)	1374 (77.8%)	504 (69.9%)		
Yes	608 (24.5%)	391 (22.2%)	217 (30.1%)		
COVID _ Medications				0.08	CLSA Autumn 2020
No	2356 (94.8%)	1682 (95.3%)	674 (93.5%)		
Yes	130 (5.2%)	83 (4.7%)	47 (6.5%)		

The findings on the relationships between the risk factors and depression status during the Autumn 2020 wave for older adults with a history of cancer and no pre-pandemic history of depression are presented in Table 3. The analysis revealed that female respondents had a statistically higher odds of incident depressive symptoms than male respondents during the COVID-19 pandemic (OR = 1.46, 95% CI [1.02; 2.08], p =0.039). Furthermore, individuals who rarely attended church or religious activities prior to the pandemic were significantly more likely to experience depressive symptoms than those who often attended church or religious services (OR = 1.79, 95% CI [1.17;2.74], p =0.007). Older adults with a history of cancer who reported feeling lonely occasionally/all the time in the Spring 2020 wave had quadruple the odds of experiencing depressive symptoms during the Autumn of 2020 than those who felt lonely rarely or never / some of the time (OR=4.40, 95% CI [2.91;6.63], p<0.001). There was a significant and substantial difference in depression between respondents with functional limitations and those without (OR = 3.08, 95% CI [2.11; 4.48], p <0.001). Moreover, COVID-related stressors were significantly associated with depressive symptoms. Individuals who had COVID or those who had people around them infected with COVID (OR = 3.08, 95% CI [2.11; 4.48], p < 0.001), those with income loss during the pandemic (OR = 2.24, 95% CI [1.61; 3.11], p < 0.001), and people who had family conflict during the pandemic (OR = 4.19, 95% CI [2.54; 6.90], p = 0.001) had significantly higher odds of incident depressive symptoms. The Nagelkerke R square for this model was 0.23.

Table 4 presents the association of depression status during the Autumn 2020 wave and covariates among respondents with a history of cancer and a pre-pandemic history of depression. Respondents who reported that their income did not meet their needs prior to the pandemic were more likely to report depression during the pandemic (OR = 2.86; 95% CI [1.63;5.01], p < 0.001). People who felt isolated from others prior to the pandemic were more likely to suffer from depression in Autumn 2020 than those who did not (OR=5.02, 95% CI [1.27;9.83], p = 0.021). Those who felt lonely occasionally / all the time during the Spring of 2020 were more likely to suffer from depression during the Autumn of 2020 than respondents who felt lonely rarely / some of the time (OR=3.42, 95% CI [2.23;5.25], p<0.001). Older adults with a history of cancer and functional limitations had a higher risk for depressive symptoms during the Autumn 2020 compared to those without such limitations (OR = 2.17, 95% CI [1.47; 3.21], p <0.001). Respondents who experienced family conflict during the pandemic were 4.48 times more likely to have depression in Autumn 2020 than those without (95% CI [2.68;7.49], p=<0.001). The Nagelkerke R square for this model was 0.31.

Table 2 Profile of CLSA Participants with Cancer According to their Pre-Pandemic History of Depression and their Depression Status in Autumn 2020.

	Respondents with Cancer History and No History of Depression Who Did Not Develop Depression (n=1, 556)	Respondents with Cancer History and No History of Depression Who Developed Depression (n=209)	p-value	Respondents with Cancer History and a History of Depression Who Did Not Develop Depression (n=390)	Respondents with Cancer History And a History of Depression Who Developed Depression (n=331)	p-value
History of depression prior to pandemic						
No history of depression	1556 (88.2%)	209 (11.8%)	<0.001			
Any history of depression				390 (54.1%)	331 (45.8%)	<0.001
Reported diagnosed by a health professional but not depressed at Baseline or Follow-up 1				203 (77.2%)	60 (22.8%)	
Depressed at Baseline only				82 (50.6%)	80 (49.4%)	
Depressed at Follow-up 1 only				72 (46.5%)	83 (53.5%)	
Depressed at Baseline and Follow-up 1				33 (23.4%)	108 (76.6%)	
Age	73.18 (8.60)	73.67 (9.70)	0.45	71.88 (8.63)	72.10 (8.92)	0.74
Sex			0.006			0.67
Female	701 (85.8%)	116 (14.2%)		251 (53.4%)	219 (46.6%)	
Male	855 (90.2%)	93 (9.8%)		139 (55.4%)	112 (44.6%)	
Marital status			0.49			0.29
Married/Common-law	1168 (88.4%)	153 (11.6%)		234 (56.1%)	183 (43.9%)	
Separated/Divorced/Widowed	301 (88.3%)	40 (11.7%)		112 (49.8%)	113 (50.2%)	
Single	87 (84.5%)	16 (15.5%)		44 (55.7%)	35 (44.3%)	
Immigrant status			0.12			0.78
No	1268 (87.6%)	180 (12.4%)		327 (54.4%)	274 (45.6%)	
Yes	288 (90.9%)	29 (9.1%)		63 (52.5%)	57 (47.5%)	
Visible minority status			0.61			0.67
No	1521 (88.1%)	206 (11.9%)		380 (53.9%)	325 (46.1%)	
Yes	–	–		10 (62.5%)	6 (37.5%)	
Education			0.99			0.56
Less than secondary school	64 (87.7%)	9 (12.3%)		29 (61.7%)	18 (38.3%)	
Secondary and some post-secondary	249 (88.3%)	33 (11.7%)		58 (53.7%)	50 (46.3%)	
Post-secondary degree/diploma	1243 (88.2%)	167 (11.8%)		303 (53.5%)	263 (46.5%)	
Household income			0.58			0.14
Less than $50,000	301 (87.5%)	43 (12.5%)		118 (50.2%)	117 (49.8%)	
$50,000–$99,999	596 (87.3%)	87 (12.7%)		146 (54.7%)	121 (45.3%)	
$100,000 or more	576 (89.0%)	71 (11.0%)		111 (60.0%)	74 (40.0%)	
Missing	83 (91.2%)	8 (8.8%)		15 (44.1%)	19 (55.9%)	
House ownership			0.25			0.054
Rent	168 (84.4%)	31 (15.6%)		77 (53.5%)	67 (46.5%)	
Own with mortgage	275 (87.0%)	41 (13.0%)		94 (49.5%)	96 (50.5%)	
Own without mortgage	1093 (89.1%)	134 (10.9%)		213 (57.9%)	155 (42.1%)	
Missing	–	–		6 (31.6%)	13 (68.4%)	
Total savings			0.22			0.08
Less than $50,000	162 (85.7%)	27 (14.3%)		82 (48.5%)	87 (51.5%)	
$50,000–$99,999	197 (85.3%)	34 (14.7%)		41 (47.7%)	45 (52.3%)	

$100,000 or more	1077 (89.2%)	130 (10.8%)		230 (58.4%)	164 (41.6%)	
Missing	120 (87.0%)	18 (13.0%)		37 (51.4%)	35 (48.6%)	
Whether income satisfies needs			0.17			<0.001
No	55 (82.1%)	12 (17.9%)		31 (31.6%)	67 (68.4%)	
Yes	1501 (88.4%)	197 (11.6%)		359 (57.6%)	264 (42.4%)	
BMI			0.66			0.72
Underweight or normal weight	502 (88.2%)	67 (11.8%)		90 (53.3%)	79 (46.7%)	
Overweight	665 (88.8%)	84 (11.2%)		161 (55.9%)	127 (44.1%)	
Obese	389 (87.0%)	58 (13.0%)		139 (52.7%)	125 (47.3%)	
Chronic pain			0.012			<0.001
No	1138 (89.4%)	135 (10.6%)		237 (60.9%)	152 (39.1%)	
Yes	418 (85.0%)	74 (15.0%)		153 (46.1%)	179 (53.9%)	
Multimorbidity			0.328			0.003
0	579 (89.8%)	66 (10.2%)		107 (63.3%)	62 (36.7%)	
1	483 (88.6%)	62 (11.4%)		122 (58.7%)	86 (41.3%)	
2	254 (85.8%)	42 (14.2%)		81 (49.4%)	83 (50.6%)	
3+	185 (85.6%)	31 (14.4%)		67 (43.2%)	88 (56.8%)	
Missing	55 (87.3%)	8 (12.7%)		13 (52.0%)	12 (48.0%)	
Feel that lack companionship			0.71			0.025
No	1522 (88.2%)	203 (11.8%)		362 (35.5%)	290 (44.5%)	
Yes	34 (8.5%)	6 (15.0%)		28 (40.6%)	41 (59.4%)	
Feel left out			0.71			0.029
No	1542 (88.2%)	206 (11.8%)		376 (55.1%)	306 (44.9%)	
Yes	–	–		14 (35.9%)	25 (64.1%)	
Feel isolated from others			1.00			<0.001
No	1545 (88.1%)	208 (11.9%)		384 (55.6%)	307 (44.4%)	
Yes	–	–		6 (20.0%)	24 (80.0%)	
Church or religious activities			0.18			0.51
Rarely	1107 (87.4%)	147 (12.6%)		255 (53.1%)	225 (46.9%)	
Often	539 (89.7%)	62 (10.3%)		135 (56.0%)	106 (44.0%)	
Religious activities at home			0.10			0.15
Rarely	775 (89.5%)	91 (10.5%)		163 (50.9%)	157 (49.1%)	
Often	781 (86.9%)	118 (13.1%)		227 (56.6%)	174 (43.4%)	
Adverse childhood experience	0.16 (0.47)	0.17 (0.44)	0.84	0.28 (0.67)	0.38 (0.71)	0.05
Left home in the past one month during COVID			0.50			0.64
No	103 (85.8%)	17 (14.2%)		35 (50.7%)	34 (49.3%)	
Yes	1453 (88.3%)	192 (11.7%)		355 (54.4%)	297 (45.6%)	
How often do you feel lonely during COVID			<0.001			<0.001
Rarely or never/Some of the time	1415 (90.8%)	144 (9.2%)		336 (62.3%)	203 (37.7%)	
Occasionally/All of the time	141 (68.4%)	65 (31.6%)		54 (29.7%)	128 (70.3%)	

(*Continued*)

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Table 2 (Continued).

	Respondents with Cancer History and No History of Depression Who Did Not Develop Depression (n=1, 556)	Respondents with Cancer History and No History of Depression Who Developed Depression (n=209)	p-value	Respondents with Cancer History and a History of Depression Who Did Not Develop Depression (n=390)	Respondents with Cancer History And a History of Depression Who Developed Depression (n=331)	p-value
Type of dwelling			0.02			0.34
House	1204 (89.3%)	145 (10.7%)		275 (55.9%)	217 (44.1%)	
Apartment	313 (85.3%)	54 (14.7%)		96 (50.8%)	93 (49.2%)	
Others	39 (79.6%)	10 (20.4%)		19 (47.5%)	21 (52.5%)	
Living alone during the COVID-19 pandemic			0.10			0.009
No	1193 (88.9%)	149 (11.1%)		264 (57.9%)	192 (42.1%)	
Yes	363 (85.8%)	60 (14.2%)		126 (47.5%)	139 (52.5%)	
Functional limitation			<0.001			<0.001
No	1238 (91.2%)	119 (8.8%)		278 (63.2%)	162 (36.8%)	
Yes	318 (77.9%)	90 (22.1%)		112 (39.9%)	169 (60.1%)	
COVID _ Infected			<0.001			0.026
No	1087 (91.2%)	105 (8.8%)		244 (57.7%)	179 (42.3%)	
Yes	469 (81.8%)	104 (18.2%)		146 (49.0%)	152 (51.0%)	
COVID _ Income			<0.001			0.010
No	1393 (89.2%)	168 (10.8%)		334 (56.4%)	258 (43.6%)	
Yes	163 (79.9%)	41 (20.1%)		56 (43.4%)	73 (56.6%)	
COVID _ Family conflict			<0.001			<0.001
No	1489 (89.8%)	170 (10.2%)		362 (59.3%)	248 (40.7%)	
Yes	67 (63.2%)	39 (36.8%)		28 (25.2%)	83 (74.8%)	
COVID _ Other family Issues			<0.001			0.008
No	684 (91.4%)	64 (8.6%)		172 (60.4%)	112 (39.6%)	
Yes	872 (85.7%)	145 (14.3%)		219 (50.0%)	219 (50.0%)	
COVID _ Health care			0.001			<0.001
No	1230 (89.5%)	144 (10.5%)		295 (58.5%)	209 (41.5%)	
Yes	326 (83.4%)	65 (16.6%)		95 (43.8%)	122 (56.2%)	
COVID _ Medications			0.20			0.07
No	1487 (88.4%)	195 (11.6%)		371 (55.0%)	303 (45.0%)	
Yes	69 (83.1%)	14 (16.9%)		19 (40.4%)	28 (59.6%)	

Notes: In rows where any cell size is less than 5, we have omitted reporting the data. This decision is in accordance with the CLSA's minimum cell size requirements for reporting.

Table 3 Logistic Regression Results for Incident Depression During Autumn 2020 Among Respondents with a History of Cancer and No Pre-Pandemic History of Depression (n=1765)

	Adjusted Odds Ratio	95% Confidence Interval	p-value
Age	1.01	[0.99;1.04]	0.26
Sex			
Male (ref.)			
Female	1.46*	[1.02;2.08]	0.039
Marital status			
Married/Common-law (ref.)			
Separated/Divorced/Widowed	0.80	[0.44;1.45]	0.46
Single	1.06	[0.49;2.31]	0.88
Immigrant status			
No (ref.)			
Yes	0.69	[0.43;1.09]	0.11
Visible minority status			
No (ref.)			
Yes	0.55	[0.14;2.16]	0.39
Education			
Less than secondary school (ref.)			
Secondary and some post-secondary	1.27	[0.51;3.15]	0.60
Post-secondary degree/diploma	1.42	[0.61;3.31]	0.42
Household income			
Less than $50,000 (ref.)			
$50,000–$99,999	1.23	[0.74;2.04]	0.43
$100,000 or more	1.18	[0.67;2.09]	0.56
Missing	0.75	[0.30;1.91]	0.55
Dwelling ownership			
Rent (ref.)			
Own with mortgage	1.15	[0.59;2.22]	0.68
Own without mortgage	0.93	[0.52;1.66]	0.80
Missing	1.15	[0.26;5.13]	0.85
Total saving			
Less than $50,000 (ref.)			
$50,000–$99,999	1.06	[0.56;2.04]	0.85
$100,000 or more	0.93	[0.52;1.67]	0.82
Missing	1.25	[0.57;2.77]	0.58
Whether income satisfies needs			
No	1.00	[0.45;2.23]	0.99
Yes (ref.)			
BMI			
Underweight or normal weight (ref.)			
Overweight	0.89	[0.61;1.31]	0.56
Obese	0.78	[0.51;1.21]	0.28
Chronic pain			
No (ref.)			
Yes	0.97	[0.68;1.38]	0.86
Multimorbidity			
0 (ref.)			
1	0.93	[0.62;1.40]	0.72
2	0.94	[0.59;1.52]	0.81
3+	1.06	[0.62;1.81]	0.82
Missing	1.08	[0.44;2.63]	0.87
Feel that lack companionship			
No (ref.)			
Yes	1.18	[0.34;4.02]	0.80

(*Continued*)

Table 3 (Continued).

	Adjusted Odds Ratio	95% Confidence Interval	p-value
Feel left out			
No (ref.)			
Yes	0.80	[0.14;4.47]	0.80
Feel isolated from others			
No (ref.)			
Yes	0.42	[0.03;5.42]	0.51
Church or religious activities			
Rarely	1.79**	[1.17;2.74]	0.007
Often (ref.)			
Religious activities at home			
Rarely	0.73	[0.49;1.08]	0.12
Often (ref.)			
ACE	0.90	[0.63;1.29]	0.58
Left home in the past one month during COVID			
No (ref.)			
Yes	1.01	[0.54;1.91]	0.97
How often do you feel lonely during COVID			
Rarely or never/Some of the time (ref.)			
Occasionally/All of the time	4.40***	[2.91;6.63]	<0.001
Type of dwelling			
House (ref.)			
Apartment	1.35	[0.88;2.09]	0.17
Others	1.46	[0.58;3.66]	0.43
Living alone during the COVID-19 pandemic			
No (ref.)			
Yes	0.69	[0.49;1.20]	0.19
Functional limitation scale			
No (ref.)			
Yes	3.08***	[2.11;4.48]	<0.001
COVID _ Infected			
No (ref.)			
Yes	2.24***	[1.61;3.11]	<0.001
COVID _ Income			
No (ref.)			
Yes	1.81**	[1.15;2.83]	0.01
COVID _ Family conflict			
No (ref.)			
Yes	4.19***	[2.54;6.90]	<0.001
COVID _ Other family Issues			
No (ref.)			
Yes	1.41	[0.98;2.01]	0.06
COVID _ Health care			
No (ref.)			
Yes	1.29	[0.88;1.88]	0.19
COVID _ Medications			
No (ref.)			
Yes	1.21	[0.61;2.41]	0.59
Likelihood ratio test statistic	219.099***		
Nagelkerke R square	0.226		

Notes: *p<0.05. **p<0.01. ***p<0.001.

The results of the sensitivity analysis are presented in Table 5. This indicates that the incidence and recurrence of depression were significantly higher among older adults with a history of cancer during the pandemic (ie, Autumn 2020) than it had been during the Follow-up 1 wave of data collection (2015–2018) when incident depression was 5.9% (95%

Table 4 Logistic Regression Results for Depression During Autumn 2020 Among Respondents with a History of Cancer and a Pre-Pandemic History of Depression (n=721)

	Adjusted Odds Ratio	95% Confidence Interval	p-value
Age	0.99	[0.97;1.02]	0.65
Sex			
Male (ref.)			
Female	0.82	[0.56;1.21]	0.32
Marital status			
Married/Common-law (ref.)			
Separated/Divorced/Widowed	0.82	[0.47;1.44]	0.48
Single	0.60	[0.30;1.22]	0.16
Immigrant status			
No (ref.)			
Yes	1.05	[0.66;1.68]	0.83
Visible minority status			
No (ref.)			
Yes	0.55	[0.16;1.90]	0.35
Education			
Less than secondary school (ref.)			
Secondary and some post-secondary	1.47	[0.61;3.53]	0.39
Post-secondary degree/diploma	1.61	[0.73;3.57]	0.24
Household income			
Less than $50,000 (ref.)			
$50,000–$99,999	1.09	[0.68;1.77]	0.71
$100,000 or more	0.99	[0.56;1.75]	0.98
Missing	1.51	[0.61;3.75]	0.38
Dwelling ownership			
Rent (ref.)			
Own with mortgage	1.75	[0.93;3.30]	0.085
Own without mortgage	1.32	[0.72;2.42]	0.36
Missing	3.16	[0.88;11.27]	0.077
Total saving			
Less than $50,000 (ref.)			
$50,000–$99,999	1.04	[0.54;1.98]	0.91
$100,000 or more	0.83	[0.50;1.39]	0.49
Missing	0.98	[0.48;2.01]	0.96
Whether income satisfies needs			
No	2.86***	[1.63;5.01]	<0.001
Yes (ref.)			
BMI			
Underweight or normal weight (ref.)			
Overweight	0.72	[0.46;1.15]	0.17
Obese	0.64	[0.40;1.05]	0.076
Chronic pain			
No (ref.)			
Yes	1.28	[0.89;1.86]	0.18
Multimorbidity			
0 (ref.)			
1	0.89	[0.55;1.44]	0.63
2	1.44	[0.86;2.40]	0.16
3+	1.31	[0.77;2.24]	0.32
Missing	1.05	[0.40;2.75]	0.92
Feel that lack companionship			
No (ref.)			
Yes	0.88	[0.43;1.81]	0.73

(*Continued*)

Table 4 (Continued).

	Adjusted Odds Ratio	95% Confidence Interval	p-value
Feel left out			
No (ref.)			
Yes	0.69	[0.21;2.24]	0.53
Feel isolated from others			
No (ref.)			
Yes	5.02*	[1.27;9.83]	0.02
Church or religious activities			
Rarely	0.95	[0.61;1.47]	0.82
Often (ref.)			
Religious activities at home			
Rarely	1.43	[0.95;2.15]	0.084
Often (ref.)			
ACE	1.06	[0.82;1.38]	0.66
Left home in the past one month during COVID			
No (ref.)			
Yes	0.84	[0.45;1.57]	0.59
How often do you feel lonely during COVID			
Rarely or never/Some of the time (ref.)			
Occasionally/All of the time	3.42***	[2.23;5.25]	<0.001
Type of dwelling			
House (ref.)			
Apartment	1.20	[0.75;1.94]	0.45
Others	1.47	[0.61;3.54]	0.39
Living alone during the COVID-19 pandemic			
No (ref.)			
Yes	1.50	[0.86;2.63]	0.16
Functional limitation scale			
No (ref.)			
Yes	2.17***	[1.47;3.21]	<0.001
COVID _ Infected			
No (ref.)			
Yes	1.14	[0.79;1.64]	0.48
COVID _ Income			
No (ref.)			
Yes	0.99	[0.61;1.60]	0.97
COVID _ Family conflict			
No (ref.)			
Yes	4.48***	[2.68;7.49]	<0.001
COVID _ Other family Issues			
No (ref.)			
Yes	1.16	[0.81;1.67]	0.43
COVID _ Health care			
No (ref.)			
Yes	1.16	[0.78;1.72]	0.46
COVID _ Medications			
No (ref.)			
Yes	1.06	[0.49;2.32]	0.88
Likelihood ratio test statistic	188.334***		
Nagelkerke R square	0.307		

Notes: *p<0.05. ***p<0.001.

Table 5 Sensitivity Analysis of CLSA Respondents with Cancer Compared to Respondents Without Any Serious Health Conditions with Respect to Incident and Recurrent Depression During the Follow-up 1 Wave of Data Collection and During the Autumn 2020 Wave of Data Collection

	The Incidence of New Depression at Follow-Up 1	The Recurrence of Depression at Follow-Up 1	The Incidence of New Depression During the Autumn 2020	The Recurrence of Depression During the Autumn 2020
Individuals with a history cancer	5.9% with 95% CI [4.7%, 7.1%]	31.3% with 95% CI [27.0%, 35.6%]	11.8% with 95% CI [10.3%, 13.3%]	45.8% with 95% CI [42.2%, 49.5%]
Individuals without any serious health conditions	4.3% with 95% CI [3.8%, 4.8%]	24.5%with 95% CI [22.2%, 26.9%]	11.3% with 95% CI [10.4%, 12.2%]	39.7% with 95% CI [37.0%, 42.4%]
p-value	0.009	0.005	0.57	0.003

CI [4.7%; 7.1%]) and recurrent depression was 31.3% (95% CI [27.0%; 35.6%]). Additionally, respondents with a history of cancer had a significantly higher prevalence of recurrent depression during the pandemic (45.8% 95% CI [42.2%; 49.5%]) when compared to individuals with no serious health conditions (39.7% with 95% CI [37.0%, 42.4%]).

Discussion

The objectives of this study were to examine the prevalence of incident and recurrent depression among older adults with a history of cancer during the COVID-19 pandemic, as well as to identify factors associated with incident and recurrent depression among these sub-populations during the pandemic. Approximately 1 in 8 older adults with a history of cancer and no pre-pandemic history of depression experienced incident depression during the COVID-19 pandemic, while approximately 1 in 2 older adults with a history of cancer and a history of depression experienced a recurrence of depression during the pandemic. We also found that when the sample was restricted to those with a pre-pandemic history of depression, the recurrence of depression during the pandemic was significantly higher for respondents with cancer when compared to individuals without any serious health conditions. These findings underlie the substantial mental health toll of the COVID-19 pandemic on older adults with a history of cancer, emphasizing the importance of screening and targeted outreach to this population. The current study also identified several factors that were associated with a higher risk of incident and recurrent depression among older adults with cancer during the COVID-19 pandemic.

Older women in the current study were more likely to develop incident depression than older men. This is in keeping with a large body of pre-pandemic research which indicates that women in Canada and abroad consistently have a higher risk of depression than men.[19] The increased risk among women may also be, in part, because older women are more likely to fall into caretaking roles, which is associated with an increased risk of depression.[20] For many women, caregiving responsibilities were severely exacerbated during the pandemic, resulting in increased caregiver burden[21] and declines in mental health.[22]

Older adults with a history of cancer who had functional limitations had more than double the odds of both incident and recurrent depression when compared to their counterparts without functional limitations. Functional limitations have been identified as a major risk factor for depression later in life.[23] The pandemic may have exacerbated functional limitations in those with a history of cancer, as socially restricted older adults are often more sedentary, which is a risk factor for the development of functional limitations.[24]

Experiencing family conflict during the pandemic was also associated with an approximate four-fold risk of incident and recurrent depression among older adults with a history of cancer. This finding aligns with research that has identified interpersonal conflict to be a risk factor for depression among older adults.[25] Extended periods of lockdown and quarantine have been found to increase familial conflict.[26] The pandemic also reduced access to many coping strategies that can help mitigate family conflict, such as time spent outside the home and time spent with friends.

Multiple measures of socioeconomic status were also associated with a higher risk of incident and recurrent depression for older adults with cancer history. Respondents who experienced a loss of income and/or difficulty accessing necessary resources during the pandemic had almost double the odds of experiencing incident depression compared to those who did not experience such financial strain. Among those with a history of depression, respondents who reported that their income did not satisfy their basic needs prior to the pandemic had nearly triple the risk of recurrent depression

compared to those whose income satisfied their basic needs. These findings support existing literature on the impact of financial stressors on the development of depression.[12] Financial stressors that have been found to contribute to depression include food insecurity, job precarity, uncertainty about the future, and lack of paid sick days.[27] Many of these stressors were also severely exacerbated by the COVID-19 pandemic which often intensified financial strain and stress levels among vulnerable older adults. A study conducted prior to the pandemic found that approximately 50% of older adults aged 55 and older in the United States did not have at least three months of emergency savings.[28]

Older adults with a history of cancer who often felt lonely during the Spring of 2020 were three times more likely to experience incident and recurrent depression during the Autumn of 2020. This finding is consistent with other research on depression during the pandemic. A recent study on depression among cancer patients in the United Kingdom found that respondents who were lonely had more than quadruple the risk of depression that those who were not lonely.[29] Cancer patients were especially vulnerable to loneliness during the COVID-19 due to the pressure to adhere to lockdown restriction to minimize infection risk.[30]

Among those with a history of cancer and no previous history of depression, those who reported not engaging in religious or spiritual activities prior to the pandemic had 79% higher odds of incident depression in Autumn 2020. This aligns with research that has identified the protective effect of religious participation on depression risk.[31] For cancer patients, religious and spiritual observance is associated with overall physical health and functional wellbeing[32] and fewer adverse mental health outcomes.[33] Although the pandemic disrupted access to many in-person religious services, many religious groups found creative ways to continue gathering as a community, whether that be online, outdoors, or in small groups that adhered to public health guidelines.[34,35] For older adults with cancer, the ability to attend virtual religious services may have provided critical opportunities for social engagement in the absence of in-person gatherings.

Older persons with a history of cancer who became ill or had a loved one become ill or die during the pandemic were twice as likely to experience incident depression. Previous studies have found that the loss of a loved one during the pandemic or having a loved one develop COVID-19 amplified psychological distress and depression among older adults.[36,37] Furthermore, periods of lockdown and physical distancing limitations disrupted many important aspects of the grieving process, such a being present at the death of a loved one[38] and holding funeral and memorial services.[39] Individuals who experienced the death of a loved one during the COVID-19 pandemic may have a greater likelihood for developing pathological grief,[40] which is an identified risk for depression.[41]

Limitations

The current study has some limitations to consider. First, depression was based on the CES-D-10, which is a self-report measure. Although a clinical assessment would have been preferable, the CES-D-10 is a frequently utilized instrument to measure depression with high reliability and validity.[42] Second, although our regression models offer valuable insight on cancer history and depression during the pandemic, it is important to note that despite incorporating a large number of variables, the variance explained in the models for incident and recurrent depression remains somewhat low (23% and 31%, respectively). This suggests that there may be other unidentified risk factors contributing to the outcomes observed in our study. For example, the data drawn from the CLSA does not specify details on the participants' cancer diagnoses, such as the type of cancer, the stage at diagnosis, prognosis, treatment information, length of time since their diagnosis, and whether or not they are in remission. It is likely that the mental health effects of the COVID-19 pandemic vary greatly depending on these factors. Additionally, some of the covariates that were included in the analysis had some limitations in their scope. For example, while our measure of multimorbidity included 17 common chronic health conditions, some conditions were missing from this analysis (eg, arthritis). Fourth, several of the covariates utilized in the current study were dichotomized for this analysis. Although merging categories of categorical variables can potentially improve statistical power and make regression results more robust, it may also result in the loss of nuanced information contained within the original categories. Fine-grained distinctions among groups might be important for a comprehensive understanding of the data. In some situations, combining categories may lead to generalizations in which characteristics of different groups are blurred. Fifth, the CLSA dataset excluded residents who were living in long-term care institutions during the baseline wave of data collection. Those living in long-term care were a particularly vulnerable subset of older adults due to the intensive lockdown restrictions implemented

during the pandemic.[43] Finally, the CLSA is restricted to respondents who are fluent in English or French, limiting the generalizability of these findings to older immigrants without fluency in one of these languages.

Conclusion

Despite these limitations, this longitudinal study makes a substantial contribution to the literature by examining the prevalence of, and factors associated with, incident and recurrent depression in a large sample of more than 2000 older adults with a history of cancer. We found that approximately 1 in 8 participants with no history of depression experienced depression for the first time during the pandemic, while approximately 1 in 2 participants with a history of depression experienced recurrent depression during the pandemic. These findings highlight the considerable toll of the COVID-19 pandemic on the mental health of older adults with a history of cancer, particularly those who may be at greater risk, such as older women, those with functional limitations, and those who experienced COVID-19 related stressors including increased family conflict and income-related stress. Clinicians and other health professionals should continue to screen their cancer patients for depression and be aware of the long shadow left by the challenges of the pandemic.

Data Sharing Statement

The research reported in this study was conducted using the CLSA Baseline Comprehensive Dataset version 6.0, Baseline Tracking Dataset version 3.7, Follow-up 1 Comprehensive Dataset version 3.0 and Follow-up 1 Tracking Dataset version 2.2, COVID-19 Questionnaire Study Dataset version 1.0 under Application ID 2104024. Under the requirements of our contract, the authors of this study are not permitted to share the data. However, data are available directly from the Canadian Longitudinal Study on Aging (www.clsa-elcv.ca) for researchers who meet the criteria for access to de-identified CLSA data by contacting access@clsa-elcv.ca.

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Disclosure

The authors report no conflicts of interest in this work.

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