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Evidence of higher suicidal ideation among young adults in Canada during the COVID-19 pandemic

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In this national study, we analyzed population-level data from a representative longitudinal survey to understand the impact of the COVID-19 pandemic on suicidal ideation rates. Between April and May 2021, responses from 1793 adults aged 20 and older were collected regarding suicidal ideation. Our analysis revealed a significant increase in suicidal ideation during the pandemic's first year, with an age-adjusted incidence rate of 7.6%—nearly three times the pre-pandemic rate of 2.7%. Young adults, particularly those between 20 and 29 years of age, had a higher incidence of suicidal ideation (10.9%) in contrast to those aged 30 and older (6.6%). Furthermore, 21.4% of young adults aged 20 to 29 reported having experienced suicidal ideation at some point in their lives, compared to 13.1% among adults aged 30 and older, indicating a heightened susceptibility to suicidal ideation in this age group. Using multinomial logistic regression, the study identified factors like younger age and job loss due to COVID-19 as contributors to suicidal ideation with other sociodemographic variables, presenting new insights in the scientific literature. Job loss contribution was independent of the age effect. The study highlights a significant increase in suicidal ideation during the pandemic, particularly among young adults, emphasizing the need for targeted mental health interventions and prioritizing their well-being for future public health strategies.

On January 25, 2020, Canada identified its first COVID-19 case, leading to comprehensive public health responses like lockdowns, social gathering restrictions, and business closures. These measures, while necessary, triggered significant economic repercussions, notably elevating the unemployment rate from 5.7% in 2019 to 9.5% in 2020^{1,2}. This increase in the unemployment rate was a focal point in Canadian suicide prevention research, with scholars anticipating its potential impact^{3,4}. McIntyre and Lee forecasted an excess of suicides in Canada as a consequence of the impact of COVID-19 on unemployment. Their model, derived from a time-trend regression analysis of data from 2000 to 2018, indicated a 1% rise in suicide rates for each percentage point increase in unemployment. Applied to the observed 2020 unemployment rate⁵, their model estimated 172 more suicides in Canada for 2020³, suggesting a total rise to 4700 suicides.

Contrary to these predictions, subsequent empirical research by McIntyre et al. revealed an unexpected trend: a decrease in suicide incidences from 10.82 per 100,000 people (March 2019–February 2020) to 7.31 per 100,000 (March 2020–February 2021)⁶. This decline was paradoxical to the anticipated increase. Whereas 4700 suicides had been projected for the period between March 2020 and February 2021, the data reported by McIntyre et al. showed 2790 suicides⁶. The study attributed the difference between the predicted and the actual suicide rates to public health measures implemented during the pandemic, including economic, housing, and health interventions⁶.

Concurrent with the observed decrease in suicide rates, recent empirical studies have documented worsening of mental health among the Canadian population in the context of the COVID-19 pandemic. During this period of dramatic social change⁷, suicidal ideation notably increased, rising from 2.7% in 2019 to a range of 4.2% to 6.2% by 2021^{8,9}. Furthermore, the impact on young adults' mental health is particularly pronounced. Data from the early pandemic months showed individuals aged 15–34 exhibited the highest rates of clinically significant anxiety symptoms at 36.0%, compared to 27.1% in those aged 35–54 and 14.5% in those aged 55 and older¹⁰. Loneliness was most prevalent among adults aged 18 to 29 (13.8%), contrasting with just 5.5% in those aged 60

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and older¹¹. Depressive symptoms, assessed using the PHQ-9 scale, were highest in individuals under 25 and lowest in those over 60¹². Notably, suicidal ideation was disproportionately higher in young adults (18–30 years) at 20.8%, compared to 14.6% in the 31–40 age group and 5.2% in those over 61¹³. These findings underscore the necessity of age-specific mental health interventions, particularly targeting the pandemic's unique impact on young adults in Canada. This focus is critical given the well-understood implications of poor mental health on productivity, healthcare resource utilization and quality of life, underscoring the broader societal and economic benefits of supporting this demographic's mental well-being^{14,15}.

In light of recent research underscoring the necessity for enhanced comprehension of suicidal ideation¹⁶, this study aims to comprehensively analyze the prevalence of suicidal ideation in Canada following the onset of the COVID-19 pandemic. Our research has three primary objectives, each with its associated hypothesis. Firstly, (i) we aim to discern the profiles of individuals who have experienced suicidal ideation during this period. We hypothesize that the incidence of suicidal ideation rose for everyone, regardless of past experiences of suicidal ideation, with a greater increase expected among young adults. Secondly, (ii) we aim to characterize the sociodemographic differences between profiles of suicidal ideation. We propose that various sociodemographic factors, including sex and ethnicity, are linked to its emergence with notable differences among different age groups. Thirdly, (iii) we explore the relationship between unemployment and suicidal ideation, addressing our central hypothesis concerning the socioeconomic impacts of the pandemic on mental health. We hypothesize that unemployment, as documented by McIntyre and Lee³, is associated with an increase in suicidal ideation. This hypothesis is predicated on the observed association where the substantial changes in employment patterns during the pandemic were concurrently associated with an increase in suicidal ideation among Canadians¹⁷.

Results

In this study, our first objective was to discern the profiles of individuals who have experienced suicidal ideation since the COVID-19 pandemic's onset. Our analysis revealed that 7.1% of participants experienced suicidal ideation during the pandemic. The age-adjusted incidence rate of suicidal ideation was 7.6% from the onset of the pandemic to May 2021. Regarding the pre-pandemic lifetime prevalence of suicidal ideation, the unadjusted rate was 12.3%, while the age-adjusted rate was 13.2%.

To verify the hypothesis that young adults reported more suicidal ideation, our sample was segmented into age groups of 10-year increments, with participants aged 70 and older grouped together. Fisher's exact tests showed a significant association between age and incidence of suicidal ideation ($p < 0.001$). Specifically, 10.9% of adults aged 20 to 29 reported suicidal ideation during the pandemic, higher than other age groups. This trend was consistent with the prevalence of pre-pandemic suicidal ideation.

Our analysis identified four distinct profiles related to suicidal ideation: those who never experienced it (Profile 1), those who had ideation before but not since the pandemic (Profile 2), those who experienced suicidal ideation before and during the pandemic (Profile 3), and those experiencing it for the first time during the pandemic (Profile 4). Figure 1 illustrates the distribution of suicidal ideation prevalence across different age groups, particularly accentuating a notable escalation in suicidal ideation among younger adults in Canada during the pandemic period. Specifically, the proportion of participants aged 20–29 who have experienced suicidal ideation at some point in their lives is 21.7%, compared to 13.1% for participants aged 30 and older.

Fisher's exact test revealed a significant association between age groups and Profiles 3 and 4 ($p < 0.01$). Thus, our data show significant differences across age cohorts for those who had suicidal ideation during the pandemic,

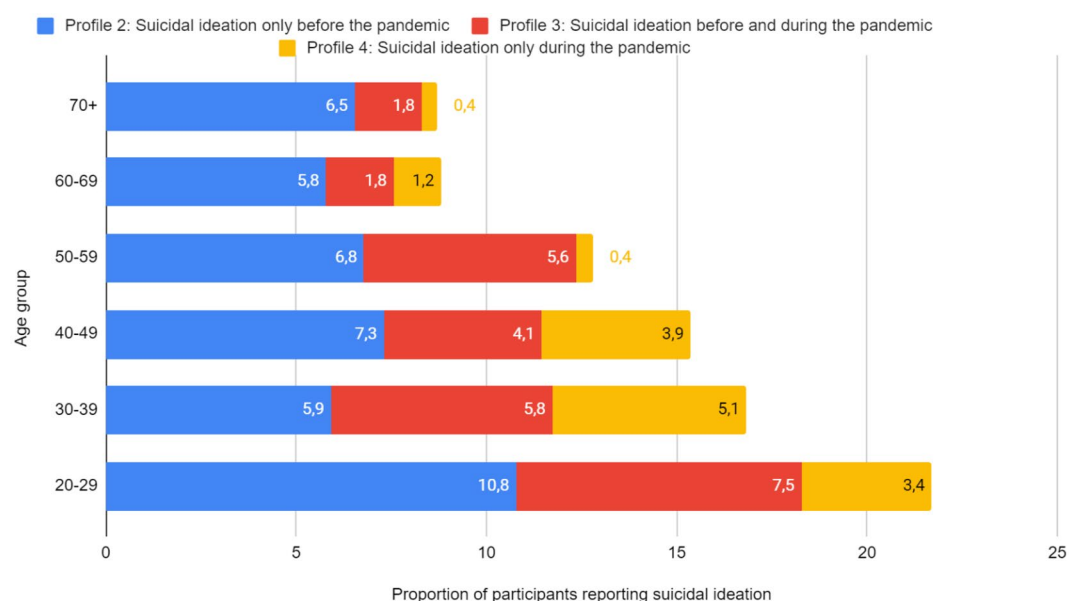


Figure 1. Proportion of suicidal ideation profile, by age group—% (n = 1793).

notwithstanding whether they had suicidal ideation before the pandemic. Conversely, age groups were not significantly associated with Profile 2, which represents participants who had suicidal ideation before but not during the pandemic ($p = 0.4$). These results suggest an overrepresentation of younger age cohorts among those experiencing new or ongoing suicidal ideation during the COVID-19 pandemic.

The second aim was to characterize the sociodemographic differences between profiles of suicidal ideation. We conducted a descriptive analysis incorporating various sociodemographic factors to assess other potential associations with suicidal ideation. The findings of this analysis, detailing the relationship between these characteristics and suicidal ideation, are presented in Table 1.

Examination of the data presented in Table 1 indicates that five variables exhibit a statistically significant association with profiles of suicidal ideation. These variables include language, ethnic group, religious affiliation, indigenous status, and employment termination as a consequence of the COVID-19 pandemic. Additionally, the results show a notable absence of any significant association between gender and suicidal ideation profiles.

Thirdly, to explore the relationship between unemployment rates and suicidal ideation, we analyzed the relationship between age and job loss due to the pandemic. Figure 2 graphically presents the distribution of pandemic-related job loss across age groups, offering insights into this potential explanatory factor for the observed patterns in suicidal ideation.

Results from a logistic regression analysis indicate that the relationship between job loss due to the pandemic and age, treated as a continuous variable, was significant ($p < 0.001$, $\beta = -0.025$). This suggests that younger participants were more likely to lose their jobs compared to older participants.

To further examine this association, we conducted a multinomial logistic regression, incorporating all sociodemographic variables in relation to suicidal ideation profiles. The results of this regression analysis are detailed in Table 2.

In our analysis, different profiles of suicidal ideation were significantly associated with various sociodemographic factors. For Profile 2 (individuals who experienced suicidal ideation only before the pandemic), factors such as belonging to a visible minority, and residence in Quebec were statistically significant, contributing to a decreased probability of suicidal ideation. In Profile 3, which comprises individuals with suicidal ideation both before and during the pandemic, factors such as being older, having a religious affiliation, and being Aboriginal were significant, with lower instances of suicidal ideation observed in these groups. Conversely, job loss due to the pandemic emerged as a significant factor increasing the probability of suicidal ideation. In Profile 4, encompassing individuals experiencing suicidal ideation for the first time amid the pandemic, older age and being

Characteristic	Group	Chi-square test [†]	Profile 1 (never had suicidal ideation)	Profile 2 (had suicidal ideation only before the pandemic)	Profile 3 (had suicidal ideation before and during the pandemic)	Profile 4 (had suicidal ideation only during the pandemic)
Total (reporting percentages)			86.1	6.9	4.4	2.7
Gender	Female	$X^2 = 4.7687$, $df = 3$, $p = 0.1895$	84.4	7.9	4.5	3.1
	Male		87.7	5.8	4.3	2.2
Language**	English	$X^2 = 17.254$, $df = 6$, $p = 0.0084$	84.6	7.5	5.1	2.9
	French		89.6	7.4	2.7	0.3
	Other		88.9	3.7	3.3	4.1
Ethnic group‡*	White	$X^2 = 8.9822$, $df = 3$, $p = 0.0295$	85.6	7.7	4.4	2.3
	Non-white		87.7	3.8	4.5	4.0
Religion**	Non-religious	$X^2 = 15.048$, $df = 3$, $p = 0.0018$	82.6	8.4	6.7	2.2
	Religious		87.8	6.1	3.2	2.9
Indigenous**	Aboriginal identity	$X^2 = 14.231$, $df = 3$, $p = 0.0026$	75.8	7.5	14.4	2.2
	Non-Aboriginal		86.4	6.9	4.1	2.7
Education	No diploma or secondary school diploma	$X^2 = 9.9103$, $df = 6$, $p = 0.1285$	83.4	7.4	5.1	4.1
	College, CEGEP or other non-university diploma		8.2	7.0	6.0	1.8
	Bachelor's degree or higher		87.4	6.6	3.3	2.6
Region	Atlantic	$X^2 = 15.505$, $df = 12$, $p = 0.2150$	86.7	5.5	6.5	1.3
	British Columbia		82.7	8.3	5.0	4.0
	Ontario		85.3	7.3	4.4	3.0
	Prairies		84.2	7.5	6.0	2.3
	Quebec		90.9	5.0	2.1	2.0
Job loss due to the COVID-19 pandemic***	No	$X^2 = 25.726$, $df = 3$, $p = 1.09e-05$	87.9	6.6	3.4	2.1
	Yes		79.0	7.9	8.3	4.8

Table 1. Chi-square test and distribution between gender, language, ethnicity, religion, indigeneity, education, region, job loss due to COVID-19 pandemic, and suicidal ideation profile—% ($n = 1793$). * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. [†]The same conclusions were drawn for Fisher's Exact test. [‡] $n = 1675$.

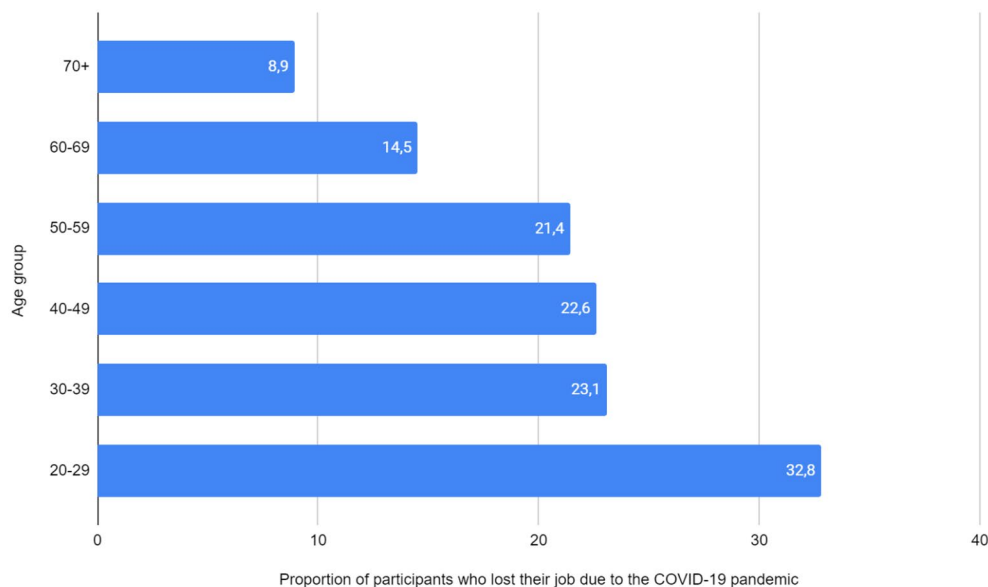


Figure 2. Proportion of participants who lost their job due to the COVID-19 pandemic, by age group—% (n = 1793).

	Dependent variable (Profile 1 is the comparison group)		
	Odds ratio (95% CI)		
	Profile 2 (had suicidal ideation only before the pandemic) (n = 116)	Profile 3 (had suicidal ideation before and during the pandemic) (n = 74)	Profile 4 (had suicidal ideation only during the pandemic) (n = 45)
Intercept	0.32 (0.08, 1.31)	1.15 (0.27, 4.85)	0.39 (0.04, 4.12)
Age (continuous)	0.99 (0.98, 1.00)	**0.98 (0.96, 0.99)	***0.96 (0.94, 0.98)
Male	0.75 (0.51, 1.11)	1.10 (0.67, 1.79)	0.73 (0.39, 1.36)
Other languages	0.62 (0.30, 1.26)	0.71 (0.32, 1.57)	1.06 (0.49, 2.27)
French	1.90 (0.86, 4.15)	0.86 (0.30, 2.42)	*0.07 (0.01, 0.69)
Non-white	*0.47 (0.25, 0.90)	0.82 (0.43, 1.59)	1.09 (0.52, 2.27)
Religious	0.76 (0.51, 1.14)	*0.55 (0.34, 0.91)	1.60 (0.80, 3.18)
Indigenous	0.90 (0.31, 2.66)	**0.30 (0.13, 0.72)	1.14 (0.18, 7.15)
No diploma or secondary school diploma	0.99 (0.66, 1.47)	1.63 (0.98, 2.69)	1.19 (0.64, 2.24)
Atlantic	0.50 (0.19, 1.36)	1.14 (0.40, 3.22)	0.32 (0.05, 2.12)
Ontario	0.76 (0.43, 1.36)	0.81 (0.39, 1.69)	0.66 (0.29, 1.53)
Prairies	0.73 (0.38, 1.40)	0.94 (0.42, 2.07)	0.53 (0.19, 1.48)
Quebec	**0.29 (0.11, 0.73)	0.40 (0.13, 1.25)	1.03 (0.36, 3.00)
Job loss	1.31 (0.82, 2.07)	***2.54 (1.53, 4.21)	*1.93 (1.01, 3.70)

Table 2. Results of multinomial logistic regression of suicidal ideation profiles with age, gender, language, ethnicity, religion, indigeneity, education, region, and job loss due to COVID-19 pandemic—(n = 1793). *p < 0.05; **p < 0.01; ***p < 0.001.

French-speaking were associated with lower rates of suicidal ideation, while job loss was again associated with a higher probability of experiencing suicidal ideation.

The pronounced job loss among young adults due to the COVID-19 pandemic partially explains the increased incidence of suicidal ideation in this demographic. However, job loss alone does not fully account for the observed differences in suicidal ideation across different age cohorts. This is evidenced by the statistically significant relationships between both age and job loss in Profiles 3 and 4, as detailed in Table 2. Additionally, preliminary unadjusted analyses reveal odds ratios of 0.99, 0.97, and 0.96 for Profiles 2, 3, and 4 respectively, indicating that the relationship between age and suicidal ideation in these profiles does not exhibit a mediation effect by other variables, more specifically job loss.

Discussion

In this study, we utilized a Canadian online survey to assess the impact of the COVID-19 pandemic on the incidence of suicidal ideation. This measurement served as a vital indicator for evaluating levels of psychological distress among individuals in the Canadian population during the pandemic period¹⁶. Our analysis revealed a marked increase in suicidal ideation since the pandemic's onset, with a reported incidence rate of 7.1%. Notably, this rate rose to 7.6% after age adjustment. Comparatively, the 2019 Canadian Community Health Survey estimated the annual suicidal ideation rate at 2.7%, underscoring the profound impact of the pandemic on the mental health of Canadians⁹. Furthermore, the similarity between the pre-pandemic lifetime suicidal ideation rate in our sample (13.2%) and the 2019 CCHS data (12.6%) suggests that the observed increase in suicidal ideation during the pandemic is likely due to the pandemic itself rather than sampling bias. This congruence supports the validity of our findings.

Our study aligns with existing scientific literature indicating that the COVID-19 pandemic disproportionately impacted younger generations^{18–20}. We observed a negative association between age and the incidence of suicidal ideation during the pandemic. Specifically, 10.9% of adults aged 20 to 29 reported suicidal ideation, in contrast to 2.2% of those aged 70 years and older. Additionally, the lifetime prevalence of suicidal ideation was notably higher among young adults, with 21.7% of participants aged 20 to 29 reporting such thoughts at some point in their lives, compared to 8.7% of those aged 70 and over. This disparity is accentuated by the nature of lifetime prevalence of suicidal ideation, which inherently increases over time within a cohort. Therefore, in the absence of generational effects, a trend opposite to that shown in Fig. 1 would be expected, and not just an equivalent prevalence across groups. Thus, the high prevalence among younger adults, more than double that of the older groups, underscores the exceptional impact of the pandemic on this demographic.

During the initial year of the COVID-19 pandemic in Canada, McIntyre and Lee projected an increase in suicide rates linked to rising unemployment³. This prediction, based on data from 2000 to 2018 and paralleling the Great Recession's impact on suicide rates, however, may not have fully accounted for governmental interventions and unemployment protections implemented during the pandemic⁶. Government policies combating unemployment are fundamental in predicting suicide, as a recent study suggested concluding that the unemployment protection level strongly modified the Great Recession's impact on suicide²¹.

Our study finds that job loss during the pandemic, indeed, played a role in influencing suicidal ideation among Canadians. Yet, this factor alone is insufficient to explain the entirety of the observed patterns in suicidal ideation. Our data indicate that while job loss was linked to an increased probability of suicidal ideation, age remained a significant factor in this analysis. Specifically, young adults appeared more susceptible to experiencing suicidal ideation in comparison to older adults. This indicates that a multivariate approach, rather than a single factor approach, is essential to fully understand the nuanced impacts of the pandemic on mental health and suicidal ideation.

A notable limitation of our study is the overrepresentation of highly educated individuals in the sample, with 52.7% holding at least a bachelor's degree, compared to the 28.5% of Canadians aged 25–64 with a university degree reported in 2016²². While this educational disparity is evident, our analysis indicates that education level does not significantly affect the prevalence or incidence of suicidal ideation. Additionally, certain demographic groups, such as individuals without a diploma, are underrepresented, and there was missing data on the ethnicity variable which may limit the generalizability of our findings to the broader Canadian population. Sampling weights were used to derive unbiased parameter estimates for all of the analyses. This is one of the best practices to deal with attrition and missing data.

The study underscores a significant increase in suicidal ideation during the pandemic, particularly among young adults, corroborating existing research that suggested a heightened vulnerability in this demographic. We observed a generational disparity in suicidal ideation rates, underscoring the need for targeted mental health interventions for younger populations. Given the ongoing sociopolitical challenges posed by the COVID-19 pandemic, our findings highlight the imperative to prioritize the mental well-being of young adults for future public health strategies and policymaking.

Methods

Participants

To understand the ramifications of the pandemic on Canadian individuals, the present research delves into two variables linked to suicidal ideation. The study utilizes a nationally representative longitudinal database from Canada. The initiative named “COVID-19 Canada: The end of the world as we know it?” involved 3617 individuals and was conducted in collaboration with the polling firm Delvinia. The survey used a panel called “Asking Canadians,” which consists of an inventory of more than one million Canadians. Participants were recruited using a non-probabilistic sampling strategy in its initial phase. Those who took part received financial compensation and had the option to complete the questionnaire using various interfaces, including mobile phones, tablets, or computers.

Attrition and missing data

Initiated on April 6, 2020, and still in progress, the study spans 12 measurement phases, each comprising a diverse array of questions addressing the personal ramifications of the pandemic. Notably, participant retention beyond the initial wave averaged 58% due to attrition. For comprehensive details regarding recruitment, representativity, data cleansing, and weighting, readers are directed to the technical report outlining the overarching framework and methodological approach of this study²³. A weighted quota approach was subsequently employed to align the sample more closely with national demographics as per Statistics Canada. Despite efforts to achieve

representativeness, certain demographic groups, including Francophones, individuals with lower educational attainment, and Aboriginal populations, were underrepresented in the sample.

We noted missing data in the ethnicity variable ($n = 118$). To reduce potential bias without using complex techniques such as multiple imputation, we replaced the missing values with the most frequent category, “White,” for the purposes of the multinomial logistic regression analysis. Weights were then added to minimize the bias.

In the eleventh wave of the survey, questions pertaining to suicidal ideation pre- and during the pandemic, as well as the impact of job loss, were introduced. The timeframe for responses spanned from April 13, 2021, to May 31, 2021. Out of the initial cohort of 3617, a total of 1793 participants addressed the queries. Furthermore, to align with official Canadian demographics and owing to a negligible prevalence ($< 1.0\%$), individuals aged 18 to 19 ($n = 12$) and those with gender identities other than male or female ($n = 2$) were excluded from statistical analyses. Furthermore, to mitigate the impact of non-representativeness, we applied demographic weights based on age, gender, province of residence, and household income.

Variables

Recognizing the influence of sociodemographic factors on suicidal ideation, this study included variables such as age, gender (male or female), mother tongue (English, French, or other), ethnic group (white or non-white), religious affiliation, Aboriginal identity, education level (ranging from no diploma to a bachelor’s degree or higher), and Canadian region (Atlantic, British Columbia, Ontario, Prairies, Quebec).

The assessment of job loss due to the COVID-19 crisis was operationalized through a direct query: “Have you lost your job as a result of the COVID-19 crisis?”. To gauge the prevalence of suicidal ideation, the study employed two pivotal questions: “Before the COVID-19 crisis, have you ever seriously contemplated suicide?” and “Since the onset of the COVID-19 crisis, have you ever seriously contemplated suicide?” These queries were formulated to distinguish between pre-pandemic and pandemic-related suicidal ideation. This study compared the prevalence and incidence of suicidal ideation among participants with the official Canadian data from the 2019 Canadian Community Health Survey (CCHS). It is imperative to note that the incidence reported in this study represents a 13- to 14-month period, in contrast to the CCHS 2019 data, which reflects a 12-month incidence.

Statistical analysis

Summary statistics, including proportions, were utilized to describe the analytical sample. Chi-square tests and Fisher’s exact tests were employed to compare profiles of suicidal ideation. Given the over-representation of older adults in our sample (mean age = 48.96 years), we conducted an age-adjusted incidence analysis in line with Statistics Canada’s guidelines and based on Statistics Canada population estimates as of July 1, 2022²⁴. Subsequently, multinomial logistic regression analyses were conducted for each profile of suicidal ideation. These models included sociodemographic variables and the variable of job loss to explore their influence on different profiles of suicidal ideation. The reference group, designated as Profile 1, consisted of individuals who reported never experiencing suicidal ideation during their lifetime. All statistical analyses were conducted using R, with multinomial logistic regressions performed via the `nnet` package²⁵.

Ethics declarations

The authors declare that all experimental protocols were approved by Comité d’éthique de la recherche en éducation et en psychologie (CEREP) at the University of Montreal (Certificat no CEREP-20–038-D). The authors declare that all methods were carried out in accordance with relevant guidelines and regulations. The authors declare that informed consent was obtained from all subjects.

Data availability

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

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Author contributions

GD, RL, RdLS, EL contributed to study conception and design. AD, DS, MPD, RdLS and EL contributed to data acquisition. GD and RL conducted statistical analyses. GD drafted the first version of the article. All authors had full access to the data, revised and approved the final version of the article.

Competing interests

The authors declare no competing interests.

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