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Prevalence of suicidal ideation among adults in Canada: Results of the second Survey on COVID-19 and mental health

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ABSTRACT

Introduction

Data from the first round of the nationally representative Survey on COVID-19 and Mental Health (SCMH) revealed that the prevalence of recent suicidal ideation in the fall of 2020 in Canada did not differ significantly from that in the pre-pandemic period in 2019. The objective of the present study was to reassess the prevalence of recent suicidal ideation in the spring of 2021.

Methods

The prevalence of suicidal ideation among adults in Canada was examined using the 2021 SCMH (conducted between February 1 and May 7, 2021), and it was compared with the prevalence in the 2019 Canadian Community Health Survey. Unadjusted logistic regression analysis was used to assess the differential likelihood of reporting suicidal ideation in population subgroups.

Results

Among adults in Canada, the prevalence of suicidal ideation since the pandemic began was 4.2%, which was significantly higher than the pre-pandemic prevalence of 2.7% in 2019. A statistically significant increase in prevalence was observed among females and males, age groups younger than 65, and several other sociodemographic groups, as well as in British Columbia, the Prairie provinces and Ontario. People who were younger than 65 years, were born in Canada, had lower educational attainment, or were never married were significantly more likely to report suicidal ideation than others during the pandemic.

Conclusion

As the second year of the pandemic began, the prevalence of recent suicidal ideation in Canada was higher than it had been before the pandemic in 2019. Continuous monitoring of suicide-related outcomes and risks is necessary so that population-level changes can be detected and inform public health action.

Key words

suicidal ideation; suicide prevention; mental health; COVID-19; pandemic; Canada; public health; surveillance.

AUTHORS

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The COVID-19 pandemic and the related public health measures have exacerbated economic, psychosocial and health-related risk factors for suicidality,^{1,2} though the long-term impact on suicide-related outcomes remains uncertain. A living systematic review has helped track the global evidence related to suicidality during the pandemic, but early findings were inconsistent and showed that the prevalence of suicide-related behaviours, including suicidal ideation, varied between studies.³ A recent international meta-analysis of 54 studies reported that the combined prevalence of suicidal ideation during the first year of the pandemic was 10.8%,⁴ which was higher than the pre-pandemic global estimates of approximately 2% to 5%.^{5,6} However, limited conclusions can be drawn, since nearly half of the included studies relied on convenience samples or did not state the measure used to assess suicidal ideation, and samples were predominantly younger (mean age of 34 years), female (57.5%) and White (66.3%).⁴ In Canada, the prevalence of suicidal thoughts during the pandemic has been studied using repeated cross-sectional surveys.^{7,8} Overall, the generalizability of these studies is limited because samples were relatively small, with comparatively short data collection and recall periods; they also lacked pre-pandemic baseline data for comparison, and some were not nationally representative.

A previous study in Canada with data from the first round of the Survey on COVID-19 and Mental Health (SCMH) found that the prevalence of suicidal ideation among adults in the fall of 2020 did not differ significantly from the pre-pandemic period.⁹ However, subgroup variation was evident, with increased prevalence among young adults, people who were born in Canada, people with lower levels of education or household income, frontline workers, and people who experienced pandemic-related income loss or loneliness.⁹ Other Canadian studies that measured suicidal thoughts or feelings during the pandemic reported similarly disproportionate impacts.⁷

In contrast with the stable national prevalence of suicidal ideation, self-rated mental health decreased and symptoms of depression increased in Canada in 2020¹⁰⁻¹² and again in 2021¹³⁻¹⁵ compared with before the pandemic. Given this evidence, it is important to continue to monitor changes in suicidal ideation over time and identify high-risk subgroups as a way to help inform timely public health approaches to suicide prevention and mental health promotion during the pandemic.

As a part of ongoing public health surveillance, the present study analyzed data from the 2021 SCMH. The objectives of the study were to update previous estimates of the prevalence of recent suicidal ideation among adults in Canada⁹ and compare them with the prevalence in 2019, and to assess the differential risk of reporting suicidal ideation across population subgroups.

Methods

The prevalence of suicidal ideation during the pandemic was estimated using cross-sectional data from Statistics Canada's

population-based SCMH, conducted between February 1 and May 7, 2021.¹⁶ Survey participation coincided with the third wave of the pandemic in Canada, when school closures, travel restrictions and other public health measures were reintroduced in many jurisdictions.¹⁷

The target population for the survey was people aged 18 or older from the 10 provinces and 3 territorial capitals in Canada. The SCMH had a two-stage sampling design: sampling dwelling and person. The SCMH frame was stratified by province, and a simple random sample of dwellings was selected within each province and within the three territorial capitals; participants in each dwelling were then selected.¹⁶ The survey had a total of 8,032 participants and a response rate of 49.3%. For the present study, data from the 6,592 participants who agreed to share their survey results with the Public Health Agency of Canada were analyzed.

For comparison with the most recent pre-pandemic period, the prevalence of suicidal ideation was estimated with data from the 2019 Canadian Community Health Survey (CCHS).¹⁸ The 2019 CCHS collected data from January 2 to December 24, 2019, and had a nationally representative sample of 57,034 participants aged 18 or older (response rate of 54.9%). The 2019 CCHS was based on the Labour Force Survey (LFS) sampling frame. The LFS first selected clusters (in this case, health regions) using a proportional sampling method, and then the dwellings were selected by systematic sampling in each cluster. An adult living in the selected dwelling was picked as the respondent using various selection probabilities based on age and household composition. Details about the two surveys have been reported elsewhere.⁹ The present study was exempt from research ethics board review. Data access was authorized by a data sharing agreement between the Public Health Agency of Canada and Statistics Canada.

To assess recent suicidal ideation, the primary outcome variable in this study, respondents of the 2021 SCMH were asked, "Have you seriously contemplated suicide since the COVID-19 pandemic began?" In the 2019 CCHS, respondents who answered "yes" to the question "Have you ever seriously contemplated suicide?" were then asked, "Has this happened in the past 12 months?"

The sociodemographic variables that were examined included gender, age, immigrant status, household income by tertile, place of residence, educational attainment, marital status, whether respondents were the parent or guardian of a child younger than 18 years, and province or territorial capital. Landed immigrants and non-permanent residents were coded as "yes" and those who were born in Canada were coded as "no" for immigrant status.

The analyses were conducted using the SAS Enterprise Guide version 7.1 (SAS Institute, Cary, North Carolina, United States). Modified Clopper-Pearson confidence intervals^{9,19} of 95% and the coefficient of variance were estimated using bootstrap weights. Chi-square tests were performed to determine whether the estimates of suicidal ideation from the

Table 1
Sample distributions, by sociodemographic characteristics, Canada, 2019 and 2021

Variable	2019 Canadian Community Health Survey		2021 Survey on COVID-19 and Mental Health	
	Number in sample	Distribution	Number in sample	Distribution
	N	%	N	%
Overall	57,034	100.0	5,742	100.0
Gender				
Female	30,932	50.8	3,294	50.7
Male	26,052	49.2	2,441	49.3
Age group				
18 to 34	9,766	28.4	969	24.8
35 to 64	22,354	50.1	3,056	53.0
65 and older	24,914	21.5	1,717	22.3
Immigrant status				
Yes	9,931	28.7	1,038	27.6
No	46,752	71.3	4,677	72.4
Educational attainment				
High school or lower	21,755	34.4	1,691	29.3
Postsecondary	34,563	65.6	4,034	70.7
Living area				
Population centre	40,914	82.9	4,265	82.2
Rural area	16,120	17.1	1,424	17.9
Marital status				
Married or living common law	31,432	62.5	3,407	64.0
Never married	11,674	25.0	1,122	22.6
Separated, divorced or widowed	13,868	12.5	1,197	13.4
Parent or guardian of child younger than 18				
Yes	9,220	23.0	1,324	28.2
No	47,814	77.0	4,408	71.8
Province or territorial capital				
Prairie provinces	12,811	17.7	1,530	17.4
Alberta	6,230	11.4	556	11.2
Manitoba	3,364	3.4	503	3.3
Saskatchewan	3,217	2.9	471	2.8
British Columbia	6,352	13.4	577	13.9
Atlantic provinces	10,561	6.6	1,709	6.6
New Brunswick	2,908	2.1	467	2.1
Newfoundland and Labrador	2,584	1.4	387	1.4
Nova Scotia	3,034	2.6	491	2.6
Prince Edward Island	2,035	0.4	364	0.4
Ontario	16,854	39.4	1,007	39.3
Quebec	10,456	23.0	919	22.7
Territorial capitals	...	...	850	0.2
Whitehorse, Yukon	...	...	355	0.1
Yellowknife, Northwest Territories	...	...	346	0.1
Iqaluit, Nunavut	...	...	149	0.0
		Median income,		Median income,
	N	\$ thousands	N	\$ thousands
Income	57,028	85.5	5,211	83.2
... not applicable				

Notes: Data from the territorial capitals (N = 850) are excluded from the 2021 Survey on COVID-19 and Mental Health estimates (except by province or territorial capital) so that comparisons between 2019 and 2021 are based on data from the same geographical locations.

"Prairie provinces" refers to Alberta, Manitoba and Saskatchewan combined. "Atlantic provinces" refers to New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island combined. "Territorial capitals" refers to Whitehorse, Yukon; Yellowknife, Northwest Territories; and Iqaluit, Nunavut; combined.

Sources: Canadian Community Health Survey, 2019; Survey on COVID-19 and Mental Health, 2021.

spring of 2021 differed significantly from those from 2019. Unadjusted logistic regressions were used to assess the differential likelihood of reporting suicidal ideation in population subgroups. Additionally, logistic regressions with survey year, population subgroup and interaction terms were performed to examine the changes in risk of suicidal ideation among the groups during the pandemic compared with before the pandemic. When the interaction term is statistically significant, the risk is considered to have changed. Statistically

significant results were identified by a p-value of greater than 0.05 in all the analyses.

Results

Table 1 shows the sample distributions of the 2019 CCHS and 2021 SCMH; Table 2 presents the prevalence estimates of suicidal ideation overall and by sociodemographic group. Among adults in Canada, the prevalence of recent suicidal

Table 2
Prevalence of suicidal ideation in the past 12 months (in the 2019 Canadian Community Health Survey) and since the COVID-19 pandemic began (in the 2021 Survey on COVID-19 and Mental Health), by sociodemographic characteristics, Canada

Variable	Prevalence in the 2019 Canadian Community Health Survey			Prevalence in the 2021 Survey on COVID-19 and Mental Health			p-value
	%	95% confidence interval		%	95% confidence interval		
		from	to		from	to	
Overall	2.7	2.5	3.0	4.2	3.4	5.0	< 0.001 ***
Gender							
Female	2.8	2.5	3.1	4.0	3.0	5.2	0.012 *
Male	2.7	2.3	3.0	4.1	3.0	5.5	0.010 *
Age group							
18 to 34	5.0	4.4	5.8	8.0	5.7	10.9	0.006 **
35 to 64	2.2	1.9	2.5	3.7	2.8	4.8	< 0.001 ***
65 and older	1.0	0.8	1.2	0.9	0.4	1.7	0.782
Immigrant status							
Yes	1.7	1.3	2.2	2.5	1.4	4.3	0.173
No	3.2	2.9	3.5	4.8	3.9	5.9	< 0.001 ***
Household income tertile							
Low income	3.5	3.0	3.9	4.2	3.0	5.7	0.254
Middle income	2.9	2.4	3.4	4.2	2.9	6.0	0.044 *
High income	1.8	1.5	2.2	3.9	2.5	5.6	< 0.001 ***
Living area							
Population centre	2.8	2.5	3.1	4.5	3.6	5.5	< 0.001 ***
Rural area	2.6	2.2	3.1	3.0	1.8	4.7	0.523
Educational attainment							
High school or lower	4.0	3.5	4.6	5.7	4.0	8.0	0.048 *
Postsecondary	2.1	1.8	2.4	3.5	2.7	4.4	< 0.001 ***
Marital status							
Married or living common law	1.6	1.4	1.8	3.0	2.2	3.9	< 0.001 ***
Never married	5.6	4.8	6.4	8.5	6.0	11.5	0.018 *
Separated, divorced or widowed	2.9	2.4	3.4	2.7	1.6	4.2	0.722
Parent or guardian of child younger than 18							
Yes	1.8	1.4	2.2	3.1	2.0	4.6	0.022 *
No	3.0	2.7	3.3	4.6	3.7	5.7	< 0.001 ***
Province or territorial capital							
Prairie provinces	3.2	2.6	3.9	5.1	3.6	6.9	0.010 *
Alberta	3.2	2.4	4.0	4.8	2.8	7.6	0.107
Manitoba	3.3	2.2	4.8	5.5	3.3	8.5	0.087
Saskatchewan	3.3	2.1	4.9	5.6	3.5	8.6	0.074
British Columbia	2.8	2.2	3.7	5.9	3.6	8.8	0.004 **
Atlantic provinces	3.8	3.1	4.7	3.5	2.5	4.9	0.665
New Brunswick	4.2	2.9	5.9	2.9	1.2	5.8	0.359
Newfoundland and Labrador	3.4	2.0	5.2	3.6	1.5	7.3	0.864
Nova Scotia	3.9	2.6	5.5	3.8	2.1	6.2	0.910
Prince Edward Island	3.5	2.0	5.6	4.8	2.4	8.6	0.385
Ontario	2.6	2.2	3.1	4.2	2.8	6.1	0.017 *
Quebec	2.2	1.8	2.7	2.5	1.4	4.1	0.648
Territorial capitals	...	...	...	5.9	4.1	8.1	...
Whitehorse, Yukon	...	...	...	5.8	3.3	9.5	...
Yellowknife, Northwest Territories	...	...	...	4.9	2.4	8.8	...
Iqaluit, Nunavut	...	...	...	8.5	3.5	16.6	...

... not applicable

* significantly different (p < 0.05)

** significantly different (p < 0.01)

*** significantly different (p < 0.001)

Notes: Data from the territorial capitals (N = 850) are excluded from the 2021 Survey on COVID-19 and Mental Health estimates (except by province or territorial capital) so that comparisons between 2019 and 2021 are based on data from the same geographical locations. "Prairie provinces" refers to Alberta, Manitoba and Saskatchewan combined. "Atlantic provinces" refers to New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island combined. "Territorial capitals" refers to Whitehorse, Yukon; Yellowknife, Northwest Territories; and Iqaluit, Nunavut; combined.

Sources: Canadian Community Health Survey, 2019; Survey on COVID-19 and Mental Health, 2021.

ideation in the spring of 2021 was 4.2%, which was significantly higher than the pre-pandemic prevalence of 2.7% in 2019. A statistically significant increase between 2019 and 2021 was observed among both females (2.8% versus 4.0%) and males (2.7% versus 4.1%). To compare with the prevalence in 2019, the overall prevalence in the 2021 SCMH is presented

in Table 1 (excluding the three territorial capitals). When the three capitals were included, the overall prevalence remained the same.

The prevalence of suicidal ideation during the pandemic was significantly higher than before the pandemic among people aged 18 to 34 and 35 to 64 years, but not among those aged 65

Table 3
Likelihood of reporting suicidal ideation in the past 12 months (in the 2019 Canadian Community Health Survey) and since the COVID-19 pandemic began (in the 2021 Survey on COVID-19 and Mental Health), by sociodemographic characteristics, Canada

Variable	Odds ratio in the 2019 Canadian Community Health Survey				Odds ratio in the 2021 Survey on COVID-19 and Mental Health				Interaction p-value
	Odds ratio	95% confidence interval		p-value	Odds ratio	95% confidence interval		p-value	
		from	to			from	to		
Gender									
Female	1.1	0.9	1.3	0.601	1.0	0.6	1.5	0.949	0.790
Male [†]	1.0	...	...	...	1.0	...	...	...	...
Age group									
18 to 34	5.4	4.2	6.8	< 0.001 ***	9.7	4.5	21.3	< 0.001 ***	0.155
35 to 64	2.2	1.8	2.8	< 0.001 ***	4.3	2.0	9.1	< 0.001 ***	0.122
65 and older [†]	1.0	...	...	...	1.0	...	...	...	...
Immigrant status									
Yes	0.5	0.4	0.7	< 0.001 ***	0.5	0.3	0.9	0.033 *	0.963
No [†]	1.0	...	...	...	1.0	...	...	...	...
Household income tertile									
Low income [†]	1.0	...	...	...	1.0	...	...	...	...
Middle income	0.8	0.7	1.0	0.075	1.0	0.6	1.7	0.960	0.459
High income	0.5	0.4	0.6	< 0.001 ***	0.9	0.5	1.5	0.744	0.050
Living area									
Population centre	1.1	0.9	1.3	0.558	1.5	0.9	2.5	0.130	0.233
Rural area [†]	1.0	...	...	...	1.0	...	...	...	...
Educational attainment									
High school or lower	2.0	1.6	2.4	< 0.001 ***	1.7	1.1	2.6	0.021 *	0.536
Postsecondary [†]	1.0	...	...	...	1.0	...	...	...	...
Marital status									
Married or living common law [†]	1.0	...	...	...	1.0	...	...	...	...
Never married	3.7	3.0	4.6	< 0.001 ***	3.0	1.9	4.8	< 0.001 ***	0.428
Separated, divorced or widowed	1.9	1.5	2.4	< 0.001 ***	0.9	0.5	1.6	0.708	0.017 *
Parent or guardian of child younger than 18									
Yes	0.6	0.5	0.8	< 0.001 ***	0.7	0.4	1.1	0.086	0.681
No [†]	1.0	...	...	...	1.0	...	...	...	...
Province or territory capital									
Prairie provinces	1.2	1.0	1.6	0.101	1.2	0.7	2.0	0.466	0.964
Alberta	1.2	0.9	1.6	0.217	1.1	0.6	2.2	0.676	0.887
Manitoba	1.3	0.9	1.9	0.232	1.3	0.7	2.5	0.389	0.936
Saskatchewan	1.3	0.8	2.0	0.311	1.3	0.7	2.5	0.334	0.851
British Columbia	1.1	0.8	1.5	0.603	1.4	0.8	2.6	0.277	0.471
Atlantic provinces	1.5	1.1	2.0	0.006 **	0.8	0.5	1.4	0.461	0.047 *
New Brunswick	1.6	1.1	2.5	0.020 *	0.7	0.3	1.6	0.369	0.071
Newfoundland and Labrador	1.3	0.7	2.3	0.375	0.8	0.3	2.1	0.719	0.435
Nova Scotia	1.5	1.0	2.3	0.057	0.9	0.4	1.8	0.716	0.196
Prince Edward Island	1.3	0.8	2.3	0.325	1.1	0.5	2.5	0.729	0.763
Ontario [†]	1.0	...	...	...	1.0	...	...	...	...
Quebec	0.8	0.6	1.1	0.164	0.6	0.3	1.2	0.121	0.334
Territorial capitals	...	...	...	...	1.4	0.8	2.3	0.192	...
Whitehorse, Yukon	...	...	...	...	1.4	0.7	2.7	0.327	...
Yellowknife, Northwest Territories	...	...	...	...	1.2	0.5	2.5	0.707	...
Iqaluit, Nunavut	...	...	...	...	2.1	0.8	5.3	0.116	...

... not applicable

* significantly different from reference category (p < 0.05)

** significantly different from reference category (p < 0.01)

*** significantly different from reference category (p < 0.001)

[†] reference category

Notes: Data from the territorial capitals (N = 850) are excluded from the 2021 Survey on COVID-19 and Mental Health estimates (except by province or territorial capital) so that comparisons between 2019 and 2021 are based on data from the same geographical locations. "Prairie provinces" refers to Alberta, Manitoba and Saskatchewan combined. "Atlantic provinces" refers to New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island combined. "Territorial capitals" refers to Whitehorse, Yukon; Yellowknife, Northwest Territories; and Iqaluit, Nunavut combined.

Sources: Canadian Community Health Survey, 2019; Survey on COVID-19 and Mental Health, 2021.

years and older. Significant increases were also observed among people who were born in Canada; had a middle or high household income; were married, living common law or never married; were living in a population centre; or had any level of educational attainment or parenting status. The prevalence of suicidal ideation also increased significantly in British Columbia, the Prairie provinces and Ontario. Non-significant increases were observed for all other sociodemographic groups and provinces, except in Atlantic Canada, where there was a non-significant decline in prevalence.

The odds ratio estimates (Table 3) showed a differential likelihood of reporting suicidal ideation in population subgroups. Both before and during the pandemic, people who were younger than 65 years, were born in Canada, had a lower educational attainment or were never married were significantly more likely to report suicidal ideation than others. Parents and guardians of children younger than 18 years and people with the highest household incomes were significantly less likely to report suicidal ideation before but not during the pandemic. The interaction term of the logistic regression model was statistically significant for the people who were separated, divorced or widowed, as well as for people in the Atlantic provinces, and was marginally significant (p-value of 0.05) for people with the highest household incomes.

Discussion

As the second year of the pandemic began in the spring of 2021, the prevalence of recent suicidal ideation in Canada was significantly higher than it was in 2019 before the pandemic. Increases in prevalence were also observed among most sociodemographic groups examined in this study, though not all were statistically significant. Moreover, some sociodemographic groups showed higher risk of reporting recent suicidal ideation, and risk changes during the pandemic were observed in some groups.

The findings of increases in suicidal ideation parallel changes in other population mental health outcomes, such as symptoms of major depression,¹¹ but contrast with a previous study that found no significant changes in the prevalence of recent suicidal ideation in the fall of 2020 (overall prevalence of 2.4%; 95% confidence interval: 2.1% to 2.9%).⁹ The increased prevalence in the spring of 2021 may be related to the cumulative negative impacts of the pandemic on physical and mental health, employment and financial circumstances, social relationships, increases in other risk factors, and possible delayed effects on suicide-related outcomes.^{20,21} For example, increased alcohol and drug consumption has been observed during the pandemic;^{22,23} a study from Japan found a delayed increase in suicide mortality,²⁴ though decreased suicide rates were reported in other countries during the early months of the pandemic.²⁵

The 2020 and 2021 cycles of the SCMH asked about suicidal ideation using the time frame of “since the COVID-19

pandemic began.” The shorter recall period (six to eight months) in the 2020 SCMH may explain why the increase in the prevalence of suicidal ideation observed in 2021 was not observed in the fall of 2020. However, this is unlikely, as similar prevalence of lifetime suicidal ideation was observed in the 2020 SCMH and 2019 CCHS.⁹

In the present study, the 4.2% prevalence of suicidal ideation is lower than the 10.8% in the recent meta-analysis.⁴ This large difference may be a result of a combination of factors, including variations in the way that suicidal ideation was measured, differences in sampling frames and methods, and differences in the impact of the pandemic in Canada compared with other nations. The difference may also be related to the small and convenience samples used in many studies included in the meta-analysis.⁴

Variations in the prevalence of suicidal ideation across sociodemographic groups have been observed in several studies during the pandemic.^{2,7,9,26,27} The results of this study underscore the possibility that younger and middle-aged adults, people with lower levels of education, and unmarried adults may have faced unique stressors during the pandemic that increased the likelihood of experiencing suicidal ideation.

A previous study found that, before the pandemic, parents and guardians of young children were significantly less likely to report suicidal ideation; this suggests that parenthood may have acted as a protective factor before but not during the pandemic.⁹ Pandemic-related stresses related to concerns about children becoming sick, caring for ill family members, child care, virtual learning, and employment may have intensified or accumulated over time, in turn increasing the risk of suicidal ideation. The present study also observed that people with the highest household incomes had a significantly lower risk of reporting recent suicidal ideation in 2019 and in the fall of 2020, but not in the spring of 2021. The change in risk between 2019 and 2021 was also marginally significant for the highest income group. Overall, the findings of this study suggest that the populations that are at risk for suicidal ideation may shift over time with the emergence of new stresses or with cumulative or latent effects.

This is one of the few studies on suicidal ideation conducted during the pandemic that used a nationally representative sample and a standardized outcome measure for comparisons with a pre-pandemic baseline. This study was limited by the modest response rate in the SCMH, though the rate was consistent with other recent national health surveys such as the CCHS. Another limitation is that the 2019 CCHS collected data throughout a 12-month period, while data collection in the 2021 SCMH lasted approximately 3 months, from February to May. This difference precludes an examination of seasonal patterns, which may contribute to a seasonality bias. However, when the data of both surveys were limited to the same collection period as the 2021 SCMH (i.e., from February to May), similar results were generated (e.g., 4.2% in 2021 versus 2.4% in 2019 overall). The slight differences in recall periods between the SCMH (10.5-to-13.5-month recall period) and the CCHS (past

12 months) may also have influenced the comparisons. It is also unclear whether the non-significant increases in prevalence that were observed for minority populations reflect the degree of change, undersampling, or some other methodological difference between the CCHS and SCMH. Moreover, because of the rarity of the event, adjusted logistic regression analyses were not performed.

In summary, the prevalence of suicidal ideation among adults in Canada significantly increased in the spring of 2021 compared with 2019. This evidence may serve as an early warning sign of other possible latent impacts of the pandemic on mental health and suicidality. As the pandemic persists, continuous monitoring of suicide-related outcomes and evaluation of the relationship between COVID-19 impacts and suicidality are necessary so that population-level changes can be detected swiftly and inform public health action.

Authors' contributions and statement

All authors advised on the conception and design of the analysis. Li Liu conducted the statistical analysis. Nathaniel J. Pollock and Li Liu drafted and revised the manuscript. All authors critically revised and read every draft of the article and approved the final submission.

The content and views expressed herein are those of the authors and do not necessarily reflect those of the Government of Canada.

Conflicts of interest

The authors have no conflicts of interest.

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