Health Reports

Profiles of mental health and their association with negative impacts and suicidal ideation during the COVID-19 pandemic: A Canadian perspective

by Michelle D. Guerrero and Joel D. Barnes

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ABSTRACT

Background
Mental health among Canadians has worsened since the start of the COVID-19 pandemic. The purpose of this study was to identify profiles of mental health difficulties and to quantify the relationships between mental health profiles, negative impacts related to the pandemic and suicidal ideation.

Data and methods
Participants were 22,721 adults (18 years and older) from the 2020 and 2021 Survey on COVID-19 and Mental Health. Latent profile analysis was used to identify patterns of anxiety, depression and psychological distress. The relationships between mental health profiles, negative impacts and suicidal ideation were examined using logistic regression models.

Results
Three mental health profiles were identified. Individuals were classified as having no mental health difficulties (Profile 1, 65.70%), low-to-moderate mental health difficulties (Profile 2, 25.52%) and severe mental health difficulties (Profile 3, 8.78%). Individuals in Profiles 2 and 3 were at greater odds than individuals in Profile 1 of experiencing emotional distress; the death of a family member, friend or colleague; difficulty in meeting financial obligations or essential needs; the loss of a job or income; feelings of loneliness or isolation; physical health problems; challenges in personal relationships with household members; and other impacts. Individuals in Profile 2 (4.27%, odds ratio (OR) = 24.30) and Profile 3 (19.09%, odds ratio (OR) = 115.75) were considerably more likely to have contemplated suicide since the onset of the pandemic compared with those in Profile 1 (0.16%).

Interpretation
Individuals who experienced high levels of anxiety, depression and psychological distress were most vulnerable to negative impacts related to the pandemic and suicidal ideation.

Keywords
latent profile analysis, suicidal ideation, anxiety, depression, psychological distress

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What is already known on this subject?

- Evidence indicates that the COVID-19 pandemic has had a profound negative impact on the mental health of Canadians and that people in vulnerable populations have been hit the hardest.

- Little research has explored the differential impact of the pandemic on those experiencing different degrees of mental health difficulties.

What does this study add?

- Two-thirds (65.70%) of Canadian adults were classified as having no mental health difficulties (Profile 1). One-quarter (25.52%) were classified as having low-to-moderate mental health difficulties (Profile 2) and 1/12 (8.78%) were classified as having severe mental health difficulties (Profile 3).

- Individuals who were most vulnerable to negative impacts and suicidal ideation during the pandemic included those who experienced severe levels of anxiety, depression and psychological distress.

- Individuals in Profile 2 (4.27%) and Profile 3 (19.09%), compared with those in Profile 1 (0.16%), were at greater odds of having contemplated suicide since the onset of the pandemic (OR = 24.30 and OR = 115.75, respectively). Among individuals with severe mental health difficulties, one in five had contemplated suicide since the onset of the pandemic.

Many Canadians have experienced worse mental health since the onset of the COVID-19 pandemic.[1-4] In May 2020, 38% of survey respondents in Canada indicated a deterioration in mental health since COVID-19 began.[3] Identified emotional challenges linked with deterioration in mental health included feeling anxious and worried (46%), sad (26%), stressed (37%), and lonely (30%).[3] Furthermore, fewer Canadian adults reported high self-perceived mental health in 2020 (60%) than in 2019 (67%).[5] The proportion of Canadians (15 years and older) who indicated that their mental health was "very good" or "excellent" decreased by 14% from 2018 (68%) to 2020 (54%).[4] Data from eight Canadian provinces revealed that the prevalence of major depressive disorder during the fall of 2020 (16%) was more than two times higher compared with the years (2015 to 2019) predating COVID-19 (7%).[6] Other national data showed that the percentage of adults with self-reported depression more than doubled (4% versus 10%), and the number of adults who indicated that their anxiety was "high to extremely high" quadrupled since the onset of the pandemic (5% versus 20%).[7]

Individuals in vulnerable populations have been disproportionally impacted by the pandemic.[3,8-11] Jenkins et al.[3] found that, compared with the general population, Canadian adults who were already experiencing mental health difficulties were two times more likely to report a decline in mental health because of COVID-19, three times more likely to report having had trouble coping and four times more likely to have had suicidal thoughts and to have attempted self-harm.[3] Individuals with a disability, with low income, who are Indigenous, of colour or who identify as LGBTQ+ have reported similar hardships.[3] Sexual and gender minority populations have

reported a deterioration in mental health, poor ability to cope, suicidal thoughts, self-harm and the use of substances to cope.[12] Other research has shown that the prevalence of pandemic-related suicidal ideation is higher among those who are younger (18 to 34 years), live alone or are unmarried, have a pre-existing mental health condition, and identify as LGBT2Q+ or Indigenous.[13] Data from these reports provide a comprehensive overview of the differential mental health impacts of COVID-19 and highlight the growing mental health inequities among vulnerable populations in Canada.

More research is needed to quantify the impact of the pandemic on those experiencing mental health difficulties. One report from Statistics Canada showed that Canadians who screened positive for at least one of three mental disorders (anxiety, depression or posttraumatic stress) reported experiencing one or more negative impacts related to the COVID-19 pandemic at a higher rate than those who did not screen positive for any mental health disorders (94% versus 64%).[14] This finding is important because it identifies the unique hardship experienced by those with mental health difficulties. However, research must move beyond the mere examination of the presence or absence of disorders. Adopting different approaches, such as latent profile analysis, will allow for the identification of shared symptom patterns of mental health difficulties. Disentangling the experiences of those with one disorder from those with multiple disorders is important given that multiple mental health difficulties amplify vulnerability. Taken together, the purpose of the current study was to use latent profile analysis to understand how symptoms of anxiety, depression and psychological distress cluster together to form unique mental health profiles and to quantify the relationships between those

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mental health profiles, the negative impacts related to the pandemic and suicidal ideation.

Methods

Data source

Data were from the Survey on COVID-19 and Mental Health (SCMH),[15] a cross-sectional, nationally representative, rapid response survey led by Statistics Canada. The purpose of the SCMH was to assess the impacts of COVID-19 on the mental health and well-being of Canadians. The first cycle of data collection took place in the fall of 2020, and the second cycle took place in the spring of 2021. The target population included individuals aged 18 years and older from all provinces and territories in Canada. The survey excludes individuals living on reserves, in institutions and outside the capital cities in the territories. Respondents completed the survey online or by telephone. A total of 14,689 respondents completed the survey in the fall of 2020, and 8,032 respondents completed the survey in the spring of 2021.

Measures

Anxiety: Anxiety was assessed using the Generalized Anxiety Disorder Scale (GAD-7).[16] The GAD-7 includes seven items that assess the presence and severity of generalized anxiety disorder. Items are rated on a four-point Likert scale ranging from 0 (not at all) to 3 (nearly every day). Responses to each item were summed to provide a single score ranging from 0 to 21, with higher scores indicating greater levels of anxiety. A score of 10 or higher represents a reasonable cut point score for identifying cases of generalized anxiety disorder.[16]

Depression: Symptoms of depression were assessed using the Patient Health Questionnaire-9 (PHQ-9).[17,18] The PHQ-9 comprises nine items that assess the frequency with which nine depressive symptoms have occurred in the past two weeks. Responses to each question are rated on a four-point Likert scale ranging from 0 (not at all) to 3 (nearly every day). An overall score was computed by summing responses from each question. Scores range from 0 to 27, with higher scores indicating more severe depressive symptoms. A score of 10 or higher represents a reasonable cut point score for identifying cases of major depressive disorder.[17,18]

Distress: Psychological distress was assessed using the Kessler Psychological Distress Scale (K10).[19] The K10 contains 10 items that assess symptoms of anxiety and depression over the previous four weeks to measure non-specific psychological distress. Items are rated on a five-point Likert scale ranging from 0 (none of the time) to 4 (all of the time). Responses to each item were summed to provide a single score ranging from 0 to 40, with higher scores indicating greater levels of psychological distress. In line with previous research on psychological distress among Canadians, a cut point score of nine was used to identify high psychological distress.[20]

Impacts of the COVID-19 pandemic: Respondents indicated whether they experienced any of the following impacts of the COVID-19 pandemic: (1) the loss of a job or income; (2) difficulty in meeting financial obligations or essential needs; (3) the death of a family member, friend or colleague; (4) feelings of loneliness or isolation; (5) emotional distress; (6) physical health problems; (7) challenges in personal relationships with members of their household; (8) other impacts; or (9) no impacts. The response options for each impact question were yes or no.

Suicidal ideation: Suicidal ideation was assessed using one item that read: "Have you seriously contemplated suicide since the COVID-19 pandemic?" The response options were yes or no.

Covariates: Several variables served as covariates, including age (18 to 34, 35 to 64, or 65 and older); gender (female, male or gender diverse); household income (less than $10,000 to $39,999, $40,000 to $79,9999, $80,000 to $149,999, or $150,000 or more); highest level of education (high school or lower, postsecondary [trade or college certificate], or university [bachelor's degree or higher]); visible minority (yes or no); province or territory; presence of children younger than 18 at home (yes or no); essential worker (yes or no); frontline worker (yes or no); diagnosed with, or knew someone diagnosed with, COVID-19 (yes or no); and cycle of SCMH (fall 2020 or spring 2021). An essential worker was defined as an individual who works in a service, facility or activity that is necessary for the preservation of life, health, public safety or basic societal functions. A frontline worker was defined as an individual who has the potential to come in direct contact with COVID-19 by assisting those who have been diagnosed with the virus.

Table 1
Summary of fit statistics for latent profile models based on anxiety, depression and psychological distress scores

Model	AIC	BIC	SABIC	Entropy	BLRT *p*-value	Smallest profile (%)
1 profile	193,447	193,495	193,476	...	...	...
2 profiles	152,951	153,031	152,999	0.93	0.01	21.0
3 profiles	136,735	136,847	136,803	0.91	0.01	8.78
4 profiles	136,742	136,887	136,830	0.67	0.01	8.77
5 profiles	130,515	130,691	130,622	0.76	0.01	4.37

... not applicable
Notes: AIC = Akaike information criterion, BIC = Bayesian information criterion, SABIC = sample-adjusted BIC, BLRT = bootstrap likelihood ratio test.
Source: Survey on COVID-19 and Mental Health, 2020 and 2021.

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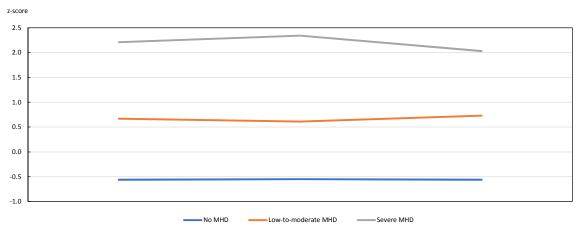
Figure 1
The three latent mental health profiles characterized by their patterns (mean z-scores) of anxiety, depression and psychological distress

z-score

No MHD — Low-to-moderate MHD — Severe MHD

Note: MHD = mental health difficulties.
Source: Survey on COVID-19 and Mental Health, 2020 and 2021.

Analysis

All analyses were conducted in RStudio 4.0.5. Missing values (less than 1%) were imputed using multiple imputation with fully conditional specification. Twenty-five imputed datasets were generated using the mice (multivariate imputation via chained equation) package.[21] The imputed datasets included all exposures, outcomes and covariates. All model results were pooled using Rubin's standard rules.[22] Latent profile analysis was conducted using the mclust package.[23] Latent profile analysis is a robust technique used to identify subtypes of homogeneous latent classes or subgroups within a large heterogeneous group.[24] Classes of psychological distress were generated using raw scores from the GAD-7 (anxiety), PHQ-9 (depression) and K10 (psychological distress). Various models with different class solutions (one to five) were tested. The optimal number of classes was determined by the Bayesian information criterion (BIC), Akaike information criterion and sample-adjusted BIC, whereby lower values indicate better model fit. The bootstrap likelihood ratio test (BLRT) was used to compare model fit between the number of classes. A significant result ($p < 0.05$) indicated that a k class model was superior to a k-1 class model. Entropy was also examined to evaluate accuracy of classification, whereby higher values represented greater accuracy. Entropy values above 0.80 are indicative of classification with minimal uncertainty. Finally, the percentage of individuals in the smallest class was considered a practical criterion, as classes with less than 5% of the sample may not be replicated in other samples. Logistic regression models were fit via the survey package[25] to examine associations between classes of psychological distress (exposures) and consequences related to the COVID-19 pandemic (outcomes). Estimates were weighted using Statistics Canada's sampling weights to account for survey design complexity and provide nationally representative findings. Standard errors, coefficients of variation and 95% confidence

intervals were estimated using bootstrap weights. Estimates with coefficients of variation between 16.6% and 33.3% indicated higher sampling error and should be used with caution. Estimates with a coefficient of variation greater than 33.3% were considered unreliable and therefore were not reported. Covariates (as described in the Methods section) were included in all models.

Results

Latent profile analysis: Table 1 presents fit indices of latent profile models with an increasing number of mental health profiles. Results showed that a three-profile solution was optimal. The entropy values for Profile 4 and Profile 5 did not meet the recommended threshold, and the smallest class in Profile 5 contained less than 5% of the sample. The selection of Profile 3 was further supported by the BLRT index, which showed that model fit significantly improved with each successive model. As shown in Figure 1, latent class profiles were defined by three levels of severity across dimensions; Profile 1 (65.70%) was labelled as "no mental health difficulties," Profile 2 (25.52%) was labelled as "low-to-moderate mental health difficulties" and Profile 3 (8.78%) was labelled as "severe mental health difficulties." On average, scores on one disorder were reflective of scores on the other two disorders. For example, levels of anxiety, depression and psychological distress were simultaneously low in Profile 1, moderate in Profile 2 and high in Profile 3. The proportion of individuals who screened positive for at least two of the three disorders was 99.80% in Profile 3, 33.35% in Profile 2 and 0% in Profile 1. Means and standard deviations across dimensions (anxiety, depression and psychological distress) by latent class profile are presented in Table 2.

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Table 2
Profiles of mental health difficulties by selected characteristics, household population aged 18 years or older, Canada, 2020 and 2021

		No MHD			Low-to-moderate MHD			Severe MHD		
			95% confidence interval			95% confidence interval			95% confidence interval	
	N[a]	Proportion or mean	From	To	Proportion or mean	From	To	Proportion or mean	From	To
Age										
18 to 34	3,785	20.91	20.02	21.80	36.88	35.10	38.66	48.82	45.24	52.40
35 to 64	12,334	50.48	49.69	51.27	49.69	47.96	51.43	44.03	40.61	47.45
65 and older	6,602	28.61	28.03	29.18	13.43	12.36	14.49	7.15	5.77	8.53
Gender										
Male	9,757	52.78	51.96	53.61	44.57	42.86	46.27	39.78	36.39	43.18
Female	12,935	47.15	46.33	47.97	55.24	53.53	56.95	59.31	55.87	62.75
Household income										
<$10,000 to $39,999	5,016	18.24	17.38	19.10	17.29	15.78	18.79	21.53	18.68	24.38
$40,000 to $79,999	6,924	28.94	27.86	30.02	26.80	24.99	28.61	30.51	27.16	33.86
$80,000 to $149,999	6,646	32.16	30.97	33.36	35.01	32.96	37.06	29.77	26.19	33.35
$150,000 and more	4,135	20.65	19.59	21.71	20.90	19.21	22.60	18.20	15.02	21.37
Highest level of education										
High school or lower	6,924	31.04	29.86	32.23	27.63	25.65	29.61	35.80	32.10	39.51
Postsecondary	8,137	33.90	32.72	35.07	32.42	30.55	34.29	34.51	31.01	38.02
University	7,660	35.06	33.85	36.27	39.95	37.90	42.00	29.68	26.38	32.99
Visible minority										
No	19,488	75.97	74.85	77.09	74.72	72.72	76.72	73.41	69.76	77.07
Yes	3,233	24.03	22.91	25.15	25.28	23.28	27.28	26.59	22.93	30.24
Parent of a child younger than 18										
No	17,188	73.92	72.92	74.92	70.11	68.46	71.76	73.30	70.25	76.34
Yes	5,533	26.08	25.08	27.08	29.89	28.24	31.54	26.70	23.66	29.75
Essential worker										
No	16,568	71.15	70.04	72.26	70.73	68.88	72.59	71.05	67.73	74.38
Yes	6,153	28.85	27.74	29.96	29.27	27.41	31.12	28.95	25.62	32.27
Frontline worker										
No	21,086	94.08	93.48	94.68	93.53	92.64	94.42	90.84	88.71	92.96
Yes	1,635	5.92	5.32	6.52	6.47	5.58	7.36	9.16	7.04	11.29
Diagnosed with, or knew someone with, COVID-19										
No	18,220	75.67	74.52	76.82	67.41	65.31	69.51	67.29	63.74	70.84
Yes	4,501	24.33	23.18	25.48	32.59	30.49	34.69	32.71	29.16	36.26
SCMH cycle										
Fall 2020	14,689	52.40	51.60	53.21	46.85	45.21	48.50	43.57	40.38	46.76
Spring 2021	8,032	47.60	46.79	48.40	53.15	51.50	54.79	56.43	53.24	59.62
Emotional distress										
No	14,253	79.39	78.40	80.39	35.16	33.22	37.10	13.86	11.45	16.27
Yes	8,468	20.61	19.61	21.60	64.84	62.90	66.78	86.14	83.73	88.55
Death of a family member, friend or colleague										
No	21,009	93.92	93.31	94.53	89.05	87.74	90.36	84.11	81.28	86.94
Yes	1,712	6.08	5.47	6.69	10.95	9.64	12.26	15.89	13.06	18.72
Difficulty meeting financial obligations or essential needs										
No	19,693	91.18	90.40	91.96	78.18	76.47	79.89	59.17	55.42	62.93
Yes	3,028	8.82	8.04	9.60	21.82	20.11	23.53	40.83	37.07	44.58
Loss of a job or income										
No	18,173	80.99	79.94	82.04	68.02	66.08	69.96	55.93	52.19	59.68
Yes	4,548	19.01	17.96	20.06	31.98	30.04	33.92	44.07	40.32	47.81
Feelings of loneliness or isolation										
No	13,578	74.61	73.53	75.70	35.14	33.19	37.09	18.69	15.98	21.41
Yes	9,143	25.39	24.30	26.47	64.86	62.91	66.81	81.31	78.59	84.02
Physical health problems										
No	17,023	87.03	86.17	87.89	55.07	53.03	57.11	31.11	27.53	34.68
Yes	5,698	12.97	12.11	13.83	44.93	42.89	46.97	68.89	65.32	72.47
Challenges in personal relationships with members of household										
No	18,850	90.90	90.15	91.64	65.82	63.85	67.79	48.54	44.72	52.36
Yes	3,871	9.10	8.36	9.85	34.18	32.21	36.15	51.46	47.64	55.28
Other impacts										
No	21,739	96.59	96.14	97.03	94.46	93.48	95.44	90.67	88.53	92.82
Yes	982	3.41	2.97	3.86	5.54	4.56	6.52	9.33	7.18	11.47
No impacts										
No	15,250	57.02	55.77	58.27	92.24	91.14	93.34	97.58	96.49	98.66
Yes	7,471	42.98	41.73	44.23	7.76	6.66	8.86	2.42 [E]	1.34	3.51
Suicidal ideation										
No	22,059	99.84	99.75	99.93	95.73	94.83	96.63	80.91	77.97	83.85
Yes	662	0.16 [E]	0.07	0.25	4.27	3.37	5.17	19.09	16.15	22.03
Exposures										
Anxiety (0 to 21)	22,721	1.42	1.37	1.46	7.12	6.99	7.25	14.57	14.23	14.91
Depression (0 to 27)	22,721	1.52	1.48	1.57	7.69	7.57	7.82	16.69	16.36	17.00
Psychological distress (0 to 40)	22,721	3.39	3.31	3.47	13.08	12.87	13.29	22.68	22.24	23.13

[a] Estimate is unweighted.
[E] use with caution
Notes: MHD = mental health difficulties.
Source: Survey on COVID-19 and Mental Health (SCMH), 2020 and 2021.

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Impact of COVID-19

The distribution of sociodemographic characteristics and impacts related to COVID-19 by mental health profile is shown in Table 2. Individuals in Profile 1 (no mental health difficulties) and Profile 2 (low-to-moderate mental health difficulties) were mostly between the ages of 35 to 64 years. Individuals in Profile 3 (severe mental health difficulties) were primarily younger (18 to 34 years and 35 to 64 years) and female. In general, varying levels of household income and education were equally distributed across all mental health profiles.

Results from the regression models are presented in tables 3 to 6. Compared with individuals in Profile 1, individuals in Profile 2 and Profile 3 were at increased odds of experiencing emotional distress (odds ratio for Profile 2 [$OR_{Profile\ 2}$] = 6.41,

$OR_{Profile\ 3}$ = 22.03); the death of a family member, friend or colleague ($OR_{Profile\ 2}$ = 1.74, $OR_{Profile\ 3}$ = 2.71); difficulty in meeting financial obligations or essential needs ($OR_{Profile\ 2}$ = 2.66, $OR_{Profile\ 3}$ = 6.11); the loss of a job or income ($OR_{Profile\ 2}$ = 1.69, $OR_{Profile\ 3}$ = 2.53); loneliness or isolation ($OR_{Profile\ 2}$ = 4.91, $OR_{Profile\ 3}$ = 11.21); physical health problems ($OR_{Profile\ 2}$ = 5.05, $OR_{Profile\ 3}$ = 13.97); challenges in personal relationships with members of their household ($OR_{Profile\ 2}$ = 4.81, $OR_{Profile\ 3}$ = 10.49); and other impacts related to the pandemic ($OR_{Profile\ 2}$ = 1.47, $OR_{Profile\ 3}$ = 2.46). Individuals in profiles 2 and 3 were less likely to report that they did not experience any negative impacts from the pandemic compared with individuals in Profile 1 ($OR_{Profile\ 2}$ = 0.13, $OR_{Profile\ 3}$ = 0.04). Individuals in Profile 2 and Profile 3 were at greater odds of having contemplated suicide since the beginning of the pandemic than those in Profile 1 ($OR_{Profile\ 2}$ = 24.30, $OR_{Profile\ 3}$ = 115.75).

Table 3

Adjusted odds ratios relating selected characteristics to emotional distress, the death of a family member, friend or colleague and difficulty in meeting financial obligations or needs, household population aged 18 years or older, Canada, 2020 and 2021

| Characteristics | Feelings of emotional distress | | | Death of a family member, friend or colleague | | | Difficulty meeting financial obligations or needs | | |
| | Odds ratio | 95% confidence interval | | Odds ratio | 95% confidence interval | | Odds ratio | 95% confidence interval | |
		From	To		From	To		From	To
Age									
18 to 34[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
35 to 64	0.94	0.83	1.08	1.36 *	1.08	1.71	0.86	0.74	1.01
65 and older	0.53 **	0.45	0.62	1.17	0.90	1.53	0.25 **	0.20	0.32
Gender[a]									
Male[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Female	1.48 **	1.43	1.76	1.09	0.93	1.29	0.79 *	0.69	0.91
Household income									
<$10,000 to $39,999[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
$40,000 to $79,999	0.87	0.75	1.02	0.99	0.78	1.25	0.65 **	0.55	0.78
$80,000 to $149,999	0.98	0.84	1.16	0.81	0.64	1.03	0.38 **	0.31	0.46
$150,000 and more	0.92	0.76	1.11	0.79	0.59	1.05	0.20 **	0.16	0.27
Highest level of education									
High school or lower[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Postsecondary	1.19 *	1.04	1.36	1.08	0.88	1.33	1.07	0.90	1.27
University	1.64 **	1.42	1.89	1.06	0.85	1.33	0.87	0.72	1.06
Visible minority									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	0.94	0.81	1.08	1.05	0.85	1.29	1.72 **	1.46	2.02
Parent of a child younger than 18									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.25 **	1.10	1.41	0.94	0.77	1.15	1.62 **	1.4	1.89
Essential worker									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	0.93	0.82	1.07	1.03	0.84	1.27	0.87	0.73	1.02
Frontline worker									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.08	0.86	1.36	1.18	0.85	1.64	1.11	0.84	1.47
Diagnosed with, or knew someone with, COVID-19									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.42 **	1.26	1.61	2.76 *	2.33	3.27	1.16	0.99	1.37
SCMH cycle									
Fall 2020[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Spring 2021	1.05	0.95	1.17	1.49 *	1.27	1.74	0.93	0.81	1.07
Mental health profiles									
No mental health difficulties (Profile 1)[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Low-to-moderate mental health difficulties (Profile 2)	6.41 **	5.74	7.16	1.74 *	1.45	2.08	2.66 **	2.28	3.11
Severe mental health difficulties (Profile 3)	22.03 **	17.63	27.52	2.71 *	2.1	3.51	6.11 **	5.00	7.48

[a] Gender-diverse individuals were included in the models but estimates were unreliable because of the small sample size in this category.

* significantly different from reference category (p < 0.05)

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

† reference group

Source: Survey on COVID-19 and Mental Health (SCMH), 2020 and 2021.

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Among individuals with severe mental health difficulties, one in five (19.09%) had contemplated suicide since the onset of the pandemic.

Overall, adults aged 65 and older (versus 18 to 34 years) were at decreased odds of experiencing emotional distress (OR = 0.53), difficulty in meeting financial obligations or essential needs (OR = 0.25), the loss of a job or income (OR = 0.16), feelings of loneliness or isolation (OR = 0.62), physical health problems (OR = 0.80), challenges in personal relationships with members of their household (OR = 0.64), other impacts (OR = 0.54) and suicidal ideation (OR = 0.32). Individuals from higher-income households (more than $80,000 versus less than $39,999) were less likely to report difficulty in meeting financial obligations or essential needs, the loss of a job or income and feelings of loneliness or isolation and were more likely to experience challenges in relationships with members

of their household and to report no impacts from COVID-19. Individuals who identified as a visible minority (versus non-visible minority) were at greater odds of reporting difficulty in meeting financial obligations or essential needs (OR = 1.72) and the loss of a job or income (OR = 1.28) and were at decreased odds of experiencing loneliness or isolation (OR = 0.71) and suicidal ideation (OR = 0.46). Parents (versus non-parents) were more likely to experience emotional distress (OR = 1.25), difficulty in meeting financial obligations or essential needs (OR = 1.62) and challenges in relationships with members of their household (OR = 2.08) and were less likely to experience suicidal ideation (OR = 0.71). Essential workers (versus non-essential workers) and frontline workers (versus non-frontline workers) were at decreased odds of experiencing the loss of a job or income (OR = 0.68 and OR = 0.78, respectively). Compared with their counterparts, individuals who were diagnosed with, or knew someone diagnosed with, COVID-19

Table 4

Adjusted odds ratios relating selected characteristics to loss of a job or income, feelings of loneliness or isolation, and physical health problems, household population aged 18 years or older, Canada, 2020 and 2021

Characteristics	Loss of a job or income			Feelings of loneliness or isolation			Physical health problems		
	Odds ratio	95% confidence interval		Odds ratio	95% confidence interval		Odds ratio	95% confidence interval	
		From	To		From	To		From	To
Age									
18 to 34[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
35 to 64	0.78 **	0.69	0.89	0.64 **	0.57	0.73	1.12	0.97	1.29
65 and older	0.16 **	0.13	0.19	0.62 **	0.53	0.72	0.80 *	0.67	0.96
Gender[a]									
Male[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Female	0.77 **	0.69	0.86	1.31 **	1.19	1.44	1.31 **	1.17	1.46
Household income									
<$10,000 to $39,999[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
$40,000 to $79,999	0.87	0.74	1.02	0.93	0.80	1.07	1.06	0.91	1.25
$80,000 to $149,999	0.65 **	0.55	0.77	0.85 *	0.73	0.99	1.10	0.93	1.31
$150,000 and more	0.50 **	0.41	0.61	0.79 *	0.66	0.94	1.06	0.87	1.29
Highest level of education									
High school or lower[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Postsecondary	1.21 *	1.06	1.39	1.12	0.99	1.26	1.13	0.98	1.31
University	0.91	0.78	1.06	1.45 **	1.27	1.66	1.37 **	1.17	1.59
Visible minority									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.28 **	1.12	1.47	0.71 **	0.62	0.82	0.99	0.85	1.15
Parent of a child younger than 18									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.10	0.98	1.24	1.06	0.95	1.20	1.00	0.88	1.14
Essential worker									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	0.68 **	0.59	0.78	0.77 **	0.68	0.88	0.92	0.79	1.06
Frontline worker									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	0.78 *	0.62	1.00	1.07	0.86	1.34	1.04	0.81	1.33
Diagnosed with, or knew someone with, COVID-19									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.28 **	1.13	1.45	1.21 *	1.07	1.35	1.40 **	1.23	1.58
SCMH cycle									
Fall 2020[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Spring 2021	0.90	0.80	1.01	1.38 **	1.26	1.52	1.30 **	1.17	1.45
Mental health profiles									
No mental health difficulties (Profile 1)[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Low-to-moderate mental health difficulties (Profile 2)	1.69 **	1.49	1.90	4.91 **	4.40	5.47	5.05 **	4.49	5.68
Severe mental health difficulties (Profile 3)	2.53 **	2.12	3.03	11.21 **	9.23	13.61	13.97 **	11.61	16.82

[a] Gender-diverse individuals were included in the models but estimates were unreliable because of the small sample size in this category.

* significantly different from reference category (p < 0.05)

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

[†] reference group

Source: Survey on COVID-19 and Mental Health (SCMH), 2020 and 2021.

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were at increased odds of experiencing emotional distress (OR = 1.42); the death of a family member, friend or colleague (OR = 2.76); the loss of a job or income (OR = 1.28); feelings of loneliness or isolation (OR = 1.21); physical health problems (OR = 1.40); and challenges in personal relationships with household members (OR = 1.20), and were at decreased odds of suicidal ideation (OR = 0.66). In the spring of 2021 (versus the fall of 2020), individuals were at greater odds of experiencing the death of a family member, friend or colleague (OR = 1.49), feelings of loneliness or isolation (OR = 1.38); physical health problems (OR = 1.30); challenges in personal relationships with household members (OR = 1.26); and suicidal ideation (OR = 1.66).

Discussion

The objective of this cross-sectional study with approximately 23,000 Canadian adults was to examine mental health profiles and their associations with negative impacts and suicidal ideation during the COVID-19 pandemic. Latent profile analysis indicated that a three-profile solution best fit the data. Individuals were classified into three conceptually meaningful latent profiles based on dimensions of anxiety, depression and psychological distress: Profile 1 was labelled as "no mental health difficulties," Profile 2 was labelled as "low-to-moderate mental health difficulties" and Profile 3 was labelled as "severe mental health difficulties." Individuals who were most vulnerable to negative impacts and suicidal ideation during the pandemic included those who experienced severe levels of anxiety, depression and psychological distress.

Table 5
Adjusted odds ratios relating selected characteristics to challenges in personal relationships with household members, other impacts and no impacts, household population aged 18 years or older, Canada, 2020 and 2021

Characteristics	Challenges in personal relationships with household members			Other impacts from COVID-19			No impacts from COVID-19		
	Odds ratio	95% confidence interval		Odds ratio	95% confidence interval		Odds ratio	95% confidence interval	
		From	To		From	To		From	To
Age									
18 to 34[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
35 to 64	0.84 *	0.72	0.97	0.90	0.71	1.14	1.28 *	1.09	1.50
65 and older	0.64 *	0.53	0.79	0.54 *	0.36	0.80	2.31 **	1.94	2.76
Gender[a]									
Male[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Female	1.04	0.92	1.18	1.02	0.83	1.26	0.77 **	0.70	0.85
Household income									
<$10,000 to $39,999[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
$40,000 to $79,999	1.23 *	1.01	1.51	1.00	0.73	1.38	1.10	0.95	1.28
$80,000 to $149,999	1.47 **	1.21	1.80	0.95	0.69	1.32	1.21 *	1.03	1.42
$150,000 and more	1.53 **	1.24	1.90	0.76	0.53	1.08	1.49 **	1.24	1.79
Highest level of education									
High school or lower[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Postsecondary	1.22 *	1.04	1.44	1.11	0.84	1.46	0.79 **	0.70	0.90
University	1.34 *	1.13	1.58	1.35 *	1.02	1.78	0.68 **	0.59	0.78
Visible minority									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	0.90	0.76	1.05	0.89	0.67	1.18	0.94	0.82	1.09
Parent of a child younger than 18									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	2.08 *	1.82	2.38	0.90	0.72	1.12	0.72 **	0.63	0.82
Essential worker									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	0.80 *	0.69	0.93	0.99	0.76	1.30	1.25 *	1.09	1.43
Frontline worker									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.20	0.94	1.54	1.18	0.80	1.73	0.96	0.76	1.23
Diagnosed with, or knew someone with, COVID-19									
No[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yes	1.20 *	1.04	1.38	1.24	0.98	1.56	0.58 **	0.51	0.66
SCMH cycle									
Fall 2020[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Spring 2021	1.26 **	1.12	1.43	1.05	0.86	1.29	0.83 **	0.74	0.92
Mental health profiles									
No mental health difficulties (Profile 1)[†]	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Low-to-moderate mental health difficulties (Profile 2)	4.81 **	4.22	5.47	1.47 *	1.16	1.86	0.13 **	0.11	0.16
Severe mental health difficulties (Profile 3)	10.40 **	8.70	12.64	2.46 **	1.83	3.31	0.04 **	0.03	0.07

[a] Gender-diverse individuals were included in the models but estimates were unreliable because of the small sample size in this category.

* significantly different from reference category (p < 0.05)

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

[†] reference group

Source: Survey on COVID-19 and Mental Health (SCMH), 2020 and 2021.

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Profiles of mental health and their association with negative impacts and suicidal ideation during the COVID-19 pandemic: A Canadian perspective

The identification of distinct latent profiles lends important insights related to the shared symptom patterns of anxiety, depression and psychological distress among Canadian adults. Results showed that, on average, scores on one disorder were reflective of scores on the other two disorders. For example, levels of anxiety, depression and psychological distress were simultaneously low in Profile 1, moderate in Profile 2 and high in Profile 3. Furthermore, mental health difficulties co-occurred in Profile 2 and Profile 3 to varying extents. The proportion of individuals who screened positive for at least two of the three disorders was 33.35% in Profile 2 and 99.80% in Profile 3. These findings are consistent with the accumulated evidence indicating that many mental disorders commonly coexist and that an increased risk of comorbidity of mental disorders is the norm, not the exception.[26-29] Comorbidity of mental disorders amplifies an individual's vulnerability. There is robust evidence showing that individuals with multiple mental disorders, when compared with those with a single disorder, are at greater risk of morbidity and of poor acute and long-term outcomes,[30-32] such as increased rates of hospitalization, interpersonal difficulties and absenteeism from work or school. Finally, this study is among the first, to our knowledge, to identify different configurations of mental health profiles using nationally representative data. These identified profiles can contribute, theoretically and methodologically, to further research on mental health among Canadian adults.

Compared with those in Profile 1, individuals in Profile 2 and Profile 3 were at greater odds of experiencing all eight negative impacts from the pandemic. These impacts were emotional distress; the death of a family member, friend or colleague; difficulty in meeting financial obligations or essential needs; the loss of a job or income; feelings of loneliness or isolation; physical health problems; challenges in personal relationships

Table 6

Adjusted odds ratios relating selected characteristics to suicide ideation since the beginning of the COVID-19 pandemic, household population aged 18 years or older, Canada, 2020 and 2021

Characteristics	Odds ratio	95% confidence interval	
		From	To
Age			
18 to 34[†]	1.00	1.00	1.00
35 to 64	0.73 *	0.54	0.98
65 and older	0.32 **	0.20	0.52
Gender[a]			
Male[†]	1.00	1.00	1.00
Female	0.77	0.58	1.03
Household income			
<$10,000 to $39,999[†]	1.00	1.00	1.00
$40,000 to $79,999	0.80	0.54	1.18
$80,000 to $149,999	0.89	0.58	1.36
$150,000 and more	0.84	0.50	1.40
Highest level of education			
High school or lower[†]	1.00	1.00	1.00
Postsecondary	0.87	0.61	1.24
University	0.66 *	0.46	0.97
Visible minority			
No[†]	1.00	1.00	1.00
Yes	0.46 *	0.29	0.72
Parent of a child younger than 18			
No[†]	1.00	1.00	1.00
Yes	0.71 *	0.52	0.96
Essential worker			
No[†]	1.00	1.00	1.00
Yes	0.81	0.56	1.19
Frontline worker			
No[†]	1.00	1.00	1.00
Yes	1.17	0.69	2.00
Diagnosed with, or knew someone with, COVID-19			
No[†]	1.00	1.00	1.00
Yes	0.66 *	0.48	0.93
SCMH cycle			
Fall 2020[†]	1.00	1.00	1.00
Spring 2021	1.66 **	1.25	2.20
Mental health profiles			
No mental health difficulties[†]	1.00	1.00	1.00
Low-to-moderate mental health difficulties	24.30 **	13.43	43.97
Severe mental health difficulties	115.75 **	63.98	209.39

[a] Gender-diverse individuals were included in the models but estimates were unreliable because of the small sample size in this category.

* significantly different from reference category (p < 0.05)

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

[†] reference group

Source: Survey on COVID-19 and Mental Health (SCMH), 2020 and 2021.

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with household members; and other impacts. Although these impacts have already been identified as a concern among people with severe mental health difficulties, they have likely been exacerbated during the COVID-19 pandemic. For example, severe mental illness is associated with obesity,[33] physical inactivity[34] and poor health conditions (e.g., diabetes or cardiovascular disease).[35] These risk factors place individuals with severe mental illness at a higher risk of COVID-19 infection and worsening physical and mental health from COVID-19-related outcomes.[36,37] Furthermore, loneliness has been a concern for people with mental health illnesses prior to the pandemic.[38,39] Heron et al.[40] found that approximately one in three people with severe mental illness reported feeling lonely during the pandemic, which is higher than rates identified in the general population during the pandemic. Many individuals in Heron et al.'s sample were limited users or non-users of the Internet, driven by a lack of skills or interest.[41] Thus, changes in the frequency of social contact and support because of technology barriers and public health measures (e.g., "stay-at-home" mandates) likely made it challenging for people with severe mental health difficulties to experience social connectivity.

One concerning finding was that individuals with low-to-moderate (Profile 2) or severe (Profile 3) mental health difficulties had greater odds of suicidal ideation compared with those experiencing no mental health difficulties (Profile 1; OR = 24.30 and OR = 115.75, respectively). This finding is consistent with previous research showing that co-occurring symptoms of anxiety, depression and other mental disorders are associated with an increased risk of suicidal ideation.[42-44] Mental health professionals need to be especially vigilant in monitoring symptoms of suicidal ideation among those suffering from severe mental health difficulties. Delivering treatments for suicidal ideation via telehealth may reduce COVID-19-related mental health consequences.[45] Furthermore, public health treatment strategies aimed at reducing suicidal behaviour should prioritize those experiencing multiple disorders. Findings in the current study also provide a strong argument for the adoption of analytical approaches that can uncover the nuanced impact of the pandemic on the lives of those with severe mental health difficulties. Using data from the 2020 SCMH, Liu et al.[46] found that the prevalence of suicidal ideation at the beginning of the pandemic was 2.44%. This did not significantly differ from 2019 (2.73%). The current study, using latent profile analysis to identify mental health profiles, revealed that 19.09% of individuals in Profile 3, 4.27% in Profile 2 and 0.16% in Profile 1 experienced suicidal ideation.

Our study showed that various individual characteristics were associated with negative impacts and suicidal ideation during the pandemic, and these findings are largely in line with previous reports.[3,47-49] The parents of children younger than 18 exhibited a greater likelihood of experiencing negative impacts. Parents of young children have faced enormous stress during the pandemic, dealing with work and financial stressors, disruptions to school or childcare, seclusion within their household and social isolation. These stressors likely have spill-over effects whereby parental distress leads to reductions in parenting quality, resulting in poorer communication (increased conflicts, use of harsh words and yelling or shouting)[47] and increases in children's internalizing and externalizing behaviour.[50] Taken together, targeted interventions, initiatives and partnerships are needed to support and promote the well-being of those in vulnerable groups.

Strengths and limitations

Strengths of our study include the large, representative sample and the inclusion of several covariates in the logistic regression models. Applying multiple imputation to treat missing values—rather than traditional listwise deletion—helped preserve power, increase precision and reduce bias. Furthermore, the use of latent profile analysis to identify varying mental health symptom patterns extends previous research examining the presence or absence of disorders. Besides strengths, the present study has limitations. First, the impact of the pandemic on gender-diverse individuals was not explored. Even though gender-diverse individuals were included in all models, it was not possible to release reliable estimates given the small sample size. Second, the cross-sectional nature of the SCMH data precludes conclusions about causality. Third, marital status was not assessed in both cycles of the SCMH and therefore was not included in our models. Being married, as opposed to widowed or divorced, has been associated with better mental well-being[51,52] and therefore may have served as a protective factor.

Conclusions

This study is among the first to investigate shared symptom patterns of anxiety, depression and psychological distress among Canadian adults during the COVID-19 pandemic. The majority of the sample was classified as experiencing no mental health difficulties (65.70%; Profile 1), followed by low-to-moderate mental health difficulties (25.52%; Profile 2) and severe mental health difficulties (8.78%; Profile 3). Individuals with low-to-moderate or severe mental health difficulties were at greater odds of suicidal ideation compared with those experiencing no mental health difficulties. The current research provides evidence that individuals with mental health difficulties have been considerably impacted by the pandemic and that individuals with severe mental health difficulties have been hit the hardest.

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