Primary Research

Factors impacting the mental health of Canadian university students during the COVID-19 pandemic

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Abstract

Since the outbreak of the novel coronavirus (SARS-CoV-2) in December 2019, public health agencies have urged countries around the world to put in place quarantine and social distancing measures to prevent the spread of the virus. In this study, we explored the impact of these measures on the mental health of Canadian university students. We conducted an online survey of 638 students at the University of Alberta and asked them to answer questions about their mental health (depression measured using the Major Depression Inventory and anxiety measured using the 7-item Generalized Anxiety Disorder), online/physical contact, online learning, COVID-19 knowledge and first-hand experience, and other demographic factors that may be associated with their mental health during the first six months of the pandemic period (March – August 2020). We found that anxiety and depression were not significantly correlated with demographic factors or average amounts of online/physical contact. However, students tended to have less symptoms of anxiety and depression if they preferred taking online course, believed they could achieve their goals, and were satisfied with university/government performance. In contrast, they had greater symptoms of anxiety and depression if they felt that the pandemic resulted in greater changes to their daily lives or they felt at risk of contracting the virus. Our results provide insight into the experience of university students during the first wave of the pandemic. We additionally discuss the implications of our research on ways to mitigate mental health concerns faced by students.

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Introduction

Since the outbreak of the novel coronavirus (SARS-CoV-2) in December 2019, public health agencies, such as the World Health Organization (WHO), have suggested that countries put in place quarantine and social distancing measures to prevent the virus' spread. On March 11, 2020, the WHO declared COVID-19 to be a pandemic and as a result, more than 160 countries around the world implemented nationwide closures. In Canada, the rapid spread of SARS-CoV-2 forced the government to take drastic measures to combat potential contagion among the population. The strict public health measures put in place in Canada have led to unprecedented disruptions and changes in people's daily activities.

According to Hawryluck et al. (2004), in previous epidemics, such as the SARS outbreak in 2003 or the Ebola outbreak in 2014, the impact on the general public was more limited: public health measures were put in place only for people who were infected or those who had been exposed to the viruses.[1] In contrast, during the current pandemic, the Canadian government recommended that people quarantine and practice social distancing regardless of whether they had been exposed to the virus.[2] People were encouraged to stay at home and to limit travel to other countries, leading to the closure of many airports for international travel. In addition, many aspects of people's professional and personal lives moved online. Companies changed their policies to allow staff to work remotely from home. Schools and universities cancelled in person classes, forcing these institutions to develop new alternatives, such as online teaching and learning. Families and friends met using online social media platforms. The impact of these changes on mental health is however an open question. Our exploratory study examined university students' mental health during the first six months (March – August 2020) of the COVID-19 pandemic period.

In the introduction, we will review several key background issues, including the effects of periods of quarantine on mental health, the mental health of university students, and the effects of online interactions and online courses on mental health.

Effects of periods of quarantine on mental health

General population

Brooks et al. (2020) conducted a systematic review about the mental health of people who had been quarantined during outbreaks of major contagious viruses (SARS and Ebola) during the past two decades and found that psychological distress was common.[3] From the 24 studies reviewed, several factors were related to poorer mental health during periods of quarantine:

- Increased duration of quarantine: longer periods of times in confinement were linked to poorer mental health, especially post-traumatic stress disorder (PTSD), avoidance behaviours, and anger;
- Reduced physical and social contact, and loss of usual routine resulted in increased frustration and boredom due to confinement;
- Inadequate information and guidelines from public health authorities led to the confusion about the purpose of quarantine and the severity of the virus, which were predictors of fear and PTSD symptoms among participants.

The results of prior research may not apply to the current situation with COVID-19 because in those outbreaks, quarantine was only recommended for people who were infected with the virus or had been exposed to the virus.[1] Hewings-Martin (2020) therefore argues that the impact of the COVID-19 pandemic on the general population may be fundamentally different than the impacts of previous epidemics, such as during SARS.[4]

Two recent studies used online surveys to explore the effects of quarantine on mental health during the COVID-19 pandemic. One study was conducted in China between the end of January - early February 2020 and the other study was conducted in several countries between April - May 2020.[5,6] Wang et al. (2020) studied the psychological impact of the initial stages of the outbreak of COVID-19.[5] The study found that 16.5% and 28.8% of respondents displayed moderate to severe symptoms of depression and anxiety, respectively. These results illustrate that even before widespread lockdowns, a substantial proportion of the population was already experiencing psychological issues.

In the study conducted by Shah et al. (2020), the authors compared their results with the results of Wang et al. (2020) to explore whether longer periods of quarantine, social isolation, and disruption of daily activities would lead to increased issues with mental health.[5,6] The study showed greater rates of psychological distress: 58.6% and approximately 50% of respondents displayed mild to severe depressive and anxiety symptoms, respectively. Though it is difficult to directly compare the results of the two studies because they were conducted in different countries (e.g., Canada, Pakistan, USA vs China), the findings suggest that the longer that people remain in quarantine, the more susceptible they become to problems with mental health.

University students

University students, in general, may be particularly susceptible to issues with mental health during quarantine and social isolation because they are already more likely to have mental health issues than the general population.[7] In recent years, the number of university students with severe mental illness has increased and one in five students suffers from one or more mental disorders worldwide, such as anxiety, depression, or obsessive-compulsive disorder.[7,8] Moreover, mental health concerns are particularly prevalent among international students.[9,10] According to Othman et al. (2019), approximately 40% and 24% of students exhibited moderate to severe depression and anxiety, respectively.[11] While the causes of these mental health issues are not clear, depression in students has been associated with factors such as GPA, socioeconomic status (e.g., expenses), and family situations.

In the context of COVID-19, there is preliminary evidence from many countries around the world that the pandemic has increased anxiety, depression, and other mental health issues among university and college students. Chang et al. (2020), Cao et al. (2020), and Kaparounaki et al. (2020) conducted online surveys with standardized tests and questions in China and Greece to assess the impact of the epidemic on the mental health of university students.[12-14] In China, 23-25% of participants experienced anxiety and 21% of students reported depressive symptoms.[12,13] In Greece, the majority of students reported an increase in anxiety (73%) and depression (61%), suggesting concerning levels of mental health issues among this group.[14] Students residing in the UK and Canada also appeared to be at higher risk of depression than those in other countries.[6]

Effects of online contact on mental health

Social media and online interactions

The impact of social networking sites, such as Facebook, and online interactions in general on mental health is controversial. On one hand, social media may be detrimental to mental health. Hunt et al. (2018) conducted an experimental study where they found that limiting social media usage had a significant impact on reducing loneliness and depressive symptoms.[15] Pantic (2014) also found that social networking sites were associated with low self-esteem and symptoms of depression.[16] According to the study, Pantic (2014) explained that social networking sites may lead to biased impressions of the physical and personality traits of other users, which may lead people who already have depressive predispositions to believe that online friends are happier than they actually are.[16] These studies, however, were conducted before the pandemic when people could potentially substitute in-person contact for online contact.

On the other hand, online contact may decrease the risk of developing mental health issues during COVID-19 and the associated quarantine period. Recent studies support this claim by showing that the use of information and communication technologies could decrease the risks of social isolation by allowing people to receive social support and protect their mental health.[3,17,18] It appears that having a phone and connecting with others through social media may be a necessity, not a luxury.[3] Online contact may thus be a way for people to engage with others and their loved ones using social networks and it may act as a buffer against the negative impact of quarantine and social distancing restrictions.

Online courses

In addition to everyday online interactions, university students, in specific, have faced the challenge of taking their classes online. Prior research has shown that e-learning or online courses can be a stressful experience for some students.[19] For example, some students may not have adequate computer literacy skill or have to work with untrained instructors, leading to additional mental health distress.[20] In contrast, it may also be the case that students are helped by continuing to engage in their normal routines. For instance, Agnew et al. (2019) explained that after the fall vacation, some students experience poor mental health due to a disruption in their routines.[21]

The ultimate impact of online courses may however depend on whether the students are satisfied by their learning experience. In a study conducted in Lebanon by Fawaz and Samaha (2020),

they found that the sudden shift transition to e-learning during the pandemic period was met with dissatisfaction by students.[22] Moreover, there was a significant association between the students' level of satisfaction and the prevalence of psychological distress.

Current study

The current study explores the mental health of university students at a large Canadian institution during the first six months of the COVID-19 pandemic. We had three main hypotheses about the factors that may impact the mental health of university students.

- Hypothesis 1: Increased online contact with other people would be associated with better mental health of university students.
- Hypothesis 2: Increased satisfaction with online learning (e.g., satisfaction with the university, preference for online courses) would be associated with better mental health in students.
- Hypothesis 3: Greater degrees of change in a student's daily routine would be associated with poorer mental health.

To address these hypotheses, we asked participants to complete an online questionnaire about their mental health, demographic information, online/physical contact, online learning, university and government satisfaction, concern about their mental health, life changes, and pandemic experience.

Method

Participants

638 university students (504 female, 120 male, 13 non-binary/genderqueer, 1 prefer not to say; Mean age = 22.90 years, excluding 8 responses of 41+ years; range = 18-41+ years) took part in the study. Of the participants who reported their ethnicity, 53% were White or Euro American, 15% were East Asian, 12% were South Asian, 7% were other, 4% were Black, Afro-Caribbean, or African American, 4% were Hispanic or Latino, 3% were Middle Eastern, and 2% were Indigenous. 88% were Canadian citizens and 12% were not Canadian citizens. The students were current University of Alberta students and had registered for the Fall 2020 semester.

Study design and procedure

Participants completed an online questionnaire with five sections. The questionnaire was available in English and French (3% of participants completed the questionnaire in French and the other 97% completed the questionnaire in English). The study was carried out from July 13 to August 15, 2020. We contacted all faculties and departments at the University of Alberta and asked them to forward our recruitment flyer to their students through their email list serves, e-newsletters, and social media accounts. The survey took 10-15 minutes to complete. After the survey was complete, participants could enter a draw to win one of three $20 gift cards.

Materials

We created a questionnaire with five sections (see Appendix for complete questionnaire). The order of presentation of the five sections was as follows:

Demographic information

Participants reported their gender, age, ethnicity, and citizenship. We additionally asked whether they were working (and if so, whether they were essential services workers). We collected data on

Table 1. Frequency and percentage of demographic variables

Variable	Frequency	Percentage
Are they working?		
Yes (working in an essential service)	368 (128)	58 (34)
No	270	42
Where do they live?		
On campus	19	3
In Edmonton	485	76
In Canada	116	18
Outside Canada	10	2
No response	8	1
Who do they live with?		
Family member(s)	407	64
Romantic partner	92	14
Roommate(s)	77	12
Alone	54	9
Other/ no response	8	1
Current academic year		
1st year	77	12
2nd year	199	31
3rd year	149	23
4th year	120	19
5th+ year/graduate studies	93	15
Faculty		
Science	90	14
Agricultural Life and Environmental Sciences	87	14
Arts	79	12
Nursing	58	9
Public Health, School of Rehabilitation Medicine	57	9
Graduate Studies and Research	54	8
Engineering	38	6
Education	37	6
Law	34	5
Saint-Jean	35	5
Kinesiology, Sport, and Recreation	18	3
Medicine & Dentistry	17	3
Pharmacy and Pharmaceutical Sciences	16	3
Alberta School of Business	11	2
Augustana	4	1
Native Studies	3	0

where they lived and whether they lived alone or with other people. Finally, we asked about their current academic year, faculty, and which University of Alberta campus they attended. See Table 1 for a summary of the demographic variables.

Online and physical contact with other people

We asked participants four questions about how often they contacted family, friends, and therapist/spiritual figures online each week since the beginning of quarantine (mid-March 2020). We also asked the same four question about in-person contact. Participants responded using the following scale: not applicable, 1-2, 3-4, 5-6, 7+ times/week. We coded responses on this scale in the following way:

not applicable = 0, 1-2 = 2, 3-4 = 4, 5-6 = 6, 7+ = 8. For online and physical contact, we aggregated the scores on the four questions out of total score of 25 (see Table 2). In addition, we asked two questions about the average number of hours per day they spent on digital devices and one question about the average number of hours per day they spent away from digital devices. Participants responded using the following scale: not applicable, 1-2, 3-4, 5-6, 7+ hours/day. Finally, we asked the students to rate their agreement about whether "online contact with others is important during this period of quarantine and self-isolation" on a 5-point scale from "strongly disagree" (1) to "strongly agree" (5).

Online course experience

We asked participants whether they were currently taking online courses or whether they had previously taken online courses. We additionally asked them to rate their agreement to four statements related to online learning (e.g., online courses are effective) using a 5-point scale from "strongly disagree" (1) to "strongly agree" (5). We calculated an aggregate score out of 20 on these questions (see Table 3).

COVID-19 knowledge and experience

Participants completed a series of questions about the virus and their experiences during the pandemic period. First, participants were asked to rate their knowledge about COVID-19 symptoms and transmission on a scale from 1 (no knowledge) to 10 (extremely knowledgeable). Then, they were provided with a list of options about possible modes of transmission and symptoms of COVID-19 (e.g., blurry vision) and required to answer "yes", "no", "maybe", or "I don't know". We coded responses on this scale in the following way, "no" = 0, "maybe" = 0.5, "don't know" = 0.5, "yes" = 1. Participants were then asked to answer three "yes", "no", "I don't know", or "maybe" questions about the following factors related to their experience with the virus: had they contacted someone who has COVID-19 symptoms, felt at risk of contracting the virus, or do they have a family member who is at high risk of contracting the virus. We calculated an aggregate score of these three questions out of 3 (see Table 4). We additionally asked two questions about whether the participants had COVID-19 symptoms or had contracted COVID-19. Participants were also asked to answer 2 questions about how satisfied they were by the performance of the provincial government and the university on a 5-point scale from "very unsatisfied" (1) and "very satisfied" (5). Then, they were asked how frequently they read updates and news about COVID-19. We also asked them to rate their agreement with the statement, "the pandemic has changed my life from what it was before", on a 5-point scale from "strongly disagree" (1) to "strongly agree" (5). Finally, we asked whether they were concerned about their mental health using "yes", "no", or "a bit" as response options.

Inventories of symptoms of anxiety and depression

To assess symptoms of anxiety, we asked participants to complete the 7-item Generalized Anxiety Disorder (GAD-7) which is a screening tool to assess anxiety symptoms in research settings.[23] The range of scores on this scale is between 0-21, with a score between 6-10 indicating moderate anxiety. We assessed symptoms of depression using the 12-item Major Depression Inventory.[24,25] The range of scores on this scale is between 0-50, with a score of 25-29 indicating moderate depression.

Table 2. Number of times per week that participants met with the following people either online or in person

	Mean	Standard deviation
Online contact		
Family member	3.43	3.97
Friend	7.50	1.93
Friend/family member when feeling uncomfortable, depressed or stressed	1.47	3.10
Therapist/spiritual figure	0.19	0.40
Total score /25	11.09	5.31
In-person contact		
Family member	1.87	3.35
Friend	0.39	1.45
Friend/family member when feeling uncomfortable, depressed or stressed	0.16	0.94
Therapist/spiritual figure	0.01	0.17
Total score /25	5.21	4.10

Note: For the questions about the therapist/spiritual figure, we asked a "yes"/"no" question about whether participants met with someone ("yes" = 1, "no" = 0).

Table 3. Ratings of online course experience

	Mean	Standard deviation
Online courses are effective	3.11	1.03
Online courses motivate me to pursue my future academic goals	2.59	1.14
I prefer online courses for the next terms (Fall 2020)	2.55	1.39
Total score /15	8.26	3.05

Table 4. Evaluation of risk related to contracting the virus

	Mean	Standard deviation
Do you feel at risk of contracting the virus?	0.63	0.87
Is any member of your family at high risk of contracting the virus?	0.54	0.40
Have you physically contacted someone presenting COVID-19 symptoms?	0.08	0.48
Total score /3	1.25	0.74

Table 5. Regression models predicting anxiety and depressive symptoms

Model for GAD-7			
	B	Std. Error	p-value
(Constant)	3.45	1.51	.02
Preference for online courses	0.06	0.08	.44
Achieve goals	-0.44	0.22	.049
Changes in life	0.53	0.26	.04
Concern about mental health	7.55	0.59	< .001
Perceived risk of contracting the virus	0.46	0.27	.08
Satisfaction with the government	-0.38	0.17	.03
Satisfaction with the university	-0.16	0.21	.46

Model for MDI			
	B	Std. Error	p-value
(Constant)	12.68	3.02	< .001
Preference for online courses	-0.07	0.16	.68
Achieve goals	-1.61	0.44	< .001
Changes in life	0.90	0.52	.08
Concern about mental health	17.08	1.19	< .001
Perceived risk of contracting the virus	0.56	0.53	.29
Satisfaction with the government	-0.82	0.35	.02
Satisfaction with the university	-0.24	0.43	.57

Ethics

The authors of this study declare that the protocol of this study has been approved by the Research Ethics Board at the University of Alberta (Pro00101234). The authors of this study completed the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Course on Research Ethics (TCPS 2: CORE). We also provided the contact information of the counselling and clinical services of the University of Alberta if participants had concerns or further questions about their mental health.

Results

We conducted correlational analyses to observe the relationship between depression and anxiety (as measured by the MDI and GAD-7) and several factors that were hypothesized to be related to changes in mental health. We calculated Pearson's correlation (r) for our variables and we used dummy coding for our categorical variables, such as gender. We discuss only the significant correlations between the predictor variables and mental health.

We first examined whether there was a correlation between anxiety (62% of the sample exhibited mild to severe anxiety) and depression (40% exhibited mild to severe depression). We observed a strong positive correlation, r (636) = .75, $p < .001$, between scores on the GAD-7 and the MDI, consistent with prior literature.[26,27] Despite the significant overlap between scores on these two measures of mental health, we will examine the correlations between the factors and anxiety and depression separately in subsequent analyses.

Demographic information

We found no significant correlations between demographic information and mental health as measured on the MDI and the GAD-7, all $ps > .05$.

Online and physical contact with other people

Even though our sample judged that online contact during the pandemic was important ($M = 4.4$, $SD = 0.81$), we did not find support for our first hypothesis: We observed no significant correlations between online contact and scores on the GAD-7 and the MDI, $ps > .05$. We additionally did not observe significant correlations between physical contact and mental health on the GAD-7 and the MDI, $ps > .05$.

Online course experience

Overall, 30% of participants were taking online courses in July/August 2020 and 45% had taken online courses before the Winter 2020 term. Consistent with our second hypothesis, we found a weak negative correlation between mental health and the preferability of online courses both for the GAD-7 and for the MDI (r (636) = -.186, $p < .001$ and r (636) = -.270, $p < .001$, respectively), demonstrating that students who preferred online courses were less likely to show psychological distress symptoms. We also found a moderate negative correlation between mental health and students' belief that they could still achieve their goals ($M = 3.74$, $SD = 1.05$) for scores on the GAD-7 and the MDI, r (636) = -.227, $p < .001$ and r (636) = -.316, $p < .001$, respectively.

COVID-19 knowledge and experience

Consistent with our third hypothesis, we observed that students who more strongly endorsed the statement that the pandemic had changed their lives ($M = 4.34$, $SD = 0.74$) had more negative mental health symptoms. We observed a weak positive correlation between changes in their daily lives and scores on the GAD-7, r (636) = .208, $p < .001$, and scores on the MDI, r (636) = .212, $p < .001$. Further, we observed that many students (58%) had at least some concern about their mental health, leading to a moderate positive correlation between concerns about mental health and scores on the GAD-7 and MDI, r (636) = .533, $p < .001$; and r (636) = .585, $p < .001$, respectively.

We additionally found a weak positive correlation between people's perceived risk of contracting the virus and mental health measured using the GAD-7 and MDI, r (636) = .160, $p < .001$ and r (636) = .143, $p < .001$, respectively. This result is unsurprising and suggests that people who thought they more at risk/were actually more at risk of contracting the virus were also more likely to show psychological distress.

Finally, we observed that student satisfaction with the university and with the provincial government was also negatively correlated with psychological distress, thus those who were satisfied had better mental health. We observed a weak correlation between university satisfaction ($M = 2.91$, $SD = 1.06$) and mental health measured on the GAD-7, r (636) = -.171, $p < .001$, and measured on the MDI, r (636) = -.220, $p < .001$. We additionally observed the same patterns for satisfaction with the government ($M = 3.12$, $SD = 1.13$): r (636) = -.161, $p < .001$ and r (636) = -.181, $p < .001$.

Multivariate regression analysis

We conducted a multivariate linear regression to explore whether anxiety and depression scores were predicted by the following variables: preference for online courses, students' belief that they could still achieve their goals, changes in students' daily life, mental health concerns, perceived risk of contracting the virus, satisfaction with the government's performance, and satisfaction with the university's performance. For symptoms of anxiety, measured using the GAD-7 (see top half of Table 5), we observed that four factors were significant predictors of students' mental health: We observed that an increased belief that students could achieve their goals and increased satisfaction with the local government were associated with better mental health. In contrast, increased changes in life status and concern for mental health were associated with poorer mental health. For depression, measured using the MDI (see bottom half of Table 5), we found that only three factors were significantly associated with mental health. Unlike for anxiety, changes in daily life were not significantly associated with depression.

Discussion

We conducted an online study with 638 participants to examine the factors that impact mental health in students at a large Canadian university during the first six months of the COVID-19 pandemic. In the subsequent sections, we discuss the main factors that we studied and describe some limitations of the study. Due to the use of a non-experimental design, the conclusions of our current study are associations between variables rather than causal relations.

Mental health and demographic information

We found that demographic information was not predictive of anxiety and depression scores in our student population. It is possible that we did not observe this relation because our assessment was only based on two inventories of mental health, the GAD-7

which measures symptoms of anxiety and the MDI which measures symptoms of depression. Additionally, there are other demographic factors that may have influenced mental health to a greater degree during the pandemic than the variables that we studied. We discuss these issues further in the limitation section.

Mental health and online and physical contact with other people

Contrary to our first hypothesis, there was no association between either online or physical contact with other people and mental health. This may be the case because the University of Alberta is located in Edmonton, Alberta which was an area of low contagion during the initial wave of the pandemic. Pancani et al. (2020) proposed that people in low contagion areas might not have perceived that the virus was as life threatening as people in high contagion areas.[18] Therefore, people in Edmonton may have ignored quarantine and social distancing recommendations and maintained more in-person contact with others in their daily lives. As a result, they did not have to rely on online contact with others as a buffer for the lack of physical contact. This possibility requires further study.

Mental health and online courses

Consistent with our second hypothesis, students who preferred online classes and believed that they could still achieve their goals had less psychological distress. As with the interpretation of any correlation, it is difficult to determine the direction of this effect. One possibility is that these students were already optimistic, resilient, and had grit. As a result, they were able to cope and adapt to changes with less impact on their mental health and take advantage of online learning as a tool to pursue their goals. Another possibility is that students who coped and adapted faster to online learning had an advantage in this environment, allowing some mitigation of the mental health impacts of the pandemic and transition to online learning. Additionally, these same students may have found that online learning allowed them to continue with their normal routines – a factor that has been found to be important in student mental health.[21] Regardless of the source of this difference, we believe it is important to note that student attitudes towards online learning may lessen the impact of mental health symptoms during the pandemic.

Mental health and COVID-19 experience

Consistent with our third hypothesis, we found that students who reported that the pandemic had changed their lives more significantly and those who were concerned about their mental health were more likely to present symptoms of anxiety and depression. These effects are likely not unique to students.[3] We believe that becoming more worried about your mental health and changes in a person's daily life are inevitable sources of anxiety and stress during the pandemic period. Our regression analyses showed, however, that changes in life were significant predictors for symptoms related to anxiety than for depression. This relationship may signify that anxiety tends to be associated with issues related to lack of control and uncertainty for the future. Further, we found that students at risk of contracting the virus reported more symptoms of anxiety and depression, which is not unexpected. It seems likely that these students may have increased stress due to the uncertainty present in their lives, which could lead to symptoms of anxiety and depression. Finally, students who were satisfied with the performance of the government and the university

showed less anxiety and depression symptoms. We speculate that one possible reason is that the more satisfied the students were with authorities, the safer that they felt, consistent with the findings of Fawaz & Samaha (2020).[22] We look forward to additional research that tests these possibilities more directly.

Limitations

This study has three main limitations. First, we collected data at only one point in time. As the situation with COVID-19 progresses, student mental health may change over time. In particular, only 30% of respondents were taking online courses during the period of the study, but during the regular Fall/Winter semesters that number would be closer to 100%. It is therefore an open question whether student mental health will change as they begin to take more online courses. Longitudinal studies on these same topics will be critical to address these questions.

Second, the study was conducted at a single university in Canada, thus affecting the external validity of the results. Canada is a developed country, and the University of Alberta is one of the Top 5 Universities in the country. This institution had the necessary resources to quickly adapt to the transition to online teaching and the ability to regularly share information with all its student body – factors that may have mitigated mental health concerns among students. The experience of students at the University of Alberta is thus arguably different from the experience of students at other institutions, even within Canada. Further studies will be necessary to understand the impact that the educational environment (e.g., country of the institution, whether the university is public, and availability of internet and computing services) has on student mental health. Additionally, as previously mentioned, the city of Edmonton was a low contagion region during the first wave of the pandemic. As Pancani et al. (2020) proposed, there may be differences between the mental health of people who live in a high contagion and people who live in low contagion areas.[18]

Third, the questions that we asked participants were limited in scope. We did not find that demographic factors were correlated with mental health; however, we did not ask questions about socio-economic factors, such as income and expenses, that were found to be correlated with mental health in other studies.[11] Additionally, we used only two mental health inventories to explore anxiety and depression. It is an open question whether other aspects of mental health in students are affected by the pandemic (e.g., PTSD or distress as measured using the Distress K-10 scale).

Conclusion and implications

The purpose of this study was to explore how different factors affect the mental health of university students during the first six months of the COVID-19 pandemic. We observed that multiple factors were associated with the mental health of university students. Students tended to have less symptoms of anxiety and depression if they preferred taking online courses, believed they could achieve their goals, and were satisfied with university/government performance. In contrast, they reported greater symptoms of anxiety and depression if they felt that the pandemic resulted in greater changes to their daily lives and they felt at risk of contracting the virus. The sudden transition to online learning and drastic public health measures have caused challenges and stress for students. Based on the findings of this research, universities could support students by putting in place measures to stop the spread of the virus, while ensuring that online

courses are well-designed to allow students to continue with their daily routines and achieve their goals.

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