Fear of COVID-19 Effects on University Student's Health Behaviours: The FRESH Study

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ABSTRACT

Background: The imposed stay-at-home restrictions with the coronavirus (COVID-19) pandemic disrupted daily routines and impacted some population groups more than others. One such group included university students who were forced to adapt to online classes reducing face to face interactions. The uncertainty associated with this change may have created a sense of anxiety and fear towards the virus. **Objective:** The objective of this study was to measure the level of fear associated with COVID-19 in Canadian undergrad university students and the influence fear may have on their health-related behaviours during an ongoing pandemic. **Methods:** Students enrolled in four large universities in the province of Alberta were invited to complete an online Fear of COVID-19 Scale (FCV-19S) from January 4th to February 15th, 2021. **Results:** Undergraduate students (n=680; 73.4% female) with a mean age of 23 (SD 5) years had an average FCV-19 score of 17.1 (SD 6.1) out of 35. Many students (60%) categorized their fear in the moderate range and females were more likely to have a higher FCV-19 score (p<.05) than males. Increases in alcohol and substance use, sleeping and eating behaviours were significantly associated (p<.05) with higher FCV-19 scores (p=.047; p=.000; p=.000). Most student's smoking behaviour (80.5%) remained the same, however physical activity decreased. **Conclusion:** In summary, students showed a moderate level of fear associated with COVID-19 during the pandemic, and those with greater levels of fear reported more negative heath behaviour choices. These results highlight that continued restrictions during the COVID-19 pandemic continue to negatively impact student's health behaviours.

Key words: Pandemics, Fear, COVID-19, Health Behaviour, Students, Universities

INTRODUCTION

The World Health Organization (WHO) on March 11th, 2020, declared the coronavirus (COVID-19) a global pandemic (WHO 2020). The Canadian Government responded with public health precautions including social and physical distancing restrictions, stay-at-home orders, and hygiene guidelines (Government of Canada 2020). Canadian universities reacted quickly and closed campus buildings, cancelled in-class lectures, tutorials and labs and replaced them with online instruction. This modification continued into the winter academic semester of the 2021 with a limited number of students returning and gaining access to campus. Most university students had not experienced remote learning for this period of time previously (March 2020 to March 2021) and therefore limited research exists on the impact this may have on their wellbeing.

On December 8th, 2020, the Alberta provincial government banned in-person dinning at restaurants, outdoor gatherings and individuals were restricted to interacting with only their household or two others for those who lived alone (Alberta, 2021a). These restrictions influenced students' iso-lation as they were unable to physically attend university, visit with peers, participate in activities, and club meetings, or even walk outdoors with a friend as this could have resulted in a $1000 fine (Alberta, 2021b). Outdoor gatherings and funerals restrictions were lifted on January 18th, 2021, followed by restaurants reopening (with strict guidelines) on February 8th, 2021 (Alberta, 2020a). Subsequent removal of boundaries in response to the declining COVID-19 hospitalizations may have changed individuals' perceived threat of the pandemic including their fear and anxiety levels (Harper et al. 2020).

The Fear of COVID-19 Scale (FCV-19S) was developed in March of 2020 to assess individuals' psychological response to the pandemic (Ahorsu et al. 2020; McCoach et al. 2013). The 7-item survey with a score ranging from 7 to 35 was initially validated in the general population and found to have robust psychometric properties (Ahorus et al. 2020; Winter et al. 2020). The FCV-19S was subsequently validated in a convenience sample of US college students (N=237) with high reliability, excellent internal consistency (α=0.91) and strong factor loadings (all loadings ≥ 0.70) (Perz et al.

2020). Another population of students attending university in Vietnam (N=5423) showed that the seven items of the FCV-19S strongly loaded on one component explaining 62.15% of the variance, with good item–scale convergent validity and high internal consistency (Cronbach's alpha =.90) (Nguyen et al. 2020). Based on the above the FCV-19S is a valid and reliable screening tool to assess fear of COVID-19 across multiple student populations (Giordani et al. 2020; Martínez-Lorca et al. 2020; Nguyen et al. 2020; Pakpour et al. 2020).

Several student studies report on the range of scores associated with the FCV-19S at the start of the pandemic. For example, medical students in Vietnam (N=5423) were found to have a mean score of 16.7 (SD) ± 5.3), with lower scores in males, older students, and students in their last academic year (Nguyen et al. 2020). Students with higher FCV-19S scores were more likely to report that their smoking and drinking behaviours remained unchanged or increased during the pandemic when compared to before (Nguyen et al. 2020). A similar FCV-19S mean score of 16.8 ± 6.0 was found in Spanish undergraduate university students (N=606) and those students enrolled in Health Science or Social Science degrees or first year students were more likely to score higher on the FCV-19S (p ≤.002) (Martínez-Lorca et al. 2020).

In summary, previous research on university students has suggested a lack of fear and limited behaviour change (Van et al., 2010; Seale, Mak, & Razee 2012) while others report increased stress or anxiety (Active Minds, 2020) with short lived pandemics. We are not aware of any studies that currently have assessed the level of fear following a prolonged duration of a pandemic, including the current COVID-19 pandemic. One very recent study by Zimmermann et al., (2020) did find increasing symptomatology associated with anxiety and depression when compared to earlier in the pandemic. They also found that cognitive and behavioral avoidance, online social engagement, and problematic internet use were predictors of these changes. In addition to the this, another longitudinal study compared wellness behaviours over four months of the 2020 spring semester in first-year students and found the behaviours were negatively affected by the COVID-19 pandemic (Copeland et al. 2020). Therefore it is possible that the ongoing duration of the pandemic may have altered students' fear of COVID-19 impacting their health behaviours. We hypothesised that a moderate level of baseline fear would be present due to the ongoing duration of the pandemic, and a higher level of fear would negatively impact health related behaviours in a population of undergraduate students attending universities in Alberta.

METHODS

Design and Participants

A cross-sectional design was employed through the online Qualtrics survey platform (https://www.qualtrics.com/) which could be accessed on a personal computer/laptop, tablet, or smartphone. The survey required approximately 15 minutes to complete, and the link was available on the University of Calgary Research page and social media sites (Facebook, Instagram, and Twitter). The University of Calgary Gauntlet newspaper featured an article that included the study survey link as well. Societies and Clubs (N=145) were emailed at each institution and asked to advertise the study through a poster with an embedded survey link. Ethical approval was received from the Conjoint Health Research Ethics Board (REB 20-2030) and informed consent was part of the anonymous survey. By closing the link participants could terminate their survey involvement.

To be included students must have been enrolled in full or part time study in the province of Alberta at one of four institutions (Mount Royal University, MRU; University of Alberta, UofA; University of Calgary, UofC; and University of Lethbridge, UofL). Those excluded were students completing a postgraduate diploma, masters, or doctoral degree. Participation was voluntary and self-directed. A similar study (Mertens et al. 2020) recruited through online advertisements using social media platforms (e.g., LinkedIn, Facebook, Twitter, and Reddit) had 695 respondents with a 63.17% completion rate. Therefore, we calculated using the formula for a cross-sectional study, n= [(z²* p*q)]/d², where p = perception of fear 50%, z = 95% confidence interval, d = error ≤5%, and a 25% non-response rate, a sample size of 400 for this study.

Survey Measures

The survey was composed of 10 questions divided into four sections beginning with Section A (question 1, consent yes or no), followed by Section B (questions 2-7, demographics), Section C (question 9, FCV-19S) and Section D (question 10, health-related behaviours). Demographic variables included age (month, year), gender identity (female, male, non-binary, Transgender- male to female, Transgender- female to male, two-spirit, or other gender not listed), and ethnicity (Black, East Asian, Indigenous, Latino, Middle Eastern, South Asian, Southeast Asian, White, or another race category). Participants were also asked to indicate the university institution enrolled at (MRU, UofA, UofC, or UofL), academic year (1st, 2nd, 3rd, 4th, 5th) and home faculty (Arts, Business, Education, Engineering, Kinesiology, Nursing, Science, Social work or Other). A prefer not to say answer was an option.

The level of fear associated with COVID-19 was measured using the FCV-19S and as previously identified is a reliable and validate tool (Ahorus et al. 2020; Perz et al. 2020; Winter et al. 2020) with seven items using a five-point Likert-scale, (1 = "strongly disagree", 2 = "disagree" 3 = "neither disagree or agree", 4 = "agree", and 5 = "strongly agree"). The score ranged was from 7 to 35, and the higher the score the greater the individual's fear of COVID-19.

Students indicated their change in health-related behaviours since the start of the pandemic compared to current day and this was measured with a modified list of 5 items using a five-point Likert scale (1 = "decreased", 2 = "somewhat decreased", 3 = "neither increased nor decreased", 4 = "somewhat increased", 5 = "increased") from Nguyen and colleagues (2020). Health-related behaviours included smoking, substance use, eating behaviour, level of physical

activity and sleep behaviour. Smoking was defined as the use of a traditional or electronic cigarette. Substance use was defined as the ingestion of alcoholic beverages or use of any cannabis products. Eating behaviour was based on the student's self-report perspective of healthy vs unhealthy dietary options. Physical activity was described as any activity increasing the individual's heart rate when compared to at rest. Sleep behaviour and changes to nighttime sleep and daytime naps were included as an additional question from the original list by Nguyen et al. (2020).

Procedure

The survey was available from January 4ᵗʰ, until February 15ᵗʰ, 2021, and the last survey was received on January 26ᵗʰ, 22 days after the survey opened. The data was stored on the Qualtrics servers, exported in excel and stored on a password encrypted file on the University of Calgary's server.

Statistical Analysis

Descriptive statistics (means, (SD, ±), and frequency distribution of scores) were analyzed using SPSS V26 for Mac (SPSS Inc., Chicago, IL). The FCV-19 score was categorized into three groups using a common strategy to determine the cutoffs, i.e., low fear, one SD or more below the mean; moderate fear one SD below or above the mean; and high fear, one SD or more above the mean. A one-way ANOVA was used to analyze the differences by the FCV-19S total scores and participants' gender identity, ethnicity, institution, and faculty. A Mann-Whitney U test was used to analyze the difference between those who identify as female or male and the question regarding the news and social media effect on the individual's fear (fifth question in FCV-19S). A Kruskal-Wallis test was used to determine the correlation between the FCV-19S total scores and student's health-related behaviours (smoking, substance intake, eating behaviour, physical activity, and sleep habit). Statistical significance was set at $p < .05$.

RESULTS

The survey link was accessed by 710 participants and 30 links were closed before completing any questions, resulting in a 95% (680) completion rate. The mean age of the participants was 23 ± 5 years, with 73.4 % identifying as female. The participant's characteristics are presented in Table 1.

The highest mean score (3.29 ± 1.32) from the FCV-19S was observed in question 5, i.e., *When watching news and stories about COVID-19 on social media, I become nervous and anxious*. See Table 2 for Participant's Mean FCV-19S scores.

Most participants were in the moderate fear category (59.0%) which ranged from a score of 12-22. The FCV-19S scores are presented in Table 3 with Low, one SD or more below the mean; Moderate, one SD below or above the mean; and High one SD or more above the mean.

Figure 1 represents the distribution of the FCV-19S scores from the minimum score of 7 to the maximum of 35. A visible inspection identified a normal distribution, however a slight skew to the left was observed. Larger values occurred in the score categories of 7, 16, and 18.

No significant differences were found between the FCV-19S total scores and participant's ethnicity (p=.964), institution (p=.277) or faculty (p=.091). A significant difference (p<.05) was found between the FCV-19S total scores and gender identity (p=.000). Individuals who identified as female (p=.000) were found to have higher FCV-19S total scores when compared to those who identified as male. Those who identified as non-binary and two-spirit (n=10) did not have significantly different FCV-19S total scores from those who identified as female (p=.870) or male (p=.430).

Table 1. Demographic Characteristics of Participants (n=680)

	Mean, SD
Age (years)	23 ± 5
University Year	3 ± 1
	n (%)
Gender	
Female	499 (73.4)
Male	164 (24.1)
Nonbinary & Two-spirit	10 (1.5)
Prefer not to say	7 (1)
Ethnicity	
White	441 (64.9)
Asian	129 (19.0)
Indigenous	24 (3.5)
Other *	76 (11.1)
Prefer not to say	10 (1.5)
Institution	
Mount Royal University	81 (11.9)
University of Alberta	256 (37.6)
University of Calgary	232 (34.1)
University of Lethbridge	107 (15.7)
Prefer not to say	4 (0.6)
Faculty	
Science	144 (21.2)
Nursing	148 (21.8)
Kinesiology	117 (17.2)
Arts	94 (13.8)
Other **	172 (25.3)
Prefer not to say	5 (0.7)

Other*- Includes those who identify as Black, Latino, Middle Eastern, Roma, Pashtun, Slavic, Mixed and interracial.
Other **- Incudes those in the faculties of Business, Education, Engineering, Social work, Law and society, Midwifery, Child studies, Open Studies, and dual degrees.
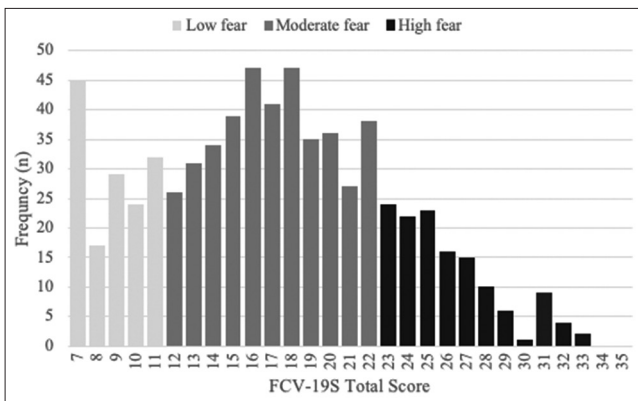
Figure. 1. Distribution of participant's (n=680) mean total FCV-19S score by category

Table 2. Participants mean (SD) total scores from the FCV-19S by question (n=680).

FCV-19S	Mean, SD
1. I am most afraid of COVID-19.	3.16 ± 1.20
2. It makes me uncomfortable to think about COVID-19.	2.90 ± 1.26
3. My hands become clammy when I think about COVID-19.	1.70 ± 0.93
4. I am afraid of losing my life because of COVID-19.	2.29 ± 1.30
5. When watching news and stories about COVID-19 on social media, I become nervous and anxious.	3.29 ± 1.32
6. I cannot sleep because I'm worrying about getting COVID-19.	1.70 ± 1.02
7. My heart races or palpitates when I think about getting COVID-19.	2.03 ± 1.25
Total	17.06 ± 6.11

Score range 7-35.

Table 3. FCV-19S by category and score (n=680)

FCV-19 category	Score	n (%)
Low	≤11	147 (21.6)
Moderate	12-22	401 (59.0)
High	≥23	132 (19.4)

Low, one SD or more below the mean; Moderate, one SD below or above the mean; High one SD or more above the mean.

Health Related Behaviours

The health-related behaviours questions from Section D of the survey had a 1.2% (n=8) nonresponse rate. Table 4 shows the increase and decrease changes to participants' health related behaviours. A three-point Likert scale was generated by collapsing two categories (decreased and somewhat decreased; increased and somewhat increased) because of the similarities in answers (Jae Jeong, 2016). Most participants (80.5%) reported no increase or decrease in smoking behaviour and many participants (45.4%) did not change their alcohol and substance use. However a considerable number of participants (33.2%) increased/somewhat increased this behaviour. Physical activity decreased or somewhat decreased in 64.6%, sleeping and eating behaviours increased/somewhat increased in 42.0% and 45.5% of the participants respectively. No significant correlation (p<.05) was found between the FCV-19S total scores and the health-related behaviours of smoking (p=.128), and physical activity (p=.110). However, alcohol and substance use (p=.047), sleeping behaviour (p=.000) and eating behaviour (p=.000) were all significantly correlated to participants' FCV-19S total scores. These three behaviours had a similar pattern with decreased/somewhat decreased for participants with lower fear scores and increased/somewhat increased for those with higher fear scores.

DISCUSSION

This cross-sectional study was administered 11 months into the pandemic lockdown, and measured university student's level of fear while examining the association between their fear of COVID-19 scores and health-related behaviours. Students attending four universities in the province of Alberta were found to have a low to moderate fear of COVID-19 based on a mean score of 17.1 ± 6.11. This mean score was comparable to a population of USA college students (18.1 ± 7.1; Perz et al. 2020), Vietnamese medical students (16.7 ± 5.3; Nguyen et al. 2020), and Spanish university students (16.79 ± 6.04; Martínez-Lorca et al. 2020). Our FCV-19 score result is therefore consistent across a wide range of college/university students and demonstrates that the level of fear is similar regardless of the time frame when measured in the first year of the COVID-19 pandemic.

Students who identified as female were significantly more likely to have a higher FCV-19S total score (18.09 ± 5.84) when compared to males (13.96 ± 5.94) in our study (p=.000). Those individuals who identified as nonbinary, or two-spirit (16.73 ± 5.60) were found to have a mean FCV-19S total score between males and females but not significantly different to either (p=.430, p=.870). Other studies demonstrate that male's perception of risk towards infectious diseases is generally lower when compared to females (Akan et al. 2010). Nguyen and colleagues (2020) similarly found males to have significantly (p<.000) lower fear of COVID-19 score, as were the score for older age (p<.000) and later academic year (p<.000) students. Perz and colleagues (2020) identified being married and of Asian descent positively correlated to fear scores, whereas Martínez-Lorca et al., (2020) found the health and social science faculties and those in first year university had higher fear scores. We did not find a significant correlation between students' ethnicity or faculty, and this may be due to the long-term effects of COVID-19 resulting from lockdown fatigue. This is defined as a state experienced when individuals have had to come to terms with a virus that has affected every aspect of their life and no further adjustments occur (Australian Psychological Society 2020).

Most Canadian adults, including university students (94%) have at least one social media account (Gruzd and

Table 4. The association between FCV-19S total scores and demographic variables

Demographic	Sum of Square	df	Mean Square	F	Sig.	Turkey HSD
Gender Identity	2127.100	3	709.033	20.626	.000	
Female - Male						.000
Female - Nonbinary & Two-spirit						.870
Male - Nonbinary & Two-spirit						.430
Ethnicity	22.160	4	5.540	1.48	.964	
White – Asian						.954
White – Indigenous						.000
White – Other						.000
Asian – Indigenous						.986
Asian – Other*						.998
Indigenous – Other*						.999
Institution	190.649	4	47.662	1.278	.277	
MRU– UofA						.995
MRU– UofC						.981
MRU –UofL						.980
UofA- UofC						.383
UofA - UofL						.556
UofC - UofL						.000
Faculty	353.723	5	70.745	1.906	.091	
Science – Nursing						.999
Science – Kinesiology						.610
Science – Arts						.998
Science – Other**						.402
Nursing – Kinesiology						.399
Nursing – Arts						.000
Nursing – Other**						.000
Kinesiology – Arts						.433
Kinesiology – Other**						.000
Arts – Other**						.270

Prefer not to say groups were excluded as the sample size was not large enough.

Other*- Includes those who identify as Black, Latino, Middle Eastern, Roma, Pashtun, Slavic, Mixed and interracial.

Other**- Incudes those in the faculties of Business, Education, Engineering, Social work, Law and society, Midwifery, Child studies, Open studies, and dual degrees.

Mai, 2020) and research states that social media can create panic regarding events such as a pandemic (Radwan and Radwan, 2020). Other researchers suggest that messages by the media may induce more fear resulting in increased compliance with the social distancing and lock down policies imposed (Mertens et al. 2020). In this study question 5 had the highest mean score of the 7 questions of the FCV-19S and referred to *nervous and anxious feelings while watching news stories of COVID-19 on social media* (See Table 2). Those who identified as female (3.52 ± 1.23), were found to exhibit significantly (p=.000) higher levels of fear on this item as compared to those who identified as male (2.61 ± 1.36). Chen and colleagues (2015) found women were more likely to use social media sites, especially in search of information and therefore this could contribute to the higher fear scores in women.

Health Related Behaviours

Students' changes related to health behaviours varied greatly (see Table 4). Most of the student's smoking behaviour (80.5%) stayed the same, and only a small percentage (7%) increased. Although it is well documented that during stressful times smoking behaviour increases, we do not know the level of smoking in this population and conceivably it could have already been very high (Vollrath, 1996). Students who experienced increases in alcohol or substance use (33.2%), sleeping behaviour (42.0%) and eating behaviour (45.5%) may have chosen these as outlets, unaware of the unhealthy or dangerous consequences. The students who were more fearful were significantly (p=.047, p=.000, p=.000) more likely to increase these three behaviours. In contrast, Bertrand and colleagues (2021) found Saskatchewan students' nutrients and caloric intake decreased when compared to be-

fore the pandemic. In comparison, a large portion (45.5%) of students from Alberta may also have had a contributing factor to the change in eating behaviour seen in students in Saskatchewan, but this relationship was not explored.

Students in both Alberta and Saskatchewan increased their alcohol intake during the pandemic (Bertrand et al. 2021). During the relatively short transition to online learning, students abruptly changed from having social and academic support as a constant in their day to being isolated in solitude. This unexpected change could have contributed to students becoming overwhelmed and therefore reaching for alternative coping mechanisms like alcohol or substance use (Schulenberg and Maggs, 2002). Students use of negative coping mechanisms should be monitored to ensure their health and safety during a period of uncertainty such as a pandemic is not compromised.

Much of the current literature supports a bidirectional relationship between sleep and depression, yet sleep quality is a well-known variable that is often impact by university students' lifestyles (Dinis & Bragança, 2018). In our study a large portion (42.0%) of students experienced an increase in sleeping behaviour during the pandemic when compared to before. Marelli and colleagues (2020) found that Italian university students' (N=307) weekday sleep routines shifted to resemble their usual weekend sleep routines during the pandemic. Although these students went to bed later and woke up later, no significant change in total sleep time was found (Marelli et al. 2020). Similarly, to our findings, an Indian university student population (N=325) found a significant (p<.001) increase in sleep duration, with many reporting oversleeping and increased napping (Majumdar, Biswas, and Sahu, 2020). Restrictions and working from home are likely contributing factors to students' increased sleep duration. These changes include less travel time to and from university which typically act as "time anchors" for students' schedules (Majumdar et al. 2020). Restrictions also included banning activities like sports or clubs and restaurant closures also resulting in students spending more time at home.

Majumdar and colleagues (2020) also found significantly higher rates of depressive symptoms in students during the lockdown than before (7.07% to 30.77%), indicating oversleeping as a possible warning sign of mental distress in students. Within our population, students' who were more fearful of the pandemic were more likely to increase their sleeping duration. Therefore, sleep duration and habits could be considered in the future to monitor students' depressive symptoms. The relationship between students' fear of the pandemic and sleep quality should be explored further to understand the increasing contribution they make on mental health.

Most students decreased levels of physical activity during the pandemic as compared to before. This could partially be explained by the provincial restrictions set in place at the time of the survey (January 2021). Gyms, fitness facilities, team sports and clubs were all ordered to close or shut down (Alberta, 2021a). Restaurants, bars, pubs, and cafes were not allowed to have in house seating, therefore many students working in the service industry had no control over reduced physical activity (Alberta, 2021a). The survey was open

during the winter, perhaps presenting an additional challenge to students and their physical activity. Tucker and Gilliland (2007) identified poor or extreme weather as a barrier to physical activity among various populations. Therefore, the ability of students to go outside and be active was likely impeded by the cold weather conditions. Lastly, the decline in physical activity could be a result of the lack of incidental activity given the physical closure of universities resulted in an elimination of thousands of steps around campuses. Sisson, McClain, and Tudor-Locke (2010) found US students at two different campuses took on average 7674 steps per weekday and 11294 steps per weekday. This large number of steps was replaced with walking to the kitchen or to another room or floor in the student's house. Bertrand and colleagues (2021) similarly found a decrease in physical activity among university students, this included those who were active and inactive before the pandemic. Physical activity has been demonstrated to not only help improve individual's physical health, but also to reduce anxiety and depression (Fox 2007). Schultchen and colleagues (2019) explained that during stressful times individuals tend to engage in less exhausting activities, often avoiding exercise and resorting to other unhealthy behaviours such as smoking, overeating, and drinking. During a major life event like a pandemic, we need to encourage students to enhance their activity to help prevent unhealthy alternative behaviours and prevent the future development of more serious mental health issues.

Strengths and Practical Implications

This is the first study to assess Canadian undergraduate students' level of fear due to the pandemic and the associated effect on their health-related behaviours. A strength of this study is the assessment time occurred sometime after the start of the pandemic, which had not been previously investigated. Another strength is the representation of participants who identified as nonbinary or two-spirit.

Limitations

We acknowledge the limitations of a cross-sectional study design study and the inability to confer causality (Levin, 2006). Recall bias was possible as the students were asked to remember and compare their behaviours from the start of the pandemic (March 2020) to the day they completed the survey (January 2021). This is likely minor since the survey was within the year of initial exposure (Bhandari and Wagner 2006). Social desirability bias was also possible as fear is by nature a sensitive issue, however the anonymity and confidentiality of the survey may have lessened this bias (Althubaiti 2016). Participants were recruited based on interest, i.e., those who were more fearful may have been more inclined to complete the survey, resulting in a possibility of self-selection bias (Bethlehem, 2020). The inclusion of other universities of the province of Alberta would have improved the generalizability, however because of the provincial variations in restrictions across the country comparisons would have been difficult (Mindell et al. 2015). The survey was only open for a short duration and therefore the four universities

in Alberta with the largest student populations were targeted. The large response rate from female participants was similar to the reported student samples from American and Spanish universities (Perz et al. 2020; Martínez-Lorca et al. 2020). We note that the responses related to student's health-related behaviour only gives a perspective of change as opposed to the degree of change. Future research on student's health-behaviours should consider longitudinal tracking to measure the magnitude of changes to these behaviours created by the major disruptions to university students' lives.

CONCLUSION

This online study occurred 11 months after the start of the COVID-19 pandemic and although students had a wide range of fear, the majority reported moderate levels of fear. Furthermore, this fear of COVID-19 was significantly associated with changes to their alcohol and substance use, sleeping and eating behaviours. This research suggests that student's health and well-being have been threatened and compromised by the COVID-19 pandemic. Interventions for university students should aim to improve physical activity, sleeping and eating behaviours and provide supportive choices around personal resilience to avoid using alcohol and substance use as coping behaviours during a pandemic.

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Author Contributions

Author 1 and Author 2 contributed to conception and design of the study. Author 1 wrote the first draft and performed the statistical analysis. Author 2 completed the to the manuscript revision, both authors read, and approved the submission.

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