



# **The effect of COVID-19 on medical students' education and wellbeing: a cross-sectional survey**

## **L'effet de la COVID-19 sur l'éducation et le bien-être des étudiants en médecine : une enquête transversale**

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### Résumé de l'article

**Contexte :** Les cursus des facultés de médecine canadiennes ont subi une restructuration majeure pendant la pandémie du COVID-19. L'objectif de cette étude était d'évaluer l'impact perçu de la pandémie sur l'éducation et le bien-être des étudiants en médecine.

**Méthodes :** Un sondage en ligne a été distribué aux étudiants en médecine au Canada. Des analyses descriptives ont été effectuées et une analyse de variance a été réalisée pour évaluer le changement de quatre habitudes de santé pendant la pandémie.

**Résultats :** 248 étudiants en médecine de 13 établissements au Canada ont participé à cette étude. 74% d'entre eux ont signalé une baisse de la qualité de leur enseignement depuis le début de la pandémie. 58% des étudiants ont trouvé que l'enseignement en ligne était inférieur à l'enseignement en présentiel. 65% des étudiants ont déclaré avoir plus de temps à consacrer à leurs loisirs et à des activités en lien avec le bien-être, environ la moitié de la cohorte s'est sentie plus déprimée (48 %) et plus seule (52 %). Les habitudes de santé des étudiants se sont considérablement détériorées à l'arrivée de la pandémie ( $F=37,4$ ,  $p < 0,001$ ). La consommation d'alcool, le temps passé assis et le temps passé devant un écran ont également augmenté de manière significative depuis le début de la pandémie ( $p < 0,001$ ). Pendant la pandémie, les étudiants ayant des antécédents de dépression ou d'anxiété ont présenté des niveaux plus élevés de symptômes liés à ces états (66 % contre 42 %,  $p = 0,003$  pour la dépression et 69 % contre 41 %,  $p < 0,0001$  pour l'anxiété), ils avaient une moins bonne qualité de sommeil (34 % contre 18 %,  $p = 0,031$ ) et une moins bonne qualité de vie en général (55 % contre 65 %,  $p = 0,024$ ) que ceux qui n'avaient pas de tels antécédents.

**Conclusion :** L'éducation et le bien-être des étudiants en médecine canadiens ont été touchés négativement pendant la pandémie.



## The effect of COVID-19 on medical students' education and wellbeing: a cross-sectional survey

### L'effet de la COVID-19 sur l'éducation et le bien-être des étudiants en médecine : une enquête transversale

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### Abstract

**Background:** Canadian medical school curriculums have undergone major restructuring during the COVID-19 pandemic. This study's goal was to assess the perceived impact of COVID-19 on medical students' education and wellbeing.

**Methods:** An online survey was distributed to Canadian medical students. Descriptive analyses and ANOVAs were used to assess changes in mental health, health habits and quality of education during the pandemic.

**Results:** 248 medical students from 13 schools across Canada participated in this study. 74% reported a reduction in the quality of their education since COVID-19. 58% of students found online to be inferior to in-person teaching. 65% of students had more time for wellness and leisure activities, about half of the cohort felt more depressed (48%) and lonelier (52%). Student's overall health habits worsened after the start of the pandemic ( $F=37.4$ ,  $p < 0.001$ ). Alcohol drinking, time spent seated, and screen time also increased since the pandemic ( $p < 0.001$ ). During the pandemic, students with a prior history of depression or anxiety expressed increased depressive symptoms (66% vs. 42%,  $p = 0.003$ ), increased anxiety (69% vs. 41%,  $p < 0.001$ ), worse sleep quality (34% vs. 18%,  $p = 0.031$ ), and poorer quality of life (55% vs. 65%,  $p = 0.024$ ) versus those with no prior history.

**Conclusion:** Canadian medical student's education and wellbeing has been negatively impacted during the pandemic.

### Résumé

**Contexte :** Les cursus des facultés de médecine canadiennes ont subi une restructuration majeure pendant la pandémie du COVID-19. L'objectif de cette étude était d'évaluer l'impact perçu de la pandémie sur l'éducation et le bien-être des étudiants en médecine.

**Méthodes :** Un sondage en ligne a été distribué aux étudiants en médecine au Canada. Des analyses descriptives ont été effectuées et une analyse de variance a été réalisée pour évaluer le changement de quatre habitudes de santé pendant la pandémie.

**Résultats :** 248 étudiants en médecine de 13 établissements au Canada ont participé à cette étude. 74% d'entre eux ont signalé une baisse de la qualité de leur enseignement depuis le début de la pandémie. 58% des étudiants ont trouvé que l'enseignement en ligne était inférieur à l'enseignement en présentiel. 65% des étudiants ont déclaré avoir plus de temps à consacrer à leurs loisirs et à des activités en lien avec le bien-être, environ la moitié de la cohorte s'est sentie plus déprimée (48 %) et plus seule (52 %). Les habitudes de santé des étudiants se sont considérablement détériorées à l'arrivée de la pandémie ( $F=37,4$ ,  $p < 0,001$ ). La consommation d'alcool, le temps passé assis et le temps passé devant un écran ont également augmenté de manière significative depuis le début de la pandémie ( $p < 0,001$ ). Pendant la pandémie, les étudiants ayant des antécédents de dépression ou d'anxiété ont présenté des niveaux plus élevés de symptômes liés à ces états (66 % contre 42 %,  $p = 0,003$  pour la dépression et 69 % contre 41 %,  $p < 0,001$  pour l'anxiété), ils avaient une moins bonne qualité de sommeil (34 % contre 18 %,  $p = 0,031$ ) et une moins bonne qualité de vie en général (55 % contre 65 %,  $p = 0,024$ ) que ceux qui n'avaient pas de tels antécédents.

**Conclusion :** L'éducation et le bien-être des étudiants en médecine canadiens ont été touchés négativement pendant la pandémie.

## Introduction

The novel Corona Virus Disease (COVID-19) pandemic is a serious global health threat. In December 2019, originating out of Wuhan, China, it was first described as cases of pneumonia of unknown origin.<sup>1</sup> As of January 30<sup>th</sup>, 2020, the WHO classified COVID-19 as a public health emergency and as of March 11, 2020 due to the alarming increase in spread it was characterized as a pandemic.<sup>2</sup>

Large efforts have been taken to help ‘flatten the curve’ and reduce the speed of viral transmission to prevent a surge of hospital admissions. The implemented public health measures included the shutdown of Canadian academic institutions. Across all provinces, medical students’ clinical rotations and in-person classes were cancelled. As with any emergency and unprecedented situation, decisions needed to be made quickly. With the highly compacted nature of medical curriculums, a dire need to find alternate teaching methods to compensate for the loss of in-person large group lectures and in-hospital teaching resulted in a quick shift to online teaching platforms. While previous studies have examined the effects of the current pandemic on medical education,<sup>3</sup> there is a paucity in data with regards to Canadian medical students’ perception of the novel online curriculums and how this form of learning compares to the traditional method of medical education.

While social distancing was a crucial measure taken to reduce the transmission of COVID-19, emerging evidence shows its negative impact on wellbeing; a person’s physical, mental, social and environmental state.<sup>4-6</sup> Furthermore, previous studies have shown that compared to individuals of similar age, medical students tend to experience higher levels of stress.<sup>7-9</sup> Health habits (sleep, alcohol, exercise, and smoking) which are associated with a student’s self-care and wellbeing impact medical student education, emotional adjustment and functioning as physicians.<sup>10</sup> By better understanding the effects of the COVID-19 pandemic on medical students’ health habits, medical school wellness programs could better target the ones mostly affected.

To that end, the goal of our study was to assess the effect of the COVID-19 pandemic on medical students’ wellbeing and medical education, in Canada, specifically with regards to their perception of the currently practiced online medical education. By comparing their health habits and the resulting impact on mental health prior to, and during

the pandemic, we wanted to better understand how their learning overall training and mental health were affected.

## Methods

This cross-sectional survey measured the effect of the COVID-19 pandemic on medical students’ education in Canada and their overall mental and physical wellness (components of wellbeing). McGill University Institutional Research Board (IRB) approval was obtained prior to the study commencement. All participants voluntarily signed an electronic consent form on the front page of the questionnaire.

### Questionnaire and recruitment

A secure and encrypted cloud-based software was used to develop an online survey with a total of 36 questions (Appendix A). The questionnaire was adapted from previous similar studies on the effect of COVID-19 on the general public’s mental health and wellbeing.<sup>11,12</sup>

Data collection occurred over four weeks, from June 1<sup>st</sup> to June 28<sup>th</sup> which corresponds to the end of the academic year (winter/summer semester). The questionnaire was sent to all 17 Canadian medical schools to be distributed through the student body’s official listserv/electronic mailing list. All survey responses were kept and analyzed in the study. To maintain full anonymity of participants, no personal identifiable information was obtained. Data collected pertaining to health habits prior to COVID-19 were based on participant recall.

### Statistical analysis

The Shapiro-Wilk test verified that the continuous data respected the parameters for normality. Descriptive analyses were performed for the demographic data of the sample. Analysis of Variance assessed the change in the health habits, from before the pandemic to during the pandemic with subsequent post-hoc tests. The health habits included time spent seated, time spent in front of a screen, amount of alcohol consumed, and time spent performing moderate and vigorous physical activity. Sub-analysis of data stratified based on the baseline mental health disorders was performed using Pearson’s chi-square test. All statistical analyses were performed using SPSS 25.0 (IBM, New York, USA) with significance set at  $p < 0.05$ .

## Results

### Demographics and health habits

The study was comprised of 248 Canadian medical students from 13 Canadian medical schools. A total of 63% of the

participants were females, which is equivalent to the Canadian medical student cohort (63% in 2018).<sup>13</sup> Demographic characteristics of the cohort is further described in Table 1. Prior clinical diagnosis with anxiety or depression was reported among 25% of students. 98% of the students were non-smokers, and 36% had not consumed any alcoholic beverages over the last six months. Pre-COVID-19, the students reported to have spent on average  $5.86 \pm 2.53$  hours per day seated,  $5.43 \pm 2.53$  hours per day in front of a computer screen,  $4.47 \pm 3.90$  hours per week performing moderate physical activities, and  $2.08 \pm 2.41$  hours per week performing vigorous physical activities. Table 1 also contrasts the demographics of those with and without prior diagnosis of depression or anxiety and highlights no differences at baseline between the two groups.

*Table 1. Demographic characteristics for the whole-cohort and stratified according to prior diagnosis of depression or anxiety*

Characteristics	Whole-cohort N = 248	Prior diagnosis of depression or anxiety N = 62	No diagnosis of depression or anxiety N = 186	p-value
Age (years)	24.5 $\pm$ 3.5	25.1 $\pm$ 4.4	24.2 $\pm$ 3.1	0.72
Sex				
Male	92 (37%)	18 (29%)	74 (40%)	0.172
Female	156 (63%)	44 (71%)	112 (60%)	
Marital status				
Single	200 (81%)	51 (82%)	149 (80%)	0.621
Married / In a relationship	46 (19%)	10 (16%)	36 (19%)	
Divorced / Widowed	2 (1%)	1 (2%)	1 (1%)	
Year of study				
First year	80 (32%)	19 (30%)	61 (33%)	0.899
Second year	48 (19%)	13 (21%)	35 (19%)	
Third year	50 (20%)	14 (23%)	36 (19%)	
Fourth year	70 (28%)	16 (26%)	54 (29%)	

Mean  $\pm$  standard deviations or the number of students and the proportions (%) are presented and statistically compared between those with and without prior diagnosis of depression or anxiety.

### COVID-19 and medical education

Most students (76%) believed that COVID-19 affected their medical education, of which 71% felt they were experiencing a reduction in the quality of their medical education during the pandemic. Moreover, 58% of all participants found online teaching inferior and less efficient compared to in-class teaching. While 77% of all participants supported online teaching as a *complementary* method to in-person teaching, only 28% favored it as a

*preferred* method. Furthermore, 67% claimed having more study time compared to 14% who had less time available for studying in comparison to the pre-COVID-19 era.

### COVID-19 and wellbeing:

Sixty-eight percent of the students reported an improvement in the promotion or the structure of the wellness programs offered since the onset of the pandemic, only 11% accessed these resources. The overall quality of life deteriorated among 40% of the students in comparison to the 18% among whom the quality of life improved ( $p < 0.001$ ). While 65% reported having more time available for leisure and wellness, approximately half felt more depressed and lonelier (48% and 52%, respectively) since the start of the pandemic. Moreover, student's overall health habits significantly worsened after the start of the pandemic ( $F=37.4$ ,  $p < 0.001$ ). Post-hoc  $t$ -tests were performed to assess the change in specific health habits. The average amount of alcoholic beverages consumed weekly (measured in beer bottles/cans consumed) increased by 20% from  $1.80 \pm 2.34$  to  $2.17 \pm 3.13$  ( $p = 0.007$ ). In terms of physical activity, 71% of the cohort reported having more time available for exercising; however, no differences were found in the average time spent actually performing physical activities such as moderate activity ( $4.47 \pm 3.90$  hours per week prior to the COVID-19 outbreak and  $4.65 \pm 4.49$  hours per week during the pandemic;  $p = 0.513$ ) or vigorous activity ( $2.08 \pm 2.41$  hours per week prior to the COVID-19 outbreak and  $2.29 \pm 2.60$  hours per week during the pandemic;  $p = 0.181$ ). In contrast, the time spent seated increased by 50% from  $5.86 \pm 2.53$  hours per day prior to the pandemic to  $8.77 \pm 3.36$  hours per day ( $p < 0.001$ ) and the time spent in front of a computer screen increased by 60% from  $5.43 \pm 2.53$  hours per day prior to the pandemic to  $8.69 \pm 3.30$  hours per day ( $p < 0.001$ ).

Despite the pandemic affecting both the students with a known prior mental illness and those without, the former experienced significantly more depressive episodes since the start of the pandemic (Table 2). Specifically, 66% of these students experienced depressive symptoms during the pandemic in contrast to 42% among those with no prior psychiatric history ( $p = 0.003$ ). Similarly, 69% of them felt stressed-out (compared to 41% among those with no prior history;  $p < 0.001$ ), and 34% reported worsening sleep quality (compared to 18% of those without prior history;  $p = 0.031$ ). The overall quality of life was worse among those with a prior mental illness (55%) compared to those without (35%;  $p = 0.024$ ).

Table 2. Effect of COVID-19 on psychological wellbeing of the students and self-perceived quality of life, stratified by prior clinical diagnosis of depression or anxiety (n = 248).

Experience since COVID-19		Prior clinical diagnosis of depression or anxiety		p-value
		Yes (n = 62)	No (n = 186)	
Depressive symptoms	More	41 (66%)	78 (42%)	0.003
	Unchanged	13 (21%)	79 (42%)	
	Less	8 (13%)	29 (16%)	
Anxiety	More	43 (69%)	76 (41%)	<0.001
	Unchanged	13 (21%)	66 (35%)	
	Less	6 (10%)	44 (24%)	
Sleep quality	Worse	21 (34%)	34 (18%)	0.031
	Unchanged	18 (29%)	78 (42%)	
	Better	23 (37%)	74 (40%)	
Loneliness	More	40 (65%)	89 (48%)	0.074
	Unchanged	17 (27%)	77 (41%)	
	Less	5 (8%)	20 (11%)	
Quality of life	Worse	34 (55%)	65 (35%)	0.024
	Unchanged	20 (32%)	83 (45%)	
	Better	8 (13%)	38 (20%)	

Number of students and the proportion in percentages (%) are compared across the two groups (with and without prior clinical diagnosis of depression or anxiety), using Pearson's chi-squared test.

## Discussion

The current study demonstrates the significant effects that the COVID-19 pandemic has had on medical students' education and wellbeing. Specifically, our results show that the majority of the students believe their medical education worsened during the pandemic. Most Canadian medical students reported having more time to participate in leisure activities and take care of their wellbeing. However, our results show that their overall wellbeing and health related habits significantly worsened during the pandemic.

The COVID-19 pandemic has had a substantial impact on the structure of our society. As we enter the second COVID-19 wave, the need to implement measures such as social distancing and wearing facial masks to reduce the transmission of this virus has become clear.<sup>14</sup> However, what still remains unclear is whether the measures implemented for teaching and maintaining medical education were successful during the first wave. The results of the current study demonstrate that while the vast majority (over three quarters of our sample) supported online teaching as a complementary method to in-person teaching, only a minority favoured it as the principal method of education. Similarly, almost two thirds of our sample found online teaching to be less effective than in-person lectures. One reason online lectures may be considered less effective by medical students is that in-person lectures provide more opportunity for meaningful social interactions.<sup>15,16</sup> Moreover, in-person observed patient simulation activities (which have been mostly ceased due to social distancing measures) allowed students to practice and receive guided feedback on their interpersonal skills. Developing these social skills is an integral part of any medical curriculum and therefore continued efforts should be made to facilitate their development during medical school.<sup>19</sup> Another factor to consider is the novelty of online teaching for instructors/faculties. Aside from the learning curve to using online platforms, instructors and faculty may not have had the time or support to adapt their courses and properly develop teaching materials to deliver their courses in an online format.<sup>17,18</sup>

Developing healthy social skills is not only an important competency for future physicians, it also has a protective effect on mental health.<sup>20</sup> While social isolation has been an integral part in the fight against COVID-19 and a major factor in 'flattening the curve,'<sup>21</sup> previous studies have shown that this can come at the cost of peoples' mental health,<sup>22</sup> which is in line with what our study demonstrated. Interestingly, our study showed that while students had more time for leisure and wellness, almost half of them were more depressed or lonelier, which sheds light on the direct effect of the pandemic on mental health. This deterioration in mental health was accompanied by a statistically significant increase in alcohol consumption, an overall worsening in health habits, and a more sedentary lifestyle.

As we continue to 'flatten the curve', medical schools need to address the secondary effects COVID-19 and social



isolation have on medical students' mental health and wellbeing. Our sub-analysis shows that medical students with a pre-existing mental illness (such as depression or anxiety) were at a higher risk of experiencing negative mental health symptoms due to COVID-19. One way to mitigate the negative effects of COVID-19 on medical education and students' mental health is by relying on mentors for guidance and support. Mentorship has long been rooted in medical education but as students face these uncertain times, its need has never been more critical.<sup>23,24</sup> Having entered a second COVID-19 wave, the authors urge physicians, residents, and senior medical students to provide guidance and support to their junior colleagues as we advance through this pandemic together.

## Conclusion

Having entered a second wave of COVID-19, it is more imperative than ever before to understand the first wave's impact on medical students' wellbeing and education. There are several takeaway messages from our study. The first is that medical students' wellbeing has worsened during the COVID-19 pandemic. Second, students with a prior history of depression and anxiety were more affected. Lastly, with regards to their education, students found that online learning was inferior to in-person teaching and that the quality of their learning had declined since the start of the pandemic. Future studies should explore specific methods in which medical education could be delivered in a safe way while in keeping with the competencies that students strive to achieve.

**Conflicts of Interest:** None

**Funding:** None

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## Appendix A.

Age	
Gender	<ul style="list-style-type: none"> <li>- Male</li> <li>- Female</li> <li>- Other</li> <li>- Single</li> </ul>
Marital Status	<ul style="list-style-type: none"> <li>- Married/domestic partnership</li> <li>- Widowed</li> <li>- Divorced</li> <li>- Med 1</li> <li>- Med 2</li> <li>- Med 3</li> <li>- Med 4</li> </ul>
What year of medical school are you currently in?	<ul style="list-style-type: none"> <li>- Med 1</li> <li>- Med 2</li> <li>- Med 3</li> <li>- Med 4</li> </ul>
Have you been previously diagnosed with anxiety or depression?	<ul style="list-style-type: none"> <li>- Anxiety</li> <li>- Depression</li> <li>- Both</li> <li>- Neither</li> </ul>
What University are you affiliated with?	
Does your medical training program/UGME office have a wellness program?	<ul style="list-style-type: none"> <li>- Yes/No</li> </ul>
Has there been a change in the wellness program of your school since the start of the pandemic?	<ul style="list-style-type: none"> <li>- Yes, the wellness program has improved in structure</li> <li>- Yes, the wellness program has been more widely promoted</li> <li>- No</li> </ul>
Have you participated in a wellness program since the pandemic?	<ul style="list-style-type: none"> <li>- Yes/No</li> </ul>
Has COVID-19 affected your medical education?	<ul style="list-style-type: none"> <li>- Yes/No</li> </ul>
How has your overall medical education been affected by the COVID-19 pandemic?	<ul style="list-style-type: none"> <li>- It improved</li> <li>- It remained the same</li> <li>- It worsened</li> </ul>
How concerned are you with getting infected with the SARS-CoV-2 virus (COVID 19)?	<ul style="list-style-type: none"> <li>- On a scale from 1 to 10</li> </ul>
How concerned are you with dying from COVID-19?	<ul style="list-style-type: none"> <li>- On a scale from 1 to 10</li> </ul>
How concerned are you with having to completely self-isolate/quarantine?	<ul style="list-style-type: none"> <li>- On a scale from 1 to 10</li> </ul>
How efficient do you believe online teaching methods are compared to in-person lecture?	<ul style="list-style-type: none"> <li>- More efficient</li> <li>- As efficient</li> <li>- Less efficient</li> </ul>
Would you opt to continue with online teaching as a <b>COMPLIMENTARY</b> method of teaching?	<ul style="list-style-type: none"> <li>- Yes/No</li> </ul>
If given the choice, would you opt to continue with online teaching as a <b>PREFERRED</b> method?	<ul style="list-style-type: none"> <li>- Yes/No</li> </ul>
How did the COVID 19 pandemic affect your personal studying time?	<ul style="list-style-type: none"> <li>- More time to study</li> <li>- Same study time</li> <li>- Less time to study</li> </ul>
Do you smoke?	<ul style="list-style-type: none"> <li>- Yes/No</li> <li>- If yes, how many cigarettes do you smoke on average daily <b>before</b> the COVID-19 pandemic</li> <li>- How many cigarettes do you smoke on average daily <b>NOW?</b></li> </ul>



Do you drink alcohol?	<ul style="list-style-type: none"> <li>- Yes/No</li> <li>- If yes, how many drinks of alcohol did you drink on average daily <b>before</b> the COVID-19 pandemic?</li> <li>- How many drinks of alcohol do you drink on average daily <b>NOW</b>?</li> </ul>
Before COVID 19, how much time did you spend sitting daily? (in hours)	
Since COVID-19, pandemic, how much time do you spend sitting daily? (in hours)	
Before COVID 19, how many hours did you spend in front of a screen? (in hours)	
Since COVID 19, how many hours did you spend in front of a screen? (in hours)	
Before COVID 19, how much time on average did you usually spend in moderate activity (in hours)?	
Since COVID 19, how much time on average have you spent in moderate activity? (in hours)	
Before COVID-19, how much time on average did you usually spend in vigorous activity?	
Since COVID-19, how much time on an average day have you spent in vigorous activity?	
Since COVID-19, I rate my overall quality of life to be	<ul style="list-style-type: none"> <li>- Better than before</li> <li>- As before</li> <li>- Worse than before</li> </ul>
Since COVID-19, I feel	<ul style="list-style-type: none"> <li>- More depressed than before</li> <li>- No change in depression symptoms</li> <li>- Less depressed than before</li> </ul>
Since COVID-19, I feel	<ul style="list-style-type: none"> <li>- More stressed/anxious than before</li> <li>- As stressed/anxious as before</li> <li>- Less stressed/anxious than before</li> </ul>
Since COVID-19, I have	<ul style="list-style-type: none"> <li>- More time to enjoy leisurely activities</li> <li>- Same time</li> <li>- Less time to enjoy leisurely activities</li> </ul>
Since COVID-19, I have	<ul style="list-style-type: none"> <li>- More time to take care of my wellness</li> <li>- Same time</li> <li>- Less time to take care of my wellness</li> </ul>
Since COVID-19, I have	<ul style="list-style-type: none"> <li>- More time to exercise</li> <li>- Same time</li> <li>- Less time to exercise</li> </ul>
Since COVID-19, I have	<ul style="list-style-type: none"> <li>- Sleeping better than before</li> <li>- Sleeping as well as before</li> <li>- Sleeping worse than before</li> </ul>
Since COVID-19, I am	<ul style="list-style-type: none"> <li>- Lonelier than before</li> <li>- As lonely as before</li> <li>- Less lonely than before</li> </ul>