Prevalence of Anxiety and Depression Among Medical Students During the Covid-19 Pandemic: A Cross-Sectional Study

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ABSTRACT

PURPOSE: The Covid-19 pandemic is a public health emergency with both physical and mental health risks. Medical students have baseline elevated rates of anxiety, depression and burnout. As such, they may be especially susceptible to the psychological stresses of Covid-19. The current study aimed to evaluate the prevalence of anxiety and depression among United States medical students during the Covid-19 pandemic.

METHODS: A cross-sectional, survey-based study collected demographic data as well as the 7-item Generalized Anxiety Disorder (GAD-7) and the 9-item Patient Health Questionnaire (PHQ-9) to assess anxiety and depression symptoms, respectively. The survey was administered from April 13, 2020 to April 28, 2020 amidst the height of the Covid-19 pandemic.

RESULTS: A total of 1,428 students from 40 US medical schools completed the survey. From those surveyed, 30.6% and 24.3% of respondents screened positive for anxiety and depression, respectively. Median GAD-7 scores were higher among females (7.0 vs 5.0, $P < .00001$), pre-clinical students (7.0 vs 6.0, $P < .00004$), and those with a friend or relative diagnosed with Covid-19 (7.0 vs 6.0, $P = .001$). Median PHQ-9 scores were higher among females (6.0 vs 4.0, $P < .00001$) and pre-clinical students (6.0 vs 4.0, $P < .00001$).

CONCLUSION: When compared to previous medical student studies, these results are 61% higher for anxiety and 70% higher for depression during the Covid-19 era. The current study suggests that there should be a heightened awareness of and sensitivity to student's mental health during the Covid-19 pandemic with certain cohorts at greater potential risk.

KEYWORDS: Covid-19, medical student mental health, anxiety, depression

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Introduction

The Covid-19 pandemic is a public health emergency of international concern that poses risk to both physical and mental health. Sources of stress are myriad including the absence of a definitive treatment for the disease, utilization of social isolation, inadequate testing, limited personal protective equipment, and associated economic consequences. Various cohorts, such as medical students, may have specific considerations during these challenging times.

Stresses can have a significant and negative impact on the mental health of the general population.[1] However, they may have an amplified impact on the mental health of medical care providers, particularly those on the frontlines of care.[2] The impact of Covid-19 exposure on health care workers was recently evaluated, and this was associated with a high risk for depression and anxiety.[2]

This adverse impact on the mental health of health care workers is not unique to the Covid-19 pandemic, as studies have shown similar effects from previous infectious outbreaks such as SARS in 2003.[1,3-5] Individuals charged with caring for infected patients demonstrated increased levels of stress, anxiety and depression.

Even before the Covid-19 pandemic, medical students have been shown to demonstrate higher rates of mental health issues than the general population, including Generalized Anxiety Disorder (GAD), depression, and burnout.[6,7] Documented causes of stressors for medical students include academic workload, competition with peers, conflicts in work-life balance, family demands, financial difficulties, and exposure to human suffering.[8] In addition to the stressors mentioned above associated with Covid-19, medical students may face unique challenges during the pandemic including disruption of pre-clinical and clinical training, adjustment to new social environments (particularly if social distancing requires a change of location), and exposure to high-risk environments. Previous pandemics, such as the 2003 SARS outbreak in China, have demonstrated the ability to cause increased stress to healthcare students, highlighting the need for additional support for this population during public health crises.[9]

While the impact of the covid-19 pandemic on healthcare workers is well documented, the effect of this public health crisis on the mental health of medical school students in the United States has not been sufficiently studied. The current study aims to assess the prevalence of anxiety and depression by screening medical students for GAD and major depressive disorder (MDD) in the era of Covid-19.

Methods

Study design

A cross-section research design was used to survey medical students at United States (US) allopathic and osteopathic medical schools between April 13, 2020 and April 28, 2020. During this period, the total confirmed cases of Covid-19 in the US grew from 579 005 to 1 005 074.[10] The social and professional networks of 2 first-year medical student authors (SH, MH) were utilized to recruit students from medical schools in the US. Students were engaged via listservs, GroupMe chats, and Facebook groups and asked to participate in the survey. The survey was sent to closed listserves and groups available to medical students only at that school. No authors of the study participated in the survey.

The survey was administered through Qualtrics Research Suite (Qualtrics, Provo, UT), a program that allows researchers to build, distribute, and analyze online surveys in real-time. The survey was electronically distributed to medical students who completed the survey in a de-identified manner.

This study followed the American Association for Public Opinion Research (AAPOR) reporting guidelines. The Rutgers University Institutional Review Board approved this study in April 2020. Additionally, this study was endorsed by the Yale University Institutional Review Board. Informed consent was obtained before starting the survey and participants were allowed to terminate at any time.

Study measures

The survey included basic demographic questions such as age, gender, location and year of study. In addition, questions concerning personal or close social network exposure to Covid-19, and the location where the student was social distancing were investigated. Anxiety and depression symptoms were assessed with 2 validated mental health instruments. The survey is available as Supplemental Digital Appendix 1.

The 7-item Generalized Anxiety Disorder (GAD-7) is a validated screening instrument for GAD. The GAD-7 total score (range 0-21) was interpreted as follows: 0 to 4 for no to minimal anxiety, 5 to 9 for mild anxiety, 10 to 14 for moderate anxiety, and 15 to 21 for severe anxiety. A score of 10 or greater has an 89% sensitivity and 82% specificity for a probable diagnosis of GAD.[7]

The 9-item Patient Health Questionnaire (PHQ-9) is a validated screening tool for depression.[11] The PHQ-9 total score (range 0-27) was interpreted as follows: 0 to 4 for no or minimal depression, 5 to 9 for mild depression, 10 to 14 for moderate depression, 15 to 19 for moderately severe depression, and 20 to 27 for severe depression. A score of 10 or higher has an 88% sensitivity and specificity for a probable diagnosis of MDD, and was used to screen for depression in the study cohort.[11,12]

It is noted that GAD-7 and PHQ-9 scores greater than 10 provide only probable diagnosis of GAD and MDD, respectively. Clinically, these scores would warrant further evaluation by a health care professional.[11,13]

Statistical analysis

Statistical analyses were performed using Qualtrics Research Suite (Qualtrics, Provo, UT). Descriptive statistics were calculated for sociodemographic data. GAD-7 and PHQ-9 scores were expressed as median (interquartile range) and mean (standard deviations).

Non-parametric Mann-Whitney *U* and Kruskal-Wallis tests were conducted to compare GAD-7 and PHQ-9 scores between demographic characteristic groups. The significance level was set at $\alpha = 0.05$ and tests were 2-tailed.

Results

Demographic characteristics

Surveys were sent to students from 40 different medical schools yielding a maximum of 15 407 potential participants. Of these, 1428 completed the survey, resulting in a conservative response rate of 9.3%. Characteristics of the cohort are shown in Table 1. Of the 1428 responding participants, 952 (66.7%) were female, and the average (standard deviation) age was 22.3 (9.0) years old.

Participants consisted of 439 (30.7%) first-year students, 423 (29.6%) second-year students, 336 (23.5%) third-year student, 202 (14.1%) fourth years students, and 28 (2.0%) students who were in a research year or pursuing a second degree. In another breakdown, 750 (54.7%) were in the pre-clinical phase and 621 (45.3%) were in the clinical phase of their medical education.

The majority of participants were social distancing away from their primary campus (1156, [81.0%]) in an urban area (783, [54.9%]) in the Northeast (579, [40.7%]). A total of 524 (36.7%) participants had a friend or relative that had been diagnosed with Covid-19.

Measurements of anxiety

The median (IQR) score on the GAD-7 for anxiety was 6 (3-11) and the mean (SD) score was 7.3 (2.1-12.5). Of these, 941 (65.9%) participants reported symptoms of anxiety and 437 (30.6%) had a positive screen for GAD (GAD-7 $\geq$ 10). The distribution of scores is shown in Figure 1.

Table 1. Demographic characteristics.

CHARACTERISTIC	NO. (%)
Participants, *N*	1428
Gender	
Female	952 (66.7)
Male	462 (32.4)
Non-binary/third gender	12 (0.8)
Prefer not to answer	2 (0.1)
Class year	
M1	439 (30.7)
M2	423 (29.6)
M3	336 (23.5)
M4	202 (14.1)
Research year/second degree/other	28 (2.0)
Phase of education	
Pre-clinical	750 (54.7)
Clinical	621 (45.3)
Location of social distancing	
At school	272 (19.0)
Away from school	1156 (81.0)
Location type	
Urban	527 (36.9)
Suburban	783 (54.9)
Rural	117 (8.2)
Region of social distancing[a]	
Northeast	579 (40.7)
South	398 (28.0)
Midwest	190 (13.4)
West	251 (17.6)
Outside US	5 (0.4)
Friend or relative diagnosed with Covid-19	
Yes	524 (36.7)
No	904 (63.3)

[a]*Northeast*: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont; *South*: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee Texas, Virginia, West Virginia; *Midwest*: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin; *West*: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming.

Higher GAD scores were seen for participants who were female, in the pre-clinical phase of their education, and had a friend or relative who had been diagnosed with Covid-19 (Table 2). Median GAD-7 scores among females versus males: 7.0 versus 5.0, $P < .00001$; median GAD-7 scores among pre-clinical versus clinical: 7.0 versus 6.0, $P < .00004$; median GAD-7 scores among those with a friend or relative diagnosed with Covid-19 versus those without: 7.0 versus 6.0, $P = .001$. Participant age did not demonstrate a significant difference in GAD-7 score.

In terms of location in which an individual was social distancing, the geographic region of the country was a significant factor. Median GAD-7 score among Northeast versus South versus Midwest versus West as 7.0 versus 7.0 versus 8.0 versus 6.0, respectively ($P = .001$). However, social distancing at or away from school and in an urban, suburban, or rural area did not demonstrate a significant difference in GAD-7 score.

Measurements of depression

The median (IQR) score on the PHQ-9 for depression was 5 (2-9) and the mean (SD) score was 6.5 (0.9-12.1). Of these, 799 (56.0%) participants reported symptoms of depression and 347 (24.3%) had a positive screen for MDD. The distribution of scores is shown in Figure 2.

Higher PHQ-9 scores were seen for participants who were female and in their pre-clinical phase of education (Table 2). Median PHQ-9 scores among females versus males: 6.0 versus 4.0, $P < .00001$; median PHQ-9 scores among pre-clinical versus clinical: 6.0 versus 4.0, $P < .00001$. Class year also had a significant effect on PHQ-9 score. Median PHQ-9 score among M1 versus M2 versus M3 versus M4: 6.0 versus 6.0 versus 5.0 versus 4.0, respectively ($P = .00006$). Participant age and having a friend or relative diagnosed with Covid-19 did not demonstrate a significant difference.

Geographic region in the country where an individual was social distancing was also associated with a difference in PHQ-9. Median PHQ-9 score among Northeast versus South versus Midwest versus West: 5.0 versus 5.0 versus 6.0 versus 5.0, $P = .020$. Social distancing at or away from school and in an urban, suburban, or rural area did not demonstrate a significant difference in PHQ-9 score.

Discussion

The Covid-19 era has ushered in a new norm of uncertainty, social isolation, and fear. For medical students, these sentiments have been compounded by concerns of exposure and separation from their community while school workflow continues. Pre-clinical students have had their curricula move to an all-online format, while clinical students are out of the hospital and attempting to schedule their final years of medical school. Given these circumstances, the impact of Covid-19 on mental health is an increasingly important topic to consider.

The current study aimed to evaluate anxiety and depression in medical students throughout the United States. The social networking methodology utilized for the study was a way to rapidly sample participants across the country. With over 1,400 participants, this was one of the larger study samples compared to similar mental health studies with medical students. The sample consisted of medical students across all class years from

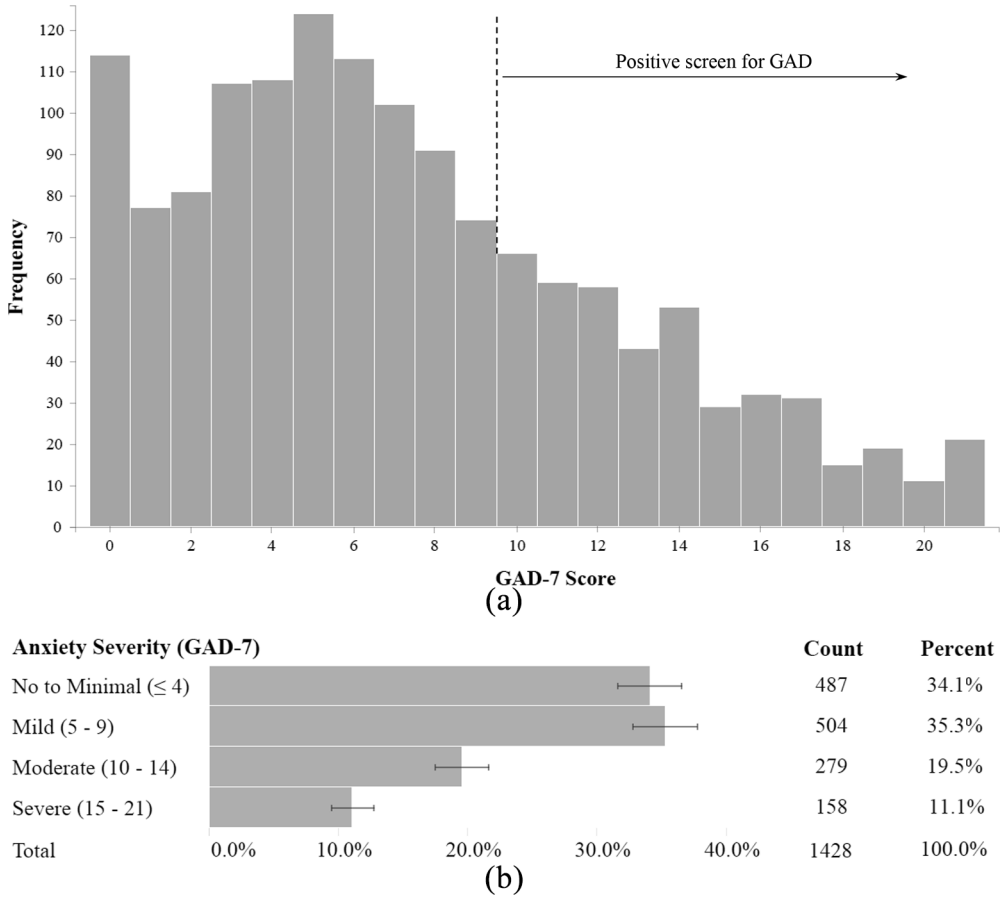

Figure 1. GAD-7 score distribution: (a) this figure shows the distribution of the 7-item Generalized Anxiety Disorder (GAD-7) among the 1428 survey respondents. These results demonstrate a median (IQR) of 6 (3-11) and a mean (SD) of 7.3 (5.2). Scores ranged from 0 to 21. Scores greater than or equal to 10 are indicative of a positive screen for probable generalized anxiety disorder (GAD). GAD-7 Severity Score: (b) this figure shows the distribution of GAD-7 scores among the respondents when grouped by severity. Results were interpreted as follows: 0 to 4 for no to minimal anxiety, 5 to 9 for mild anxiety, 10 to 14 for moderate anxiety, and 15 to 21 for severe anxiety. Error bars represent the confidence interval of the anxiety severity group percent (no to minimal [≤4]: 31.7-36.6%; mild [5-9]: 32.9-37.8%; moderate [10-14]: 17.6-21.7%; severe [15-21]: 9.5-12.8%).

Table 2. Association of anxiety and depression scores and demographic characteristics.

CHARACTERISTIC	MEDIAN GAD-7 SCORE	*P* VALUE	MEDIAN PHQ-9 SCORE	*P* VALUE
Gender		**<.00001**[a]		**<.00001**[a]
Female	7.0		6.0	
Male	5.0		4.0	
Class year		.022[b]		**.00006**[b]
M1	7.0		6.0	
M2	7.0		6.0	
M3	5.0		5.0	
M4	5.0		4.0	
Phase of education		**<.00004**[a]		**<.00001**[a]
Pre-clinical	7.0		6.0	
Clinical	6.0		4.0	
Location of social distancing		.353[a]		.193[a]

(Continued)

Table 2. (Continued)

CHARACTERISTIC	MEDIAN GAD-7 SCORE	*P* VALUE	MEDIAN PHQ-9 SCORE	*P* VALUE
At school	6.0		6.0	
Away from school	6.5		5.0	
Location type		.745[b]		.525[b]
Urban	7.0		5.0	
Suburban	6.0		5.0	
Rural	7.0		5.0	
Region of social distancing		**.001**[b]		**.020**[b]
Northeast	7.0		5.0	
South	7.0		5.0	
Midwest	8.0		6.0	
West	6.0		5.0	
Friend or relative diagnosed with Covid-19		**.001**[a]		.357[a]
Yes	7.0		5.0	
No	6.0		5.0	

Abbreviations: GAD-7, 7-item Generalized Anxiety Disorder; PHQ-9, 9-item Patient Health Questionnaire.
[a]Mann-Whitney U test.
[b]Kruskal-Wallis test.
Note. The bolded *P* values emphasize statistically significant differences in GAD-7 or PHQ-9 scores between variables.

forty different allopathic and osteopathic schools from all regions of the United States.

Another strength of this study is the period in which responces were collected. On the first day of data collection, the world was nearing 2 million cases, and the United States had approximately 600 000 confirmed cases with 27 000 deaths.[14] The study was collected while there were approximately thirty thousand new confirmed cases each day in the United States.[14]

The GAD-7 instrument demonstrated a high prevalence of moderate to severe GAD (30.6% with a score of ⩾10) in the study cohort (Figure 3). At baseline, this has been reported in the general population (age 20-39) for 2.3% surveyed.[6] The baseline for medical students has been reported to be 19%.[6] In the Covid-19 era, medical students are therefore 61% more likely to have a GAD-7 score indicative of probable GAD.

In terms of associations for higher GAD-7 scores, the results of this study demonstrated several pertinent positive and negative findings. Gender, class year, phase of medical education, region, and having a friend or relative diagnosed with Covid-19 each demonstrated significant differences among groups. Having a friend or relative affected by Covid-19 resulted in a significant increase in GAD. The stage of education influenced the survey outcomes. Pre-clinical students had a higher prevalence of GAD, possibly due to relocation, uncertainty associated with exam dates, at-home distractions, and less medical school experience. Additionally, many clinical medical students were not in the hospital at this time decreasing their day-to-day pressure. Age, social distancing at or away from school and in an urban, suburban, or rural location did not demonstrate a statistically significant difference with GAD-7.

The PHQ-9 instrument demonstrated a high prevalence of depression (24.3% with a score ⩾10) in respondents (Figure 3). At baseline, this has been reported in the general population (age 18-54) to be 4.9%.[15] The baseline for medical students has been reported to be 14.3%.[16] In the Covid-19 era, medical students are therefore 70% more likely to have a PHQ-9 score indicative of probable MDD.

Significant group differences in PHQ-9 were also noted. There was a statistically significant difference in gender, class year, and phase of medical training. The stage of education influenced the survey outcomes, and pre-clinical students had a higher prevalence of depression. Age, having a friend or relative diagnosed with Covid-19, and social distancing at or away from school and in an urban, suburban, or rural location did not demonstrate a statistically significant difference with PHQ-9.

Additionally, while regional location of social distancing demonstrated a statistically significant effect on GAD-7 and PHQ-9 scores, sample size imbalance among the different regions makes this outcome difficult to interpret. Furthermore, regions were broad, encompassing a variability in population densities, and prevalence of Covid-19. Displacement of students (I.e. social distancing at or away from their primary

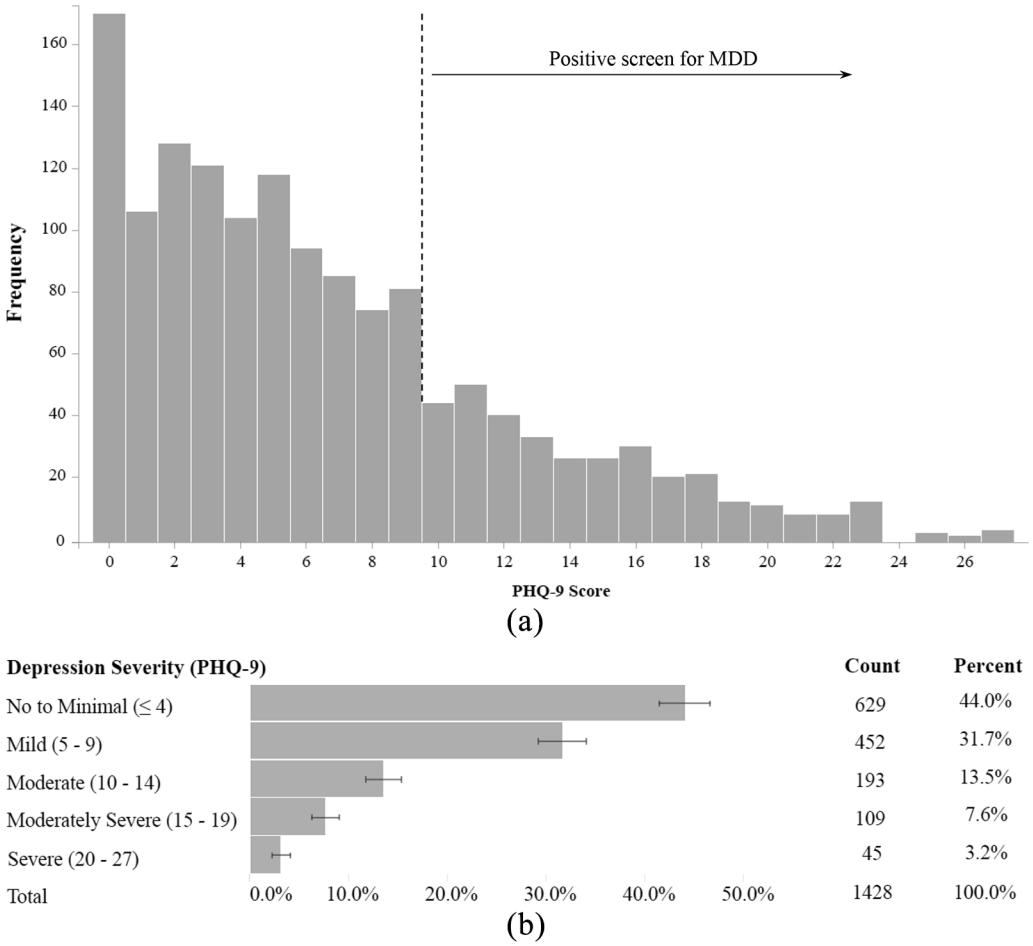

Figure 2. PHQ-9 score distribution: (a) this figure shows the distribution of the 9-item Patient Health Questionnaire (PHQ-9) among the 1428 survey respondents. These results demonstrate a median (IQR) of 5 (2-9) and a mean (SD) of 6.5 (5.6). Scores ranged from 0 to 27. Scores greater than or equal to 10 are indicative of a positive screen for probable major depressive disorder (MDD). PHQ-9 Severity Score: (b) this figure shows the distribution of PHQ-9 scores among the respondents when grouped by severity. Results were interpreted as follows: 0 to 4 for no to minimal depression, 5 to 9 for mild depression, 10 to 14 for moderate depression, and 15 to 19 for moderately severe depression, and 20 to 27 for severe depression. Error bars represent the confidence interval of the depression severity group percent (no to minimal [≤4]: 41.5-46.6%; mild [5-9]: 29.3-34.1%; moderate [10-14]: 11.8-15.4%; moderately severe: [15-19]: 6.4-9.1%; severe [20-27]: 2.4-4.2%).

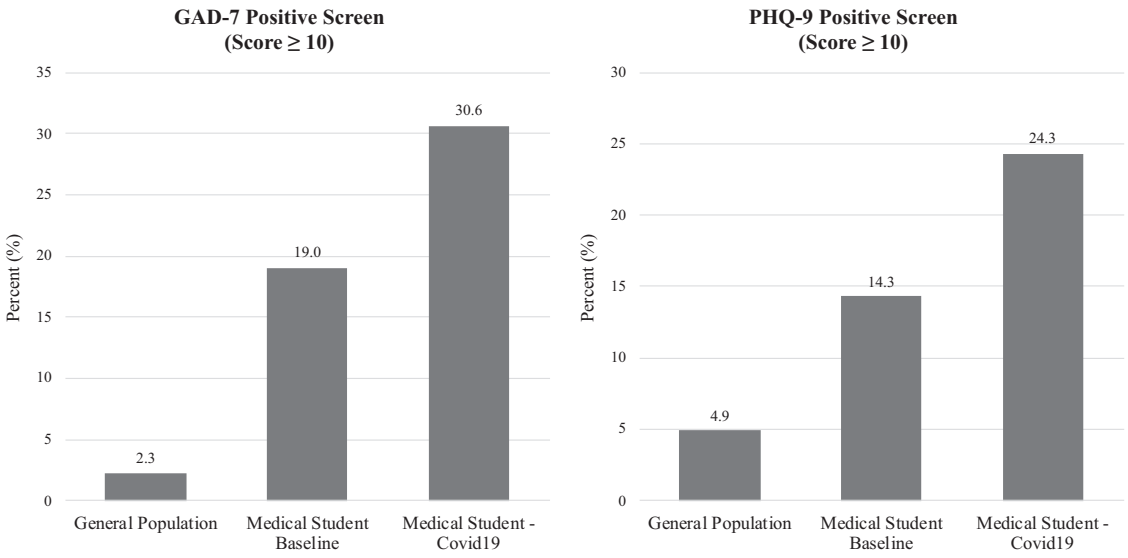

Figure 3. GAD-7 and PHQ-9 Severity Scores compared to previous estimates. This figure shows the incidence of GAD-7 and PHQ-9 positive screens (score ⩾ 10) compared to the general population and previous medical student estimates.

campus) and placement in an urban, suburban, or rural environment did not significantly impact study outcomes. Despite the concentration of Covid-19 cases in urban centers, GAD and depression scores were similar for students in urban, suburban, and rural locales.

These findings are imperative to consider when assessing medical student mental health in the Covid-19 era. Most importantly, this study identified a high prevalence (30.6% and 24.3%) of medical students who should be further evaluated for Generalized Anxiety Disorder and depression, respectively. These meaningful rises in GAD and depression, along with the challenges of seeking care during the pandemic is a worrisome combination.

The survey was sent out in a way to reach the highest number of medical students possible. An anticipated pitfall of a survey study designed to reach as many students as possible through a social-network approach is a low response rate. As a result, the data may be less generalizable, as non-response bias (or the inverse) may influence the likelihood of completing the survey. Over or underrepresentation of baseline mental health issues in the study cohort may influence the results of the study. Because there was no active control group in the study as it was enacted during the Covid-19 pandemic, and comparisons were made to historic controls, a methodology with inherent limitations. Nonetheless, a matched cohort was not possible given the widespread nature of the pandemic.

Overall, this cross-sectional, survey-based study identified an increase in the prevalence of GAD and depression (approximately 60% and 70% respectively), suggesting that medical students may be especially susceptible to the emotional impact of the Covid-19 pandemic. This study suggests that there should be increased awareness of and sensitivity to student's mental health during the Covid-19 era. These results can provide valuable information to medical school administrators and educators to respond to the pandemic to best combat anxiety and depression. Schools can supply students with resourses, including counsiling, peer advocacy, and support. Additionally, those who are feeling symptoms of anxiety and depression should seek professional mental health care.

Author Contributions

SJH, MNH and SP conceived the idea, analyzed data, and drafted the manuscript. JG supervised the study throughout the whole process including data analysis and presentation, and manuscript preparation. All the authors have discussed and approved the final manuscript.

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Supplemental Material

Supplemental material for this article is available online.

REFERENCES

1. Wang C, Pan R, Wan X, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health*. 2020;17:1729.
2. Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open*. 2020;3:e203976.
3. Bai Y, Lin C-C, Lin C-Y, Chen J-Y, Chue C-M, Chou P. Survey of stress reactions among health care workers involved with the SARS outbreak. *Psychiatr Serv*. 2004;55:1055-1057.
4. Lee AM, Wong JGWS, McAlonan GM, et al. Stress and psychological distress among SARS survivors 1 year after the outbreak. *Can J Psychiatry*. 2007;52:233-240.
5. Chua SE, Cheung V, Cheung C, et al. Psychological effects of the SARS outbreak in Hong Kong on high-risk health care workers. *Can J Psychiatry*. 2004;49:391-393.
6. Mousa OY, Dhamoon MS, Lander S, Dhamoon AS. The MD blues: under-recognized depression and anxiety in medical trainees. *PLoS One*. 2016;11:e0156554.
7. Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Acad Med*. 2006;81:354-373.
8. Hill MR, Goicochea S, Merlo LJ. In their own words: stressors facing medical students in the millennial generation. *Med Educ Online*. 2018;23:1530558.
9. Wong JGWS, Cheung EPT, Cheung V, et al. Psychological responses to the SARS outbreak in healthcare students in Hong Kong. *Med Teach*. 2004;26:657-659.
10. CDC. Coronavirus disease 2019 (COVID-19) in the U.S. centers for disease control and prevention. April 24, 2020. Accessed April 26, 2020. https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html
11. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16:606-613.
12. Arrieta J, Aguerrebere M, Raviola G, et al. Validity and utility of the Patient Health Questionnaire (PHQ)-2 and PHQ-9 for screening and diagnosis of depression in rural Chiapas, Mexico: a cross-sectional study. *J Clin Psychol*. 2017;73:1076-1090.
13. Spitzer RL, Kroenke K, Williams JBW, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med*. 2006;166:1092-1097.
14. Worldometer. United States coronavirus: 1,064,819 cases and 61,680 deaths. Accessed April 30, 2020. https://www.worldometers.info/coronavirus/country/us/. 2020.
15. Shim RS, Baltrus P, Ye J, Rust G. Prevalence, treatment, and control of depressive symptoms in the United States: results from the National Health and Nutrition Examination Survey (NHANES), 2005-2008. *J Am Board Fam Med*. 2011;24:33-38.
16. Schwenk TL, Davis L, Wimsatt LA. Depression, stigma, and suicidal ideation in medical students. *JAMA*. 2010;304:1181-1190.