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Predictors of emotional wellbeing in osteopathic medical students in a COVID-19 world

<https://doi.org/10.1515/jom-2020-0272>

Received October 18, 2020; accepted December 17, 2020;
published online February 18, 2021

Abstract

Context: In March 2020, the World Health Organization declared the novel coronavirus disease 2019 (COVID-19) outbreak a pandemic. Due to the rapid spread, strong contagion, high incidence of lethality in severe cases, and the lack of a pharmaceutical prevention or cure, COVID-19 has posed a serious threat to human life and health. It has also had a tremendous impact on mental health, including fear and worry, difficulty sleeping or concentrating, and increased use of poor coping mechanisms. Osteopathic medical students have had additional concerns regarding the interruption of their studies, closing of clinical rotations, and postponed licensing exams. To date, few reports have focused on osteopathic medical students and their reactions to the outbreak.

Objectives: To assess resilience, coping, health behaviors, and emotional wellbeing of osteopathic medical students during the onset of the COVID-19 pandemic.

Methods: In this cross-sectional study, we distributed an anonymous online survey to all medical students enrolled at Nova Southeastern University in May 2020 (n=1,310) via an e-mail invitation using the institution's student list-servs. Our major study variables were based on published reports and anecdotal evidence; we subsequently developed the Emotional Wellbeing in Healthcare Professions Students Questionnaire (EWB-Q). This EWB-Q contained

validated scales to assess the contribution of levels of coping strategies used, personal resilience, and health behaviors on the emotional wellbeing of osteopathic medical students. Multiple linear regression and other statistical analyses were conducted using SPSS v0.26.

Results: Of the 1,310 students invited to participate, 335 (25.5%) surveys were returned. Of those, 133 had more than 33% of the necessary data missing and were removed, resulting in 202 (15.4%) completed questionnaires. The mean age of the participants was 26.7 years. About half (n=92; 45.5%) were in the clinical phase (years 3 and 4) of their medical school training (in rotations). A significant regression equation was found ($F[4,171]=17.481$, $p<0.000$, $R^2=0.290$, $R^2_{\text{adjusted}}=0.274$), indicating that levels of coping, personal resilience, and health behaviors (i.e., not sleeping more than usual, not exercising less than usual) accounted for a significant amount of the variance in emotional wellbeing scores in osteopathic medical students. Higher levels of resilience, greater use of coping strategies, not sleeping more than usual, and not exercising less than usual were predictors of emotional wellbeing.

Conclusions: Cultivating positive mental health should be a high priority for medical educators as they develop and implement curriculum-based initiatives to help medical students bolster their personal resilience and to encourage healthy coping behaviors during times of crisis and beyond. A proactive position that assists with building personal resilience and developing stress management habits is paramount in assisting students who are grappling not only with the challenges of rigorous medical training, but also with the uncertainty and stress that exists during any major global health or socioeconomic crisis.

Keywords: coping; COVID-19; emotional wellbeing; health behaviors; mental health; osteopathic medical student; resilience.

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In March 2020, the World Health Organization declared the novel coronavirus disease 2019 (COVID-19) outbreak a pandemic [1]. Due to the rapid spread, strong contagion, high mortality rates in severe cases, and the lack of a pharmaceutical prevention or cure, COVID-19 has posed a

significant threat to human life and health and has had an impact on mental wellbeing [2, 3]. While the unease brought on by COVID-19 has affected many, medical students may be experiencing particular stress during this infectious disease outbreak. In addition to fear and worry about one's own health – precipitating changes in exercise patterns, difficulty sleeping or concentrating, worsening of chronic health problems, and increased use of poor coping mechanisms – medical students have had additional concerns regarding the interruption of their studies, including the closing of clinical rotations, postponed licensing exams, and social isolation from peers during their academic careers. Exposure to disasters and pandemics has been associated with emotional distress [4]. However, some individuals continue to function normally during adversity, which may be due to personal resilience [5–8]. There is research to support the idea that greater resilience can help alleviate feelings of helplessness in the face of setbacks [9].

Personal resilience

A higher level of resilience provides an individual with the ability to withstand and recover from emotional duress in an effective manner [6]. It has been thought to act as a protective factor that promotes emotional well-being [10]. Positive emotions have been shown to predict increases in resilience [11]. Increases in resilience can foster the relationship between positive emotions and increased life satisfaction, suggesting that mental wellbeing can manifest as individuals develop resilience, which is a resource for living well [12]. Some previous studies of medical students in the United States and globally [6, 7, 13] have documented high levels of resilience relative to the general population, effectively lowering their psychological distress. Personal resources such as optimism, active coping, and social support may facilitate the ability to recover from stress or adversity [14–16]. The ability to recover may, in turn, have a direct relationship with emotional wellbeing outcomes [17].

Previous literature has posited that medical students possess some degree of resilience that helps buffer the stress of a rigorous medical training [18, 19]. There is a need, however, to explore how resilience has affected wellbeing in medical students during the COVID-19 pandemic [20].

Coping skills

Coping skills are daily strategies used to manage external situations and help increase resilience; they may be

instrumental to managing emotional wellbeing. Poor coping skills have been linked to suboptimal mental health – particularly depression – in medical students [13, 21–23]. While the topic of coping strategies has been extensively studied [24–26], the nuances of coping behaviors are not fully understood and may depend on the situation and population being studied [27]. For instance, few studies to date have focused on coping strategies among medical students during a pandemic such as COVID-19 [28, 29]. Moreover, medical students are generally reluctant to seek out mental health services, despite having high rates of anxiety and depression [30–32].

Emotional wellbeing for medical students in a COVID-19 world

Wellbeing is instrumental in preventing and reducing the severity of mental health issues [33]. Medical students can be vulnerable to emotional distress due to the significant challenges in their learning environment. For example, 582 medical students in a previous study [34] had better mental health indicators (lower rates of burnout and depression) than their age-matched peers when they began their graduate studies. However, in other studies, the prevalence of psychological distress increased compared with the age-matched general population cohorts in the United States [35–38] Canada [32], Australia [39], and China [40]. These data underscore the need to examine emotional wellbeing, especially during the COVID-19 pandemic, which has the potential to exacerbate matters and affect medical students' ability to learn and perform in the postgraduate clinical learning environment.

Contributing factors to medical students' struggles with emotional health issues may be related to having high expectations of self, pressure to attain academic excellence, isolation due to long hours of studying, and their presence in a highly competitive academic environment. Attending medical school during the COVID-19 pandemic may exacerbate their stress responses. For example, a study of the Severe Acute Respiratory Syndrome (SARS) epidemic [41] showed that quarantine measures specific to respiratory infections caused increases in mental health complaints among the general population, specifically regarding depression, panic attacks, anger, anxiety, boredom, fear, loneliness, and suicidal ideation [41]. During the current pandemic, having social interactions or developing a (potentially unrelated) cough or fever can cause greater-than-normal anxiety and distress given the fear of contracting COVID-19 [42].

High levels of depression and other mood disorders have been reported in medical students [32], but few studies are available that have assessed their emotional wellbeing and factors that may influence it during COVID-19 in medical students [43, 44]. Initial data gathered since the onset of COVID-19 indicate that front-line healthcare professionals have a high risk of developing negative emotional wellness outcomes [44, 45].

The levels of medical students' resilience, coping, and health behaviors and the extent to which these factors contribute to their emotional wellbeing during the COVID-19 pandemic is yet unknown. Few reports have focused on these students and their reactions to the outbreak.

Current research

The purpose of this study was thus to investigate personal resilience, level of coping strategies, health behaviors, and emotional well-being among medical students in the United States during the onset of the COVID-19 pandemic. With this study, we hypothesized that higher levels of personal resilience, a greater number of coping skills, and positive health behaviors would make significant contributions to emotional wellbeing in medical students.

Methods

Participants and recruitment

A cross-sectional study design was used to collect data from medical students enrolled at Nova Southeastern University through a quantitative survey delivered electronically. The survey was distributed online to all enrolled medical students in May 2020 ($n=1,310$ medical students) via an e-mail invitation using the institution's student listservs. The study was approved (No. 2020-190) by the Nova Southeastern University Institutional Review Board (ethics committee for research with human subjects). Participants were informed about the study via a cover letter with consent form that accompanied the survey. They were also instructed that clicking the link to start the survey indicated they consented to participate in the study. Reminder emails were sent to potential participants ($n=1,310$) after 1 week and 5 days prior to the close of the online questionnaire, notifying them of the campaign's end date. Participant anonymity was maintained during the data collection process by using a numerical coding protocol that does not store any identifying information. REDCap (<http://projectredcap.org/>), a secure, user-friendly web application for building and managing online surveys and databases, was used to collect and store respondent data before it was transferred to SPSS for analysis.

Emotional wellbeing in healthcare professions students questionnaire

The primary author (R.J.) developed a 56-item survey called the Emotional Wellbeing in Healthcare Professions Students Questionnaire (EWB-Q; Supplemental Material). We reviewed some published papers from academic peer-reviewed journals (for the purpose of informing the researchers in developing a research question and selecting major study variables), which provided insight into recent literature. After considering the context of those articles, major study variables were chosen based on those we thought to be linked to medical students' resilience, coping, and emotional wellbeing. The EWB-Q contained validated measures to assess resilience, coping, certain health behaviors (i.e., healthy sleeping and exercise patterns), emotional wellbeing, and demographic items.

Sample characteristics

All the participants were osteopathic medical students in years 1 through 4. Six items developed by the researchers were used to assess participants' age, race, ethnicity, sex, living situation, and student status (preclinical vs clinical).

Resilience

The 6-item Brief Resilience Scale (BRS) assesses the ability to bounce back or recover from stress, with higher scores indicating a higher level of resilience [17]. The BRS is a reliable scale that is negatively related to anxiety, depression, negative affect, and physical symptoms when other resilience measures, and optimism, social support, and Type D personality (high negative affect and high social inhibition) are controlled [17]. Responses are scored on a 5-category ordinal scale, where: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree. Higher scores indicate higher levels of resilience. Examples of items include "I tend to bounce back quickly after hard times," and "I usually come through difficult times with little trouble." Internal consistency for the BRS is good, with Cronbach's alpha ranging from 0.80–0.91.

Coping

The Brief COPE is a 28-item scale with scores ranging from 1 to 4, with higher scores indicating greater use of coping strategies [45]. Responses are: 1 = I haven't been doing this at all; 2 = I've been doing this a little bit; 3 = I've been doing this a medium amount; and 4 = I've been doing this a lot. Examples of items include "I've been accepting the reality of the fact that it has happened," "I've been getting comfort and understanding from someone," and "I've been trying to find comfort in my religion or spiritual beliefs." No published reports could be found of reliability estimates.

Emotional wellbeing

The Higher Mental Health Continuum (MHC-SF) is a 14-item scale with scores ranging from 1 to 6, with higher scores indicating a higher level

of emotional wellbeing. According to Keyes [46, 47], people can be classified as flourishing (higher scores) or languishing (lower scores) regarding emotional wellbeing. Responses are scored on a 6-category ordinal scale, where: 1 = never; 2 = once or twice; 3 = about once a week; 4 = about 2 or 3 times a week; 5 = almost every day; and 6 = every day; higher scores indicate greater levels of emotional wellbeing. Examples of items include “that the way our society works makes sense to you,” and “that your life has a sense of direction or meaning to it.” Internal consistency reliability of the MHC-LF has been high (>0.80).

Health behaviors

Two single items regarding health behaviors were included in the assessment battery: (1) “I’ve been exercising more than usual;” and (2) “I’ve been sleeping more than usual.” These items were scored using a 4-point ordinal scale where: 1 = I haven’t been doing this at all; 2 = I’ve been doing this a little bit; 3 = I’ve been doing this a medium amount; and 4 = I’ve been doing this a lot.

Data analysis

All data were cross-checked for errors (e.g., out of range values, missing data, outliers). Surveys with more than one-third (33%) data missing were considered incomplete and excluded from analysis. Internal consistency (Cronbach’s alpha) for scales were computed for the sample and compared with estimates from previous studies (when available) in which the instruments were used. For this study sample, internal consistency estimates for measures within the survey were favorable: resilience ($\alpha=0.883$), coping skills ($\alpha=0.808$), and emotional wellbeing ($\alpha=0.910$). Sample characteristics were summarized as frequency and percentage for discrete variables and as means and standard deviation for a continuous variable. Summary statistics for the major study variables are reported below. A linear regression analysis was used for hypothesis testing to explore the contributions of personal resilience, coping, and health behaviors to emotional wellbeing in osteopathic medical students.

Results

Of the 1,310 students invited to participate, 335 (25.5%) surveys were returned; 133 of those had $>33\%$ data missing and were removed, resulting in 202 (15.4%) completed questionnaires.

We piloted the questionnaire with five medical students not involved in the study before disseminating it and recorded the amount of time it took to complete, which was between 10 and 15 min. Table 1 reports the characteristics of the sample. The mean age of the participants was 26.7 years (range, 21–57 years); 40.9% ($n=76$) of those who answered the item regarding sex were male and 59.1% ($n=110$) were female. Regarding training phase, 110 (54.4%) participants were in the preclinical phase and 92 (45.6%) students were in the clinical phase.

Table 1: Characteristics of the sample ($n=202$).

Characteristic	n	%*
Self selected race or ethnicity		
Asian/Pacific Islander	43	26.2
Black	5	3.0
Biracial/multiracial	7	4.3
White	103	62.8
“Other”	6	3.7
Hispanic or Latino	32	17.3
Sex		
Female	110	59.1
Male	76	40.9
Current training stage		
Preclinical	110	54.4
Clinical	92	45.6
Current living situation		
Single (living alone)	50	27.0
Single (living with family/friends)	87	47.0
Married/partnered (living together)	44	23.8
Other living situation	18	2.2

* Valid percent is reported; missing data were excluded from the calculations.

Summary statistics for the major study variables are provided in Table 2. The mean score for the Brief Resilience Scale was 3.67 (range, 1–5), with higher scores indicating greater personal resilience. The mean score for the Brief COPE was 2.29 (range, 1–4), with higher scores indicating higher use of coping strategies. The mean score for the Higher Mental Health Continuum was 4.39 (range, 1–6), with higher scores indicating greater levels of emotional wellbeing.

Regarding health behaviors, the mean score for the item “I’ve been sleeping more than usual” was 2.5 (range, 1–4), with higher scores indicating the participant was sleeping more than usual after the onset of COVID-19. For the item “I’ve been exercising less than usual,” the mean score was 2.14 (range, 1–4), with higher scores indicating participants had been exercising less during this time.

Table 2: Summary statistics for major study variables.

	n	Mean	SD	Min	Max
Personal resilience, scale	197	3.67	0.774	1	5
Level of coping strategies used, scale	202	2.29	0.358	1	4
Emotional wellbeing, scale	191	4.39	0.861	1	6
Sleeping more than usual (single item)	201	2.50	1.043	1	4
Exercising less than usual (single item)	201	2.14	1.097	1	4

Table 3 reports the findings from the regression analysis. Linear regression modeling indicated that the level of coping skills, personal resilience, and certain health behaviors (i.e., not sleeping more than usual and staying with exercise regime) explain a significant amount of the variance in emotional wellbeing scores in medical students during the first months of the COVID-19 pandemic in the United States. A significant regression equation was found: $F(4,171)=17.481$, $p<0.000$, $R^2=0.290$, R^2 adjusted=0.274. Higher levels of resilience, greater use of coping strategies, not sleeping more than usual, and exercising as they had before COVID-19 significantly contributed to emotional wellbeing in this sample of osteopathic medical students.

The regression analysis showed that higher levels of personal resilience, engaging in more coping strategies, not sleeping more than usual, and not exercising less than usual significantly contributed to maintenance of emotional wellbeing in this sample of medical students in the early months of the COVID-19 pandemic.

Discussion

It has been suggested that there is a relationship between personal resilience and health outcomes [17]. Individual resources such as optimism, active coping, and social support may facilitate the ability to recover from stress or adversity. The ability to recover itself may, in turn, have a more direct relationship with mental health outcomes. Fostering personal resilience and promoting healthy coping behaviors may facilitate emotional wellbeing during stressful events such as the COVID-19 pandemic. However, medical school curricula do not always offer activities that teach effective coping skills like how to develop resourcefulness, teamwork, and communication skills, how to build support networks, or how to effectively make use of external resources [48], even though many students believe resilience training would be helpful,

particularly during or prior to the start of their clinical training [18].

Evidence also exists that cognitive and behavioral strategies focusing on resilience and coping skills can have positive effects on managing stressors [33, 49, 50] and help cultivate resilience [51]. For example, mindfulness training may help mitigate emotional distress by reducing the anticipation anxiety [52, 53] experienced by medical students regarding a COVID-19 infection, in addition to the clinical uncertainty faced as a medical trainee [53].

Our findings suggest a need to further understand the role and impact of resilience, coping, and certain health behaviors that are specific to medical students in times of crisis. Potential additional health behaviors of medical students used to cope during the COVID-19 pandemic that may merit exploration include a more detailed analysis of nutrition and exercise behaviors; an evaluation of increased consumption of alcohol, recreational drugs, and/or other potentially abusive substances; and a review of students' levels of social interaction and isolation, especially for new or incoming students without a social support system, given current quarantine measures. There may be an ongoing need for curriculum-based approaches to promote emotional wellbeing and help medical students make sense of their context as it relates to COVID-19 and future public health crises. Efforts should be taken to research interventions that meaningfully help to develop future generations of physicians who are resilient, maintain skillful coping strategies, and engage in positive health behaviors.

Limitations

This study utilized a cross-sectional survey design to collect data and thus generalizations cannot be made regarding changes or trends over time, directionality of influence, or cause-and-effect relationships. Moreover, multisite data collection might have provided a more diverse sample of respondents, which limits the ability to generalize findings to all medical students. There are several disadvantages of conducting research via online surveys, such as limited respondent availability or reduced willingness to respond without a person in front of them. However, the conclusions drawn from this survey can be useful to direct more focused research efforts to understand factors related to emotional wellbeing in medical students during an infectious disease epidemic, pandemic, or other large-scale health crisis, for which a longitudinal investigation may be more appropriate.

Table 3: Regression model for emotional wellbeing.

	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>	<i>Sig</i>
(Constant)	34.152	6.813		5.013	0.000**
Personal resilience	1.124	0.179	0.419	6.623	0.000**
Level of coping	0.170	0.082	0.141	2.079	0.039*
Sleeping more than usual	-1.634	0.800	-0.144	-2.044	0.043*
Exercising less than usual	-1.827	0.747	-0.168	-2.445	0.015*

Predicted variable: emotional wellbeing. * $p<0.05$; ** $p<0.01$.

Conclusions

This study investigated several factors to predict the emotional wellbeing of osteopathic medical students at the onset of the COVID-19 pandemic in the U.S. with the goal of providing a better understanding of how to help these students navigate large-scale crises that affect them personally and professionally. The findings show that certain indicators (i.e., personal resilience, coping strategies, and certain health behaviors) significantly predicted emotional wellbeing in this sample.

These findings highlight the need for strategies to assist medical students while they are in school to mitigate some of the potentially harmful repercussions of living through a pandemic while also training to be a front-line healthcare provider. Coping skills and resilience are needed to navigate the current COVID-19 pandemic as well as any future infectious disease health crisis for which medical trainees might be called upon to serve. As the importance of mental health among physicians and medical trainees continues to be of concern, especially during crises and pandemics, cultivating positive mental health should be a key priority for medical educators.

Research funding: None declared.

Author contributions: Dr Jacobs provided substantial contributions to conception and design, acquisition of data, analysis, and interpretation of data and drafted the manuscript; Dr Kane, Dr Caballero, and Ms Lanspa drafted the article or revised it critically for important intellectual content; all authors gave final approval of the version of the article to be published; and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Competing interests: Authors state no conflict of interest.

Informed consent: All participants in this study provided informed consent.

Ethical approval: This study was approved by the Institutional Review Board at Nova Southeastern University (ethics committee for research with human subjects (No. 2020-190).

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Supplementary Material: The online version of this article offers supplementary material (<https://doi.org/10.1515/jom-2020-0272>).