Assessing Psychological Resilience and Distress Among Graduate Health Profession Students During the COVID-19 Pandemic

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Abstract

Background: Resilience, a person's ability to adapt to adverse events, is associated with positive outcomes, especially in the field of healthcare. Research into the effects of the COVID-19 pandemic may help to understand and combat the long-term mental health burden for trainees in health care.

Objective: This cross-sectional study aimed to assess the impact of the pandemic on health profession students' educational experiences, determine the association between their self-reported resilience and psychological distress and assess group differences between students from different graduate health profession programs in an academic medical center.

Methods: Graduate health profession students completed a 44-question online survey and the 10-item Connor Davidson Resilience Scale (CD-RISC-10) during the COVID-19 pandemic period between January-March 2021. We used descriptive statistics, independent samples t test, Related-samples Wilcoxon signed rank test, Pearson correlations test and Analysis of variance (ANOVA) to analyze the data.

Results: Majority of respondents reported that COVID-19 had a negative impact on their education and caused a reduction in educational opportunities (76.6% and 73% respectively). Majority also reported feeling burned out, lonely/isolated, or frustrated by COVID-19 restrictions (70.0%, 67.4%, and 61.8% respectively). Students reported increased use of both avoidant and adaptive coping strategies during the pandemic. Higher resilience scores were associated with higher self-reported stress, fewer burnout symptoms, and better overall well-being.

Conclusion: The COVID-19 pandemic significantly affected students in graduate health profession programs. Instructional quality, educational opportunities, institutional trust, peer socialization, and personal health and wellbeing were perceived to be negatively impacted. Students may require additional support and resources from their training programs to mitigate these concerns. Future studies should evaluate the long-term impact of the COVID-19 pandemic among pandemic-era graduate health profession students.

Keywords

Graduate medical education, health profession education, COVID-19, resilience, coping

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Introduction

The construct of resilience is generally described as one's ability to overcome or "bounce back" from adversity, and is thought to be a modifiable rather than stagnant trait.[1] Resilience has been associated with lower rates of mental illness, including less depression, anxiety, and obsessive-compulsive symptoms in adolescents.[2] Prior to the COVID-19 pandemic, resilience had been studied in healthcare workers under high stress. For example, among ICU nurses, correlations were found between higher levels of resilience and lower levels of post-traumatic stress disorder (PTSD), burnout, and mental health conditions (eg, anxiety, depression).[3,4] Given previous research demonstrating the association between resilience and psychological stress, there has been burgeoning interest in how personal resilience might temper the psychological impact of living through the COVID-19 pandemic.[5]

The COVID-19 pandemic has had an unanticipated impact on the United States and the world at large. As of November 4, 2022, over 1 million Americans have died from COVID-19 with 97,604,763 infections.[6] The consequences of the pandemic have been widespread throughout worldwide communities with rising unemployment, economic anxieties, school closures, vaccine hesitancy, personal and/or family illness, and grieving the death of friends and family. There have been well-documented impacts of quarantine and COVID-19 on mental health for millions of individuals, including increased rates of PTSD, adjustment disorder, anxiety, and depression.[7-10] Recent studies have found that during the COVID-19 pandemic, up to 80% of health care providers reported symptoms of "post-traumatic stress disorder, depression, insomnia, severe anxiety, general psychiatric symptoms, or high levels of work-related stress".[11] Despite the growing literature exploring the challenges to health care workers, K-12 and college students, and society as a whole during the COVID-19 pandemic, there has been limited research on how graduate health profession students from various disciplines responded to these challenges.[4,12]

Graduate health profession education can differ significantly from other types of graduate education with its focus on interactive clinical experiences. Students in graduate health programs often must balance classroom-based learning with clinical work and research activities, as well as the responsibilities and challenges of emerging adulthood. Many graduate health students rely heavily on their social support systems to cope with novel stressors and curricular demands.[13] The pandemic caused disruptions to existing supportive relationships due to social distancing and quarantine requirements. In addition, many universities suspended in-person learning, closed campus housing, cancelled extra-curricular and social activities, and transitioned instruction to a virtual format. While some students chose to return to their hometowns, others remained in their university towns, risking increased isolation while simultaneously being tasked with major changes to their curricula and other pandemic-related stressors. For example,

students across multiple disciplines and training levels experienced a disruption in research activities involving human or animal subjects.[14] Indeed, the Medscape Medical Student Life and Education Report 2020, a survey of over 2600 students around the US, showed that 42% of US medical students were at least moderately negatively affected by COVID-19, with 76% of medical students reporting burnout at least some of the time.[15]

Although there are similarities across disciplines, the pandemic did not affect all health profession students equally. Graduate dental programs, whose curricula rely heavily on clinical interaction and skill-based learning, increased the use of computer-based or physical models, in addition to initiating novel safety guidelines for patient encounters.[16,17] Nursing students, who generally continued to have clinical-based education/rotations were identified as having increased anxiety associated with fear of infection, particularly among those who worked in areas with PPE shortages.[18] There were delays and cancellations of USMLE board examinations for medical students, with some schools even modifying their graduation requirements.[19,20] As a result, graduate health profession students, in an already rigorous period of their lives, had to rapidly adapt to significant educational changes while simultaneously managing the physical, mental, and emotional strain of the pandemic.

Given the unique experiences and challenges faced by graduate health profession students, the aim of the present study was to assess the impact of the COVID-19 pandemic on health profession students' educational experiences, and to determine the association between their self-reported resilience and psychological distress. The secondary aim of the study was to assess group differences between students from different graduate health profession programs within the same university.

Methods

Study Design and Participant Recruitment

This study includes cross-sectional data from an anonymous questionnaire administered online via Qualtrics between January 2021-March 2021. All procedures were reviewed and approved as exempt by the University of Florida Institutional Review Board (IRB202003001). Academic deans/program directors for 12 graduate health profession programs were informed about the study and asked to send an email invitation with a link to the study questionnaire to all students who were currently enrolled in their programs. The deans/directors were asked to copy the study PI on the invitation emails to confirm when they were sent to the students. The research team sent a follow-up email to the deans/directors 4 weeks after initial contact requesting that a reminder email be forwarded to students. Participation in the study was voluntary and no compensation was offered. A list of resources was provided at the end of the survey for students interested in seeking help.

Participants

The study sample included graduate health profession students from nine disciplines (Clinical Psychology, Dentistry, Graduate Nursing, Health Administration, Medicine, Occupational Therapy, Physician Assistant Studies, Public Health, Veterinary Medicine) at a large university in the southeastern United States. The size of the programs (ie, number of eligible students) varied across discipline. Deans/directors from three other graduate health profession programs (Pharmacy, Physical Therapy, Speech, Language and Hearing) declined to share the study invitation with their students.

Measures

The full study questionnaire contained 44 items and was designed to be completed in 10 minutes or less. The first eight items included consent to participate in the study and participant demographics. The questionnaire allowed respondents to bypass any questions that they did not wish to answer and to exit the survey at any time. To exclude duplicate submissions, the survey could only be accessed once from each email link. Students had three months to complete the questionnaire. To maintain anonymity, a research information statement was included on the first page of the questionnaire in lieu of a signed informed consent, with participants acknowledging their agreement prior to accessing the first question. Limited demographic data (ie, health profession program of study, year of study, race, ethnicity, sex, and relationship/dependent status) were collected to protect participant anonymity.

COVID-19 impact. A total of 25 items assessed student perceptions regarding the impact of the COVID-19 pandemic on their education, wellbeing, and personal experiences. The items were developed by the study team, which consisted of two medical students, a clinical faculty member with expertise in integrative medicine and resilience, and a research faculty member with expertise in clinician wellbeing/distress, psychiatric epidemiology, and survey construction. Most items were rated on 7-point Likert-type scale (ie, 7 = very positive change, 6 = moderately positive change, 5 = slightly positive change, 4 = no change, 3 = slightly negative change, 2 = moderately negative change, or 1 = very negative change). Additional questions assessed the students' current level of distress and concerns about graduating on time. Items developed for this study are included in Appendix A.

Burnout. The non-proprietary single item measure of burnout was used. This item, "Overall, based on your definition of burnout, how would you rate your level of burnout?" offers 5 response options ranging from 1 = "I enjoy my work. I have no symptoms of burnout" to 5 = "I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help." This item has demonstrated good psychometric properties.[21]

Resilience. The 10-item Connor Davidson Resilience Scale (CD-RISC-10)[22] was used to assess student resilience. The CD-RISC-10 is a validated scale that asks respondents to rate characteristics of resilience using a 5-point scale, from 0 = not true at all to 4 = true nearly all the time. As a short form of the original CD-RISC,[23] the CD-RISC-10 has a possible score range of 0-40 points. The CD-RISC-10 has demonstrated good reliability and validity[22] in quantifying resilience levels with mean scores for nursing, dental, and medical students ranging from 26.7 to 32 points.[24]

Statistical Analysis

Data were exported from Qualtrics into SPSS v.27 for analysis. In order to retain all possible study participants, mean substitution was used to compute total scores for the small number of participants (n = 3) who missed an item of the CD-RISC-10. Descriptive statistics were calculated, and independent samples t-tests were used to assess differences on measures of stress, COVID-19 impact on wellbeing, and resilience between individuals who did/did not experience various COVID-19 related stressors. Related-samples Wilcoxon signed rank tests were used to calculate within-person differences in use of various coping strategies before vs during the pandemic. Pearson correlations were calculated to explore the association between resilience and pandemic-related distress. Finally, one-way ANOVA with Tukey's HSD post-hoc tests was used to explore group differences in stress, burnout, and resilience among students in different health profession programs of study.

Results

Participant Demographics

A total of 450 students opened the questionnaire and provided consent on the first page. Of these, 68 did not complete any further questions and six were excluded because they responded that they were not graduate students in 1 of the targeted programs. Thus, a total of 377 graduate health profession students were included in the study analyses (ie, 83.78% of those who consented to participate). Participants from invited programs included medical students (n = 66) and physician assistant students (n = 12) from the College of Medicine, graduate-level nursing students from the College of Nursing (n = 59), dental students from the College of Dentistry (n = 56), veterinary students from the College of Veterinary Medicine (n = 61), and students from graduate programs in Occupational Therapy (n = 50), Clinical and Health Psychology (n = 25), Public Health (n = 39), and Health Administration (n = 9) from the College of Public Health and Health Professions. Participant demographics and program-specific response rates are listed in Table 1.

Table 1. Participant Demographics.

Characteristic	n (% of Total Sample)
Gender (n = 376)	
Female	301 (80.1%)
Male	68 (18.1%)
Transgender/nonbinary	3 (.8%)
Prefer not to say	4 (1.1%)
Year of study (n = 376)	
1st	139 (37.0%)
2nd	118 (31.4%)
3rd	60 (15.9%)
4th	51 (13.5%)
5th or higher	8 (2.1%)
Race (n = 375)	
White	283 (75.5%)
Asian/Pacific Islander	35 (9.3%)
Black or African American	26 (6.9%)
American Indian or Alaskan native	1 (.3%)
Bi-racial/Multi-racial	14 (3.7%)
Other	2 (.5%)
Ethnicity (n = 375)	
Not of hispanic origin	321 (85.6%)
Hispanic origin	47 (12.5%)
Prefer not to say	7 (1.9%)
Relationship status (n = 377)	
Single	164 (43.5%)
Committed relationship	114 (30.2%)
Married	64 (17.0%)
Engaged	29 (7.7%)
Divorced	3 (.8%)
Widowed	0 (.0%)
Prefer not to answer	3 (.8%)
Dependents	
Pet(s)	178 (47.2%)
Child (ren)	38 (10.1%)
Elderly/Disabled Adult	11 (2.9%)
Prefer not to say	3 (.8%)
Response rate by graduate program	N (% of eligible students in program)
Clinical health and psychology	25 (32.9%)
Dentistry	56 (15.1%)
Graduate nursing	59 (13.4%)
Medicine	66 (12.22%)
Occupational therapy	50 (31.6%)
Physician assistant studies	12 (10.4%)
Health Administration	9 (17.3%)
Public health	39 (19.5%)
Veterinary medicine	61 (31.1%)

Impact of COVID-19 on Participants' Education

The majority of participants reported that the COVID-19 pandemic negatively impacted their academic experience. Specifically, 76.6% of respondents (n = 289) reported a negative impact on their education and training as a whole, and 73% (n = 274) reported that the pandemic reduced the educational opportunities available to them. Of the 317 students who reported about didactic/classroom based educational experiences, 49.8% (n = 158) reported a negative change, and 74.9% of the 303 students who reported on clinical/patient-centered educational experiences (n = 227) reported a negative change. Only

Table 2. Satisfaction with the Institutional Response to COVID-19.

	Slight, Moderately, or Very Satisfied, %	Neutral, %	Slightly, Moderately, or Very Negatively, %
Support from the university	65.3	13.5	21.2
Support from graduate/Professional program	66.8	13.0	20.2
Access to COVID testing	83.0	15.4	1.6
Access to and use of personal protective equipment	66.5	25.5	8.0

44.6% (n = 168) of participants indicated that they were satisfied with their current level of in-person educational contact. Less than a quarter of students felt pride about working on the "front lines" in clinical settings (21.5%), with 13.8% reporting excitement about the increased clinical opportunities or responsibilities that became available to some students in the wake of the COVID-19 pandemic. Finally, 40.2% (n = 151) of participants reported at least some concern that COVID-19 would affect their ability to graduate on time.

Satisfaction with Institutional Response

Although the majority of students reported being generally satisfied with the institutional response to the pandemic (see Table 2), a significant minority noted dissatisfaction, particularly related to the provision of support for students. They provided mixed responses regarding how the pandemic impacted their views of faculty, with 35.5% reporting a positive change in their views of faculty, 44.2% reporting no change, and 20.3% reporting a negative change. About a quarter of students (24.1%) reported feeling pressure from their training programs to work in a situation they believed to be dangerous (ie, due to potential COVID-19 exposure), and 22.3% of students reported feeling resentful towards their training programs.

COVID-19 Exposure and Infection

At the time of the study, 352 participants (93.4%) reported that they had personally been tested for COVID-19, and 9.8% (n = 37) reported testing positive at least once. Almost half (n = 154, 40.8%) of the participants reported close personal contact with a known COVID-19 positive case, and 151 individuals (40.1%) had to quarantine due to exposure. Further, 40.3% of participants (n = 152) reported that they worked face-to-face in clinic with patients who had previously tested positive for COVID-19, 23.9% (n = 90) reported interactions with patients who were actively infected with COVID-19, and 13.5% (n = 51) reported working with patients who later died or were likely to die from COVID-19. Over two-thirds of students (n = 267, 70.8%) reported that a family member or close friend had tested positive for COVID-19, with 19.6% (n = 74) reporting that a loved 1 required hospitalization, and 9.5% (n = 36) reporting that a family member or close friend had died from COVID-19.

Independent samples t-tests demonstrated that none of these experiences was significantly associated with self-reported stress, COVID-19 impact on wellbeing, or scores on the CD-RISC assessment of resilience (all $ps > .05$)

COVID-19 Effect on Participants' Levels of Stress and Burn out

A total of 323 participants (85.7%) reported being fearful of infecting family or loved ones, and 285 (75.6%) reported being fearful of contracting COVID-19 themselves. Most participants also reported feeling burned out, lonely/isolated, and frustrated by restrictions due to COVID-19 (70.0%, 67.4%, and 61.8% respectively). Many students endorsed feelings of guilt for "not contributing enough" (37.7%). In addition, almost 70% of respondents reported their current stress as somewhat high (32.6%), very high (27.9%), or severe (8.8%). Less than a quarter (22.5%) rated their stress as moderate, with just 8.2% of students reporting their levels of stress as somewhat low (n = 24), very low (n = 4), or non-existent (n = 3). On the single-item burnout measure, only 5.9% of students denied any distress, and 34.7% reported occasional stress with decreased energy. Indeed, 37.6% of students described themselves as "burning out," 14.4% reported burnout symptoms that would not go away, and 7.5% reported burnout so severe that they wondered if they could go on without obtaining help.

COVID-19 Effect on Participants' Wellbeing and Perceptions

Over 84% (n = 318) of students reported that COVID-19 negatively affected their wellbeing; whereas, only 3.7% (n = 14) reported it positively impacted their wellbeing, and 11.9% (n = 45) reported no impact. Specifically, 78.9% (n = 295) reported their quality/quantity of social interactions was negatively impacted, 56.8% (n = 213) reported COVID-19 negatively impacted their hobbies, and 51.7% (n = 194) said it negatively impacted physical activity. A significant minority (32.8%, n = 123) of respondents reported that COVID-19 had a positive impact on physical activity. Sleep was impacted in various ways, with 42.9% (n = 161) reporting a negative impact on sleep, 46.1% (n = 173) reporting no changes, and 10.9% (n = 41) reporting a positive impact on sleep.

Table 3. Frequency of Using Coping Strategies Pre-Pandemic vs During Pandemic.

Coping Strategy	Pre-COVID M (SD)	During COVID M (SD)	W	p
Drinking alcohol	2.06 (.93)	2.1 (1.09)	3.62	<.001
Drug use	1.2 (.59)	1.3 (.78)	3.85	<.001
Eating	2.6 (1.07)	2.9 (1.21)	6.91	<.001
Hobbies	3.4 (.97)	3.0 (1.09)	−6.25	<.001
Journaling	1.6 (.94)	1.7 (1.02)	2.11	.04
Mediation/Mindfulness	2.3 (1.11)	2.4 (1.14)	2.81	.005
Outdoor activities	3.3 (1.09)	3.3 (1.15)	−1.01	.31
Physical Activity/Exercise	3.5 (1.11)	3.3 (1.22)	−2.99	.003
Reading	2.5 (1.18)	2.5 (1.17)	−.20	.84
Sex/Masturbation	2.4 (1.10)	2.3 (1.14)	−1.37	.17
Social interactions with family/Friends in person	3.9 (.99)	2.6 (1.00)	−13.92	<.001
Social interactions with family/Friends virtually	2.4 (1.16)	3.1 (1.09)	9.92	<.001
Social media	3.0 (1.18)	3.1 (1.32)	2.71	.007
Spiritual or religious practices	2.3 (1.38)	2.1 (1.34)	−3.40	.001
TV/Movies	3.4 (1.01)	3.6 (1.06)	4.42	<.001
Video games	1.7 (1.07)	1.9 (1.23)	4.88	<.001

Notes: W = Related samples Wilcoxon Signed Rank Test statistic. 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always.

Regarding the impact on student perceptions of society, 86.7% (n = 325) of participants reported that COVID-19 negatively impacted their views of society, with 8.5% (n = 32) remaining neutral, and only 4.8% (n = 18) reporting a positive change. In contrast, only 29.3% (n = 110) said that COVID-19 negatively impacted their views of themselves, with 23.2% (n = 87) reporting it led to a positive change in their view of self, and the remainder reporting no change (n = 178).

COVID-19 Effect on Participants Coping Strategies

As seen in Table 3, students reported differences in their frequency of using various coping strategies prior to vs during the COVID-19 pandemic. There was a significant increase in utilization of avoidant coping strategies during the pandemic such as drinking alcohol, using drugs, over- or under-eating, and increasing screen time (ie, social media, TV/movies, and video games). However, students also reported increased engagement in healthier coping strategies such as hobbies, journaling, meditation, physical activity, spiritual practices, and socialization.

Association Between Self-Reported Resilience and COVID-19 Impact on Well-Being

On the CD-RISC-10, students reported a mean score of 27.33 (SD = 5.83), with a median score of 27, and mode of 27. As seen in Table 4, Pearson correlations demonstrated a statistically-significant association between higher resilience scores and higher self-reported stress. However, resilience scores were inversely correlated with burnout, and those with higher resilience scores also reported a less negative impact of COVID-19 on their overall well-being. Specifically, higher

resilience was associated with less negative impact of COVID-19 on sleep, physical activity, and views of self and society.

Group Differences in Self-Reported Stress, COVID-19 Impact on Wellbeing, and Resilience

Table 5 lists the average stress, burnout, wellbeing impact, and resilience scores for students in each program. Results of the omnibus ANOVA tests comparing scores across graduate health programs were significant for self-reported stress, ($F_{8, 368} = 5.42$, P < .001), burnout ($F_{8, 366} = 4.13$, P < .001), COVID-19 impact on wellbeing ($F_{8, 368} = 2.89$, P = .004), and resilience ($F_{8, 366} = 4.27$, P < .001). Tukey's HSD posthoc tests demonstrated that medical students reported significantly *lower* stress than students in clinical/health psychology (P = .009), dentistry (P = .009), graduate nursing (P = .002), occupational therapy (P = .04), and veterinary medicine (P < .001); whereas, veterinary medicine students reported *greater* stress than public health students (P = .03). Medical students also reported lower levels of burnout than veterinary medicine students (P < .001), graduate nursing students (P < .001), clinical/health psychology students (P = .02), occupational therapy students (P < .05), and dental students (P < .05). There were no significant differences in burnout between students in the other programs. Veterinary medicine students reported significantly more negative impact of COVID-19 on their wellbeing than medical students (P = .01) and public health students (P = .04). Medical students scored higher on resilience than students in clinical/health psychology (P = .02), public health (P = .002), and veterinary medicine (P = .009).

Table 4. Correlation Between Individuals' CD-RISC-10 Resilience Score and Their Current Functioning.

Variable	M (SD)	Correlation with CD-RISC-10 Total Score (Pearson r)	p
Current stress[a]	2.96 (1.16)	.29	<.001
Current burnout rating[b]	2.83 (1.0)	−.34	<.001
COVID impact on wellbeing[c]*	5.24 (.96)	−.23	<.001
COVID impact on the quantity/quality of your social interactions with your friends and family[c]	5.24 (1.32)	−.02	.70
COVID impact on sleep[c]	4.52 (1.08)	−.13	.01
COVID impact on physical activity[c]*	4.40 (1.66)	−.12	.03
COVID impact on ability to hobbies[c]	4.63 (1.41)	−.04	.40
COVID impact on view of society[c]*	5.56 (1.12)	−.25	<.001
COVID impact on view of self[c]*	4.13 (1.11)	−.24	<.001

Notes.
[a]1 = Extreme, 2 = Very high, 3 = Somewhat high, 4 = Moderate, 5 = Somewhat low, 6 = Very low, 7 = None.
[b]1 = No symptoms of burnout, 2 = Occasional stress and decreased energy, 3 = Burning out, 4 = Burnout symptoms won't go away, 5 = Completely burned out.
[c]1 = Very Positive Change, 2 = Moderately Positive Change, 3 = Slightly Positive Change, 4 = Neutral, 5 = Slightly Negative Change, 6 = Moderately Negative Change, 7 = and Very Negative Change.

Table 5. Stress, COVID-19 Impact on Wellbeing, and Resilience Scores by Graduate Health Program.

Program	Self-Reported Stress M (SD)[a]	Burnout M (SD)[b]	COVID-Impact on Wellbeing M (SD)[c]	CD-RISC Resilience M (SD)[d]
Physician assistant studies	2.83 (.84)	2.83 (.84)	5.33 (.89)	24.75 (3.11)
Public health	3.18 (1.21)	2.82 (1.02)	4.97 (.93)	25.11 (5.96)
Clinical health and psychology	2.64 (1.19)	3.08 (1.08)	5.64 (1.15)	25.12 (5.07)
Veterinary medicine	2.49 (.99)	3.15 (1.06)	5.59 (.86)	26.26 (5.95)
Graduate nursing	2.78 (1.02)	3.03 (.92)	5.32 (.86)	27.10 (5.44)
Occupational therapy	2.92 (1.05)	2.86 (.81)	5.26 (.88)	27.41 (5.59)
Dentistry	2.86 (1.14)	2.84 (1.06)	5.07 (.97)	28.56 (6.11)
Medicine	3.59 (1.23)	2.29 (.94)	5.00 (.91)	29.60 (5.10)
Health Administration	3.78 (1.09)	2.44 (.53)	5.11 (1.54)	31.11 (5.97)

[a]1 = Extreme, 2 = Very high, 3 = Somewhat high, 4 = Moderate, 5 = Somewhat low, 6 = Very low, 7 = None.
[b]1 = No symptoms of burnout, 2 = Occasional stress and decreased energy, 3 = Burning out, 4 = Burnout symptoms won't go away, 5 = Completely burned out.
[c]1 = Very positive change, 2 = Moderately positive change, 3 = Slightly positive change, 4 = Neutral/No change, 5 = Slightly negative change, 6 = Moderately negative change, 7 = Very negative change.
[d]CD-RISC Total score (range = 0-40).

Discussion

Graduate health profession programs implemented changes in delivering pre-clinical and clinical education as an initial response to COVID-19. New waves and variants of the coronavirus presented ongoing challenges. The present findings may assist graduate health educators and students in developing or bolstering strategies to enhance student resilience and wellbeing in response to COVID-19, as well as in response to future pandemics

There were mixed results regarding how respondents viewed the impact of COVID on their clinical training. Overall, 76.6% felt that COVID-19 had a negative impact on clinical training. A similar study published earlier in the pandemic (July 2020), reported that around 59% (N = 300) of medical students felt that COVID-19 negatively impacted their clinical clerkships.[25] While this study was in Europe rather than the United States, it highlights that across the world, a high number of students were feeling dissatisfied with their clinical learning opportunities. In the US, this dissatisfaction may have been even greater. A subset of the students (ie, 1 out of every 4) reported feeling that their training programs had pressured them to work with COVID-positive patients. A similar number felt resentful towards their programs. These results are similar to a study assessing physician job satisfaction, which found that found 21% were dissatisfied with their jobs during the COVID-19 era.[26]

Despite their concerns about COVID exposures and the negative perceived impact of COVID on their training, most students felt positively towards their direct faculty, their

individual programs, and even the university at large. There are many factors that could have impacted these feelings, ranging from high testing availability on campus, effective virtual learning programming, or recognition of the efforts being made during difficult times. This dichotomy of dissatisfaction with learning opportunities but satisfaction with educators corresponds with a survey of UK medical students who reported they were unstimulated and unengaged after transitioning to online learning, despite reporting that educators themselves were prepared for the lessons.[27] This dissatisfaction may be more reflective of the challenges of online education than of the educators themselves. Many of the students in the UK study also "worked the frontlines," with 700 students volunteering with the NHS. However, student perceptions of their experience were not reported, so it is unclear whether they experienced similar concerns about working with COVID-positive patients.[27] Results of the current study differ from observations in Jordan and the United Arab Emirates, where medical students were dissatisfied with teaching quality as well as instructor response.[28,29] In the state of Georgia, public health students reported the need for increased communication, understanding of circumstances, engaging teaching and faculty training/resources, fewer assignments, and adequate technological infrastructure.[30] From Wi-Fi access to the need for adaptation by faculty and students, a multitude of challenges may contribute to individual differences in satisfaction with online learning throughout the world. The 1 clear theme is that students across the globe felt additional burden and limited learning opportunities during the COVID pandemic.

It is important to note the context of these responses. This study was conducted in the winter of 2021, during the phase of the pandemic when the Alpha virus strain was dominant and before widespread availability of vaccines. While some students who were expected to rotate in patient care settings had been able to receive vaccination, it was not until after this questionnaire was administered that widespread vaccination was available to all students. Further, the data were collected a year after the pandemic began. By that time, many institutions already had adequate measures in place to protect their students and were beginning to transition graduate health profession students back to in-person training. Again, a majority reported adequate access to testing and PPE. This may explain why respondents were both pleased with the response from their school, and at the same time felt concerned about interacting with COVID-positive patients.

Beyond the impact of COVID-19 on their education and training, students overwhelmingly responded that COVID-19 had negatively impacted their personal wellbeing. Nearly all the respondents felt fearful of contracting the virus or infecting those they loved. Most felt lonely and burned out. Alarmingly, 15% of respondents felt the burnout would not go away and >7% specified they may need to seek help. These results are particularly impactful given that our sample was made of mostly students early in their training. While

research predating the pandemic suggested high baseline levels of pressure, stress, and burnout among health profession students, data out of Cyprus, which compared medical student's pre-COVID burnout levels to COVID burnout levels found an increase in prevalence from 26% to 51%.[31] In Japan, female medical students reported increased rates of psychological distress compared to pre-pandemic values.[32] Most of our participants reported high stress levels with 69% of respondents reporting somewhat high, very high, or severe stress. In Texas, a study of undergraduate students showed increased anxiety regarding academic performance, and increased levels of depression, anxiety, and suicidal thoughts during this time period.[12] Another large study (N = 13 000) assessing high school, undergraduate, and postgraduate students found that 14% felt a need to find professional help for their feelings about COVID-19.[33] Taken together with our results, these results suggest that universities may benefit from being more proactive about engaging students in seeking mental health support during future pandemics or disruptions to traditional learning structures.

For over a decade there has been research encouraging support for resilience in medical students as they face adverse events, psychological distress, highly emotional circumstances, and moral injury.[34] Arima et al Found that during the pandemic, reports of higher self-esteem and self-efficacy among medical students was associated with lower levels of psychological distress.[32] This is similar to our findings that higher resilience was associated with lower reported burnout, even in the setting of higher reported levels of stress. Arima et al suggested that targeting self-esteem and self-efficacy may help improve resilience. This corresponds with previous literature that identifies confidence, self-efficacy, social connections, and a gradual increase in demands to help promote resilience among students.[34] COVID-19 did not allow for this slow transition to novel learning environments, and students had new challenges and new stressors to face seemingly overnight. Those who reported higher resilience showed fewer negative perceptions of COVID-19, self, and society and, less impact of COVID-19 on sleep and physical activity. Their resilience may be what allowed them to adapt, bounce back, and carry on with their studies without becoming disenfranchised with society as a whole, or having psychosomatic changes. Given that resilience has also been associated with improved clinical outcomes for patients, improved practitioner wellbeing, and decreased attrition from graduate health programs, there is a large potential benefit of creating educational programing that allows students to further develop resilience-enhancing skills.[35]

Although studies demonstrate that training can increase personal resilience, the field as a whole currently lacks cohesiveness in program design and implementation, making it difficult to ascertain broader implications of how resilience training may impact individual resilience levels.[36] However, following a 4 week intervention where veterinary students discussed concepts of self-care, the meaning of resilience, and

the stressors they faced in their program, participants showed increased levels of self-reported resilience; participants cited improved understanding of resilience, and increased knowledge of available resources or self-care practices.[37] The finding that certain graduate health programs had higher or lower average resilience scores presents an opportunity for future research to determine whether these differences result from variability in the curricula, intrinsic differences in the individuals who seek these types of training, or another factor, and how these differences can be mitigated. Individual graduate health programs may benefit from sharing effective educational materials, collaborating on the development of programs/resources, and/or offering multidisciplinary learning opportunities to improve resilience among trainees throughout the health professions. When an 8-week Mindfulness in Motion intervention was offered to multiple disciplines of healthcare workers (physicians, nurses, pharmacists, dietitians, ARNPs, chaplains, physical therapists, clinical staff, non-clinical staff and patient care assistants) during the pandemic, they found decreased burnout and stress levels with increased resilience and work engagement across all participants.[38] Such programs, offered at a university level may provide greater support to a broader number of students, while allowing individual programs or collages to address the specific needs of the students in their program. Addressing burnout, stress, resilience, and overall satisfaction within healthcare worker's education and careers has never been a more important task. With the "great resignation" in full force, healthcare workers are a precious resource.[39] It is essential to ensure that workers have systems-level protections in place for adequate staffing, fair compensation, and self-care.

Limitations

There are several important limitations to highlight in this study. First, there was a relatively low response rate within multiple disciplines. In addition, those who responded were mostly pre-clinical students in the first few years of their curriculum, rather than those at the conclusion of their programs, who were more likely to be engaged in direct clinical care. Participants were recruited from a single institution, and were mostly white female students, which may limit generalizability of results. The self-report nature of the survey data may introduce social desirability bias and recall bias. In addition, age, work hour obligations, and family obligations (including childcare responsibilities) were not included in the study. As certain programs (ie, nurse practitioner programs) typically have older students, it is possible that these additional stressors may have impacted students from certain programs more than others, Finally, efforts to minimize the time burden for study participation necessarily limited the constructs and themes that could be explored.

Conclusions

The COVID-19 pandemic had significant personal and professional impacts on students in the graduate health professions. This study demonstrated that high levels of stress and burnout, and negative impacts on health and well-being were common. Results suggested a correlation between higher resilience and lower reported burnout, despite high reported levels of stress.

Declaration of Conflicting Interests

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Supplemental Material

Supplemental material for this article is available online.

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