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The Psychiatric Burden on Medical Students in New York City Entering Clinical Clerkships During the COVID-19 Pandemic

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Abstract

For medical students first entering the clinical space in July 2020, the unique challenges related to the coronavirus pandemic threatened to amplify the psychological distress associated with clerkship rotations. This study aimed to characterize the mental health of third-year medical students starting clinical clerkships in the midst of a pandemic by assessing symptoms of major depressive disorder (MDD), generalized anxiety disorder (GAD), and posttraumatic stress disorder (PTSD) as well as risk, coping, and protective factors associated with psychological outcomes. Of 147 third-year medical students at the Icahn School of Medicine at Mount Sinai in New York City, 110 (75%) participated in this prospective survey-based study with 108 included in the final analysis. 43 (39.8%) respondents screened positive for symptoms of either MDD, GAD, or PTSD. Multiple regression analyses revealed that greater overall symptom severity was associated with more avoidant coping, more traumatic events witnessed, poorer student and leisure functioning, lower trait emotional stability, and lower social support. Worries related to COVID-19 did not significantly influence outcome variables. To better understand the role of the pandemic on psychological outcomes in third-year medical students, additional research should focus on the trajectory of these outcomes over the year during the coronavirus pandemic.

Keywords Medical education · Coronavirus · Psychological resilience · Depression · Anxiety · Ptsd

Introduction

Incoming medical students exhibit better mental, emotional and physical health than age-matched peers in the general population [1]. Yet, enrolled medical students experience significantly higher rates of psychological distress than their age-matched

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counterparts, suggesting that the medical school experience itself may be particularly stressful [2, 3]. Pre-COVID-19 pandemic reports of anxiety symptoms among American medical students had anxiety scores at least one standard deviation higher than the general population [2]. Meanwhile, roughly 11% of the general US adult population reported regular feelings of worry, nervousness or anxiety in 2019 [4]. The overall prevalence of MDD or depressive symptoms among medical students has consistently hovered around 27.2% for the past 30 years [5], which is at least four times that of the general population (4-5%) [4].

Traditionally, medical students are educated in the classroom until the third year of medical school, where they rotate through different clinical settings. While adjusting to the clinical wards at the start of that transition, students report the greatest burden of depressive symptoms [6]. Students' perceived level of stress is associated with periods of transition, which may explain why students describe their third year of medical school as the most stressful [7, 8]. Feelings of imposter syndrome, defined as chronic feelings of self-doubt and incompetence despite evidence of abilities, may contribute by precipitating burnout, which has been associated with decreased satisfaction with work-life balance [9]. Moreover, 80% of students report experiencing a difficult clinical event (such as patient suffering, personal mistreatment by superiors, or poor role modeling) on their rotations, with half of students endorsing that the experience adversely affected their well-being [10]. Specific experiences linked to stress and trauma in the third-year include mistreatment, witnessing patient suffering or death, and encountering poor physician role modeling [11].

Little is known about the experience of medical students in their clinical years during the course of disasters such as pandemics. Previous studies of medical students involved in disaster response have observed an amplified emotional response to a disaster in female students and students participating in intense, less supervised activities [12, 13]. Engagement in relief efforts themselves has not been significantly associated with increased burden of psychiatric illness in the short or long-term [12, 14, 15]. If anything, volunteer participation has been associated with higher levels of post-traumatic growth and professional self-esteem [12, 14]. On the other hand, in a cohort of New York City medical students in April 2020 during COVID-19 related suspension of clinical rotations, students who volunteered to participate in COVID-19 relief efforts experienced higher ratings of depressive, anxious, and PTSD symptoms than students who did not volunteer [13], suggesting that students' response to the ongoing stresses of the COVID-19 pandemic may be unique.

The novel challenges presented by COVID-19 threaten to amplify the adverse effects of medical school on student mental health [2, 3, 16]. Studies of the general population identified three and four-fold increases in anxious and depressive symptoms from June 2019 to June 2020 [17], with particularly elevated burden in individuals with lower income, exposure to more COVID-19 stressors, single status, age 18-25, performing essential work, and minority racial/ethnic groups [17, 18]. Chinese medical students reported a high degree of professional pride during the pandemic, while roughly 25% experienced at least a mild degree of GAD symptoms associated with the financial effects of COVID-19 and delays in academic activities [19, 20]. Similarly, a cross-sectional study in Brazil found high rates of moderate or severe GAD and MDD symptoms in medical students, with a further increase in students who identified as female [21].

During the academic year between June 2020 and June 2021, third-year medical students will be tested by both the clinical experience itself and COVID-19. This study aims to identify the prevalence of MDD, GAD, and PTSD symptoms and the individual factors contributing to this psychological distress in third-year medical students entering the clinical wards in June 2020.

Methods

Setting

This study was conducted at the Icahn School of Medicine at Mount Sinai (ISMMS) in New York City (NYC) between June and July, 2020. 147 students beginning their 3rd year core clerkships were eligible to participate. Students completed rotations in Medicine, Ambulatory Care-Geriatrics Clerkship, Surgery & Anesthesiology, Obstetrics–Gynecology, Pediatrics, Neurology, and Psychiatry at Mount Sinai health sites across the five boroughs. The study was approved by the institutional review board at the ISMMS (HS#: 20-00435| GCO#1: 20-0930(0001) ISMMS).

Design

All eligible students received an invitation to participate in the survey in June 2020 at their institutional email from a member of the research team. Students were invited to complete the survey via an anonymous electronic platform. In order to receive the $75 compensation, participants were directed to a Google Form after completing the survey to submit their email addresses in such a way so as not to connect identifying information to their survey responses. The survey took roughly 45 minutes to complete.

Measures

The survey included validated instruments that measured psychological symptoms, risk factors, coping factors, and protective factors, as well as questions about demographics and worries about the COVID-19 pandemic. Similar measures were used in a 2009 study conducted at the ISMMS that measured the impact of stressful events during the third year of medical students [11]. The measures are as follows:

Mental Health Outcomes

7-Item Generalized Anxiety Disorder Scale: The GAD-7 assesses minimal, mild, moderate, and severe GAD [22].
8-Item Patient Health Questionnaire: The PHQ-8 is a well-established diagnostic and severity measure for MDD [23].
PTSD Checklist for the DSM-5: The PCL-5 is a widely-used measure of PTSD, corresponding to DSM-5 symptom criteria [24].

Risk Factors

The Life Events Checklist for the DSM-5: The LEC-5 is a screening survey of traumatic life events that are known to potentially lead to PTSD or distress [25]. Number of items that were endorsed as "Happened to me" were summed as the variable "Number of potentially traumatic events experienced." Number of items that were endorsed as "Witnessed it" were summed as the variable "Number of potentially traumatic events witnessed."

Childhood Trauma Questionnaire - Short Form: The CTQ-SF is an assessment of a wide range of childhood maltreatment experiences [26].

Social Adjustment Scale, Self report short version: The SAS-SR Short Form measures social functioning in multiple domains [27]. The study used the Student and Leisure sections of the instrument. Higher scores reflect worse functioning.

Worries about COVID-19: At the height of the pandemic, a team of researchers and clinicians with expertise in internal medicine, psychiatry, psychology, and disaster mental health [28] developed 21 questions specifically related to the COVID-19 pandemic. Participants answered on a scale from 1 ("Not worried at all") to 5 ("Worried nearly all the time"). Based on factor analysis, we grouped items into four categories: (1) Worries about equipment, basic needs, and personal consequences, (2) Worries about infecting others, (3) Worries about workload, performance, and schedule, and (4) Worries about getting infected. Factor-based mean scores were then calculated for each category. The internal stability of the scale was high (Cronbach's α=0.94). Please see supplementary materials for a list of these questions.

Coping Factors

Brief COPE: The BCOPE Inventory assesses a wide range of common coping strategies grouped into Approach Coping and Avoidant Coping [29].

Religious COPE: The RCOPE Inventory evaluates religious coping in the face of life stressors [30]. Coping strategies were grouped into adaptive coping and maladaptive coping.

Protective Factors

Connor-Davidson Resilience Scale: The CD-RISC-10 is a 10 item scale that measures resilience, defined as positive adaptation in the face of adversity or trauma [31].

Revised Life Orientation Test: The LOT-R measures dispositional optimism and pessimism [32].

Ten Item Personality Inventory: The TIPI is a brief measure of the Big Five personality dimensions: extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience [33].

Multidimensional Scale of Perceived Social Support: The MSPSS measures three dimensions of social support: family, friend, and significant other [34].

Statistical Analyses (R 4.0.2 (R Core Team, Vienna, Austria) was used for statistical analyses. The four main outcome variables were scores on the PHQ-8, GAD-7, and PCL-5, and a symptom composite score. The symptom composite score was an indicator of general psychiatric distress and was calculated by standardizing and averaging the scores on the PHQ-8, GAD-7, and PCL-5. Missing data on the outcome variables (< 1% of items in the three screening measures) were imputed using multiple imputation by chained equations [35]. Descriptive statistics were calculated to summarize sample characteristics and symptom severity. Bivariate analyses examined associations between symptom severity and demographic, risk, coping, and protective factors. Nonparametric Spearman's correlations were computed for categorical independent variables and Kruskall-Wallis one-way analyses of variance for continuous independent variables. Four separate multiple linear regression analyses were conducted for PHQ-8, GAD-7, PCL-5, and symptom composite

scores. For each regression, only independent variables that were significantly associated in the bivariate analysis at p < .05 were included in the multivariate models. Finally, relative importance analyses were conducted to identify the relative proportion of variance that was explained by each of the significant predictors in the multiple linear regressions after accounting for intercorrelations among these predictors [36].

Results

Participant Characteristics and Prevalence of Psychiatric Symptoms

Of the 147 third year medical students who were invited to participate, 110 (75%) completed the survey. Of the 110 respondents, two had missing data on all items of the screening measures that could not be imputed, resulting in a final sample of 108 students. Tables 1 and 2 present participant characteristics and symptom severity among the sample. 43 (39.8%) respondents screened positive for symptoms of either MDD, GAD, or PTSD, with positive screens for GAD, MDD and PTSD in 32%, 24% and 7% of students respectively.

Correlates of GAD, MDD, PTSD and Symptom Composite Score

Table 3 presents the bivariate associations between the symptom composite score and scores on the PHQ-8, GAD-7, PCL-5 with demographic, risk, coping, and protective factors.

Psychiatric Symptom Composite Scores

Only those factors that were significantly associated with the outcome variables in the bivariate analyses were entered into their respective multiple linear regressions. Results of the multiple linear regressions are presented in Table 4. The model predicting overall symptom severity accounted for 60% of the variance in symptom composite score. Greater symptom composite scores were significantly associated with greater number of potentially traumatic experiences witnessed (LEC-5), poorer social functioning (SAS-SR), increased use of avoidance as a coping strategy (BCOPE), lower trait emotional stability (i.e, less calm, easily upset, anxious; TIPI), and lower social support (MSPSS). Relative importance analysis revealed that the majority of the total variance explained in the symptom composite was accounted for by avoidant coping (18.0% of total variance explained), trait emotional stability (15.1%), and social functioning (13.7%), compared with traumatic experiences witnessed and self-reported social support accounting for only 9.4% and 9.0%, respectively.

MDD, GAD, and PTSD Symptoms

Greater symptoms of MDD were associated with increased avoidant coping (accounting for 19.2% of total variance explained) and lower trait emotional stability (26.5% of total variance explained) in the relative importance analysis. The overall model accounted for 41% of the variance in the PHQ-8 total score. Greater symptoms of PTSD were

Table 1 Sample characteristics of n=108 ISMMS medical students in Summer 2020

	n (%) or mean (SD)
Demographics	
Age	25.4 (1.8)
Gender, female	52 (50)
Ethnicity	
Caucasian	42 (41.6)
Asian	31 (30.7)
Other	28 (27.7)
Relationship status, single	54 (52.4)
Seeking dual degree	21 (20.2)
Risk Factors	
No. of potentially traumatic events experienced (LEC-5)	1.5 (1.4)
No. of potentially traumatic events witnessed (LEC-5)	1.7 (2.3)
Childhood trauma (CTQ)	36.4 (12.2)
Student and leisure functioning (SAS-SF)	1.9 (0.7)
Worries about equipment, basic needs, and consequences	2.5 (0.9)
Worries about infecting others	3.3 (1.0)
Worries about workload, performance, and schedule	3.4 (1.0)
Worries about getting infected	2.5 (1.0)
Coping	
Approach coping (BCOPE)	32.0 (7.7)
Avoidant coping (BCOPE)	22.1 (4.9)
Adaptive religious coping (RCOPE)	3.9 (6.1)
Maladaptive religious coping (RCOPE)	1.2 (2.7)
Protective Factors	
Conscientious trait (TIPI)	5.4 (1.2)
Emotional stability trait (TIPI)	4.5 (1.3)
Extraversion trait (TIPI)	4.4 (1.6)
Agreeableness trait (TIPI)	5.0 (1.1)
Openness to experience trait (TIPI)	5.1 (1.2)
Resilience (CD-RISC)	28.6 (6.4)
Optimism (LOT-R)	14.1 (4.4)
Social support (MSPSS)	5.6 (1.1)

LEC-5 Life Events Checklist for DSM-5, *CTQ* Childhood Trauma Questionnaire, *SAS-SF* Social Adjustment Scale-Self-Report, *BCOPE* Brief COPE, *RCOPE* Brief RCOPE, *TIPI* Ten-Item Personality Inventory, *CD-RISC* Connor-Davidson Resilience Scale, *LOT-R* Life Orientation Test-Revised, *MSPSS* Multidimensional Scale of Perceived Social Support

associated with greater number of potentially traumatic events witnessed (accounting for 22.2% of total variance explained), poorer social functioning (16.5% of total variance explained), more avoidant coping (13.3% of total variance explained), and less social support (16.5% of total variance explained). The overall model accounted for 54% of the variance in PCL-5 total score. None of the predictor variables were significant in the multiple regression model for severity of GAD symptoms.

Table 2 Psychiatric symptoms among *n*=108 ISMMS medical students in Summer 2020

	n (%) or mean (SD)
Depression	
PHQ-8 score, mean (SD)	5.83 (5.43)
PHQ-8 symptom severity, n (%)	
None	56 (51.9)
mild	26 (24.1)
moderate	17 (15.7)
moderately severe	7 (6.5)
severe	2 (1.9)
Anxiety	
GAD-7 score, mean (SD)	7.36 (5.79)
GAD-7 symptom severity, n (%)	
minimal	42 (38.9)
mild	31 (28.7)
moderate	20 (18.5)
severe	15 (13.9)
PTSD	
PCL-5 score, mean (SD)	11.86 (12.81)

PHQ-8 8-item Patient Health Questionnaire, *GAD-7* 7-item Generalized Anxiety Disorder Scale, *PCL-5* Posttraumatic Stress Disorder (PTSD) Checklist for DSM-5

Discussion

The intense pressures and demands of medical training are especially salient during the clerkship years and can lead to detrimental psychological outcomes [11, 37, 38]. Over the 2020-2021 academic year, ISMMS students rotating on the wards in NYC had to contend not only with the stress of clinical immersion, but also unique challenges presented by COVID-19. In this study, conducted at the start of the third year, we found that 40% of students at the ISMMS screened positive for at least one of the following psychiatric conditions: GAD, MDD or PTSD. Psychiatric burden was higher in students with avoidant coping styles, lower trait emotional stability, lower social support and social functioning, and those who had witnessed a greater number of traumatic events.

In a 2009 mental health surveys of third-year ISMMS students, 4% of students screened positive for GAD (measured by the Beck Anxiety Index), 6% of students screened positive for MDD (measured by the Beck Depression Index), and 0% of students screened positive for PTSD.[11] In comparison, the results of our June 2020 study illustrate an increase in psychiatric burden amongst medical students, with positive screens for GAD, MDD and PTSD in 32%, 24% and 7% of students respectively.

The prevalence of positive screens of MDD and GAD identified in this cohort were similar to those reported in frontline healthcare workers in Spring 2020 during the height of the pandemic [28, 39] and paralleled the general population's mental health in June 2020 [17]. As a result, it would be reasonable to assume the psychological impacts of COVID-19 contributed substantially to the increase in psychiatric burden amongst ISMMS students. Surprisingly, worries about COVID-19 were not significant in the models predicting well-being outcomes. Participants may have been influenced by

Table 3 Association between psychiatric symptoms and demographic, risk factors, coping, and protective factors in $n=108$ ISMMS Medical Students in Summer 2020

	Symptom Composite		PHQ-8		GAD-7		PCL-5	
	r_s or H^a	p	r_s or H^a	p	r_s or H^a	p	r_s or H^a	p
Demographics								
Age	.11	.326	.10	.314	.10	.341	.04	.713
Gender, female[b]	.39	.534	1.12	.290	.45	.500	.34	.563
Ethnicity[b]	2.88	.237	3.02	.221	2.67	.263	4.38	.112
Caucasian								
Asian								
Other								
Relationship, single[b]	<.01	.994	.07	.796	.06	.801	2.07	.151
Seeking dual degree[b]	.60	.439	.56	.454	<.01	.994	.14	.705
Risk Factors								
No. of potentially traumatic events experienced (LEC-5)	.06	.552	-.02	.846	-.01	.959	.17	.103
No. of potentially traumatic events witnessed (LEC-5)	.23	**.026**	.13	.214	.15	.131	.32	**.001**
Childhood trauma (CTQ)	.27	**.012**	.32	**.001**	.09	.367	.29	**.006**
Student and leisure functioning (SAS-SF)	.51	**<.001**	.45	**<.001**	.41	**<.001**	.40	**<.001**
Worries about equipment, basic needs, and personal consequences	.34	**<.001**	.31	**.002**	.31	**.002**	.28	**.006**
Worries about infecting others	.19	.062	.11	.259	.21	**.036**	.19	.066
Worries about workload, performance, and schedule	.42	**<.001**	.42	**<.001**	.43	**<.001**	.13	.215
Worries about getting infected	.07	.482	.07	.472	.13	.185	.06	.559
Coping								
Approach coping (BCOPE)	-.01	.942	-.04	.684	.04	.713	-.04	.733
Avoidant coping (BCOPE)	.60	**<.001**	.52	**<.001**	.58	**<.001**	.38	**<.001**
Adaptive religious coping (RCOPE)	.08	.463	.08	.445	.07	.498	.09	.416
Maladaptive religious coping (RCOPE)	.08	.480	.05	.607	.05	.654	.13	.228

Table 3 (continued)

	Symptom Composite		PHQ-8		GAD-7		PCL-5	
	r_s or H^a	p	r_s or H^a	p	r_s or H^a	p	r_s or H^a	p
Protective Factors								
Conscientiousness trait (TIPI)	-0.23	**.025**	-.19	.061	-.29	**.003**	-.06	.569
Emotional stability trait (TIPI)	-.55	**<.001**	-.54	**<.001**	-.58	**<.001**	-.21	**.045**
Extraversion trait (TIPI)	-.18	.084	-.12	.223	-.06	.522	-.29	**.005**
Agreeableness trait (TIPI)	-.12	.248	-.14	.155	-.12	.210	-.03	.754
Openness to experience trait (TIPI)	-.09	.395	-.07	.473	.06	.535	-.15	.154
Resilience (CD-RISC)	-.35	**<.001**	-.30	**.002**	-.26	**.008**	-.32	**.002**
Optimism (LOT-R)	-.61	**<.001**	-.53	**<.001**	-.45	**<.001**	-.48	**<.001**
Social support (MSPSS)	-.31	**.002**	-.35	**<.001**	-.12	.217	-.35	**<.001**

PHQ-8 8-item Patient Health Questionnaire, *GAD-7* 7-item Generalized Anxiety Disorder Scale, *PCL-5* Posttraumatic Stress Disorder (PTSD) Checklist for DSM-5, *LEC-5* Life Events Checklist for DSM-5, *CTQ* Childhood Trauma Questionnaire, *SAS-SF* Social Adjustment Scale-Self-Report, *BCOPE* Brief COPE, *RCOPE* Brief RCOPE, *TIPI* Ten-Item Personality Inventory, *CD-RISC* Connor-Davidson Resilience Scale, *LOT-R* Life Orientation Test-Revised, *MSPSS* Multidimensional Scale of Perceived Social Support

[a]Statistics are Spearman correlation coefficients (rs) for continuous independent variables and Kruskal-Wallis H-Statistics (H)

[b]categorical independent variables

Table 4 Multiple linear regression in n=108 ISMMS Medical Students in Summer 2020

	Symptom Composite			PHQ-8			GAD-7			PCL-5		
	B (SE)	β	p	B (SE)	β	p	B (SE)	β	p	B (SE)	β	p
Risk Factors												
Number of potentially traumatic events witnessed (LEC-5)	.08 (.03)	.22	**.003**	-	-	-	-	-	-	1.93 (.44)	.34	**<.001**
Childhood trauma (CTQ)	.00 (.01)	-.02	.844	.02 (.04)	.04	.681	-	-	-	.01 (.10)	.01	.916
Student and leisure functioning (SAS-SR)	.26 (.10)	.21	**.010**	1.25 (.74)	.16	.095	1.45 (.74)	.18	.053	4.21 (1.68)	.22	**.014**
Worries about equipment, basic needs, and consequences	.04 (.09)	.40	.669	.56 (.66)	.10	.398	.00 (.73)	.00	.997	-.80 (1.33)	-.05	.552
Worries about infecting others	-	-	-	-	-	-	.00 (.63)	-.00	.994	-	-	-
Worries about workload, performance, and schedule	-.03 (.09)	-.04	.703	-.39 (.66)	-.07	.561	1.10 (.67)	.20	.104	-	-	-
Coping												
Avoidant coping (BCOPE)	.05 (.02)	.30	**.001**	.25 (.12)	.23	**.038**	.23 (.12)	.20	.062	.82 (.27)	.30	**.003**
Protective Factors												
Conscientiousness trait (TIPI)	.03 (.06)	.04	.632	-	-	-	-.46 (.47)	-.10	.328	-	-	-
Emotional Stability trait (TIPI)	-.17 (.07)	-.27	**.018**	-1.41 (.50)	-.36	**.006**	-.93 (.51)	-.22	.072	.32 (1.05)	.03	.761
Extraversion trait (TIPI)	-	-	-	-	-	-	-	-	-	-.76 (.79)	-.09	.343
Resilience (CD-RISC)	-.01 (.01)	-.05	.543	.00 (.08)	.00	.977	.01 (.09)	.01	.899	-.23 (.19)	-.12	.218
Optimism (LOT-R)	-.02 (.02)	-.12	.265	-.08 (.14)	-.07	.594	-.21 (.14)	-.17	.143	-.35 (.36)	-.12	.327
Social support (MSPSS)	-.18 (.07)	-.22	**.012**	-.91 (.52)	-.19	.082	-	-	-	-3.16 (1.16)	-.25	**.008**
Adjusted R^2	.60			.41			.45			.54		

PHQ-8 8-item Patient Health Questionnaire, *GAD-7* 7-item Generalized Anxiety Disorder Scale, *PCL-5* Posttraumatic Stress Disorder (PTSD) Checklist for DSM-5, *LEC-5* Life Events Checklist for DSM-5, *CTQ* Childhood Trauma Questionnaire, *SAS-SF* Social Adjustment Scale-Self-Report, *BCOPE* Brief COPE, *TIPI* Ten-Item Personality Inventory, *CD-RISC* Connor-Davidson Resilience Scale, *LOT-R* Life Orientation Test-Revised, *MSPSS* Multidimensional Scale of Perceived Social Support

declining cases, hospitalizations and deaths related to COVID-19 in NYC at the time of survey distribution [40]. Additionally, many students were still quarantined off campus. Therefore, worries about COVID-19 may not have yet affected this cohort of students as strongly as front-line workers or even student volunteers [13, 41, 42].

Yet, COVID-19 may have complicated, amplified or forced students to confront other sources of distress, exerting indirect influence on their psychological well-being. While the questions we asked about COVID-19 worries touched on clinical, academic, and health concerns, these questions are not exhaustive. As a result, it might not have captured the full scope of the pandemic's impact on student life. Additionally, during this period of time, the murders of George Floyd, Breonna Taylor, Ahmaud Arbery and other Black Americans highlighted the systemic racism in the United States, and sparked protests against police brutality across the globe. Third-year students were also wrestling with academic concerns, including Step 1 scheduling disruptions and changes to the classical structure of the third year. Using the Twitter "Hedonometer", a tool that tracks public sentiment by sampling 10% of tweets each day and categorizes them as positive or negative, scientists reported the two week stretch from May 26th-June 9th 2020 as the saddest two weeks on Twitter [43]. Our study collected data on the tail end of this time point, suggesting that early summer of 2020 was a particularly challenging moment in time. Future studies should seek to understand not only the impact of COVID-19, but also how personal, political and current events played a role in the mental health of students during 2020 and beyond.

Our current findings can be used by educational leaders to inform medical student well-being and mental health interventions. Our results, along with more recent reports of MDD and GAD amongst students surveyed in the last several years, demonstrate a mental health crisis amongst trainees, irrespective of these acute stressors such as COVID-19 [5, 44, 45]. Given the relationship we found between avoidant coping mechanisms and psychiatric burden, programming that educates students about the value of confronting difficult experiences and emotions may be beneficial. As students benefit most from discussing trauma with their teammates [11], school leaders might also consider training peer or resident-educators in evidence-based traumatic stress processing interventions [46]. Importantly, students who employ avoidant coping strategies may not be inclined to speak up in a room, seek out support from designated advocates, nor alert someone of a traumatic event. With this vulnerable population in mind, more proactive well-being screening and delivery of interventions by medical institutions that do not rely solely on students' self reports or requests for help may be beneficial. Additionally, given the finding that lower social support and poorer social functioning is associated with increased psychiatric distress, medical educators could consider building social and leisure activities into curricula to encourage rest and socialization. By taking these actions for students, institutional leadership can demonstrate its support, which is closely linked to improved psychological well-being amongst front-line healthcare workers [41].

Limitations

There are several limitations to this study. The cross-sectional design limits our ability to infer causal relationships. All of our survey instruments were self-reported and survey based, therefore subject to response bias. Due to the stigma around mental illness, respondents may have been reluctant to disclose their symptoms. The instruments asked students to look back on past events and symptoms, leading to the possibility of recall bias. Our school-wide study may not generalize to students around the country at other schools.

This is particularly possible given COVID-19's differential impact on various parts of the United States and the variable timeline of COVID-19 surges across the country.

Future Directions

The physical and mental health of our front-line providers and trainees plays a pivotal role in the fight against COVID-19. To this end, medical institutions are monitoring physical symptoms of COVID-19 in students and employees. The prevalence of psychological distress in medical students seen in this study suggests that medical institutions should similarly be tracking and responding to symptoms of psychological distress. We plan to administer quarterly mental health surveys to third year students at the ISMMS over the 2020-2021 academic year to observe the interaction of the stress of clinical rotations, personal life events, and the pandemic.

Conclusions

The results of the present study demonstrate that a large proportion of third year medical students entering the clinical wards during the COVID-19 pandemic in NYC experienced significant psychological burden. In this study, coping skills, personality traits, previous traumas, and social interactions largely explained this psychological distress. Concerns regarding COVID-19 did not appear to meaningfully contribute, possibly because students had not yet entered the clinical wards at the time of data collection. These findings suggest that developing healthy coping-skills, fostering interpersonal supportive relationships, and prioritizing leisure time in the clinical year may be useful interventions for medical educators to develop and incorporate into their curricula.

Declarations

Ethics Approval The study was approved by the Institutional Review Board (IRB) at the Icahn School of Medicine at Mount Sinai in May 2020 and determined to be exempt with a waiver of informed consent (HS#: 20-00435| GCO#1:20-0930(0001) ISMMS).

Consent to Participate/Publication This study was deemed by the IRB at ISMMS to have a waiver of informed consent. All participants accessed a form at the beginning of each survey informing them that their responses were collected for use in a research study. No identifying information was collected for this study.

Conflicts of Interest Dr. Charney is named as co-inventor on patents filed by the Icahn School of Medicine at Mount Sinai (ISMMS) relating to the treatment for treatment-resistant depression, suicidal ideation and other disorders. ISMMS has entered into a licensing agreement with Janssen Pharmaceuticals, Inc. and it has and will receive payments from Janssen under the license agreement related to these patents for the treatment of treatment-resistant depression and suicidal ideation. Consistent with the ISMMS Faculty Handbook (the medical school policy), Dr. Charney is entitled to a portion of the payments received by the ISMMS. Since SPRAVATO has received regulatory approval for treatment-resistant depression, ISMMS and thus, through the ISMMS, Dr. Charney, will be entitled to additional payments, beyond those already received, under the license agreement. Dr. Charney is a named co-inventor on several patents filed by ISMMS for a cognitive training intervention to treat depression and related psychiatric disorders. The ISMMS has entered into a licensing agreement with Click Therapeutics, Inc. and has and will receive payments related to the use of this cognitive training intervention for the treatment of psychiatric disorders. In accordance with the ISMMS Faculty Handbook, Dr. Charney has received a portion of these payments and is entitled to a portion of any additional payments that the medical school might receive from this license with Click Therapeutics. Dr. Charney is a named co-inventor on a patent application filed by the ISMMS for the use of intranasally administered Neuropeptide Y (NPY) for the treatment of mood and anxiety disorders. This intellectual property has not been licensed. Dr. Charney is a named co-inventor on a patent application in the US, and several issued patents outside the US filed by the ISMMS related to the use of ketamine for the treatment of post-traumatic stress disorder (PTSD). This intellectual property has not been licensed. No other declarations of interest to disclose.

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