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Psychological Consequences Among Residents and Fellows During the COVID-19 Pandemic in New York City: Implications for Targeted Interventions

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Other disclosures: Dr. Feder is named co-inventor on an issued patent in the United States, and several issued patents outside the United States, filed by the Icahn School of Medicine at Mount Sinai (ISMMS) for the use of ketamine as a therapy for post-traumatic stress disorder (PTSD). This intellectual property has not been licensed.

Dr. Charney is named as co-inventor on patents filed by 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 United States, and several issued patents outside the United States filed by the ISMMS related to the use of ketamine for the treatment of PTSD. This intellectual property has not been licensed.

*Ethical approval:* The study was approved and deemed exempt by the Institutional Review Board at the Icahn School of Medicine at Mount Sinai: HS#: 20-00423; GCO#1: 20-0888(0001).
Abstract

Purpose
To examine the psychological impact of the COVID-19 pandemic on medical trainees (residents and fellows) working at Mount Sinai Hospital (MSH) in New York City (NYC), the initial epicenter of the United States pandemic.

Method
The authors administered a survey to 991 trainees in frontline specialties working at MSH in NYC between April and May 2020. The instrument assessed symptoms of major depressive disorder, generalized anxiety disorder, COVID-19-related posttraumatic stress disorder, and burnout. Psychiatric screens were aggregated into one composite measure, and meeting criteria on any of the 3 scales was considered a positive screen for psychiatric symptoms. The survey also assessed COVID-19 related exposures, worries, coping strategies, and desired interventions. Multivariable logistic regressions were conducted to identify factors associated with psychiatric symptoms and burnout.

Results
Of the 560 respondents (56.6% response rate), 29.7% screened positive for psychiatric symptoms and 35.8% screened positive for burnout. History of a mental illness, COVID-19-related duties and personal/career worries, and coping by substance use were associated with increased likelihood of screening positive for psychiatric symptoms. Positive emotion-focused coping and feeling valued by supervisors were associated with decreased likelihood. Internal medicine and surgical specialties, a history of mental illness, increased work hours, duty-related worries, personal/career worries, coping via self-blame and venting, and coping via substance use were associated with higher odds of burnout. Feeling valued by supervisors was associated with
decreased burnout odds. The most common crisis-related needs included access to personal protective equipment, food provisions, and financial support.

Conclusions

Psychological distress and burnout affected approximately one-third of trainees sampled during the height of the pandemic in NYC. As the pandemic surged beyond NYC, these findings suggest that interventions should include addressing basic needs, promoting leadership affirmation, moderating work hours, supporting trainees financially, and enhancing mental health support.
As the COVID-19 pandemic swept the globe, it placed unprecedented strain on health care systems worldwide.\textsuperscript{1–4} COVID-19 is the highly infectious acute upper respiratory viral syndrome thought to be caused by the SARS CoV2 virus. As the virus spread around the world, health care professionals rose to the occasion as essential workers, facing fundamental changes to their work often involving redeployment to unfamiliar patient care settings,\textsuperscript{5} patient censuses exceeding normal hospital capacities,\textsuperscript{3,4} alarming rates of patient deaths,\textsuperscript{6} and personal risks incurred while treating COVID-positive patients. Health care workers expressed a desire for enhanced institutional support,\textsuperscript{7} and some studies demonstrated that the greatest psychological burden lay with those serving on the frontlines in hospitals most affected by the pandemic.\textsuperscript{8–11}

While all health care workers are affected by these dramatic alterations in clinical care, trainees, including residents and fellows, may face particular personal and professional challenges. During previous global health crises, residents and fellows have, as physicians in training, questioned their technical proficiency and ability to care for patients.\textsuperscript{12,13} During the COVID-19 pandemic, many residency and fellowship programs dramatically altered their normal courses of training,\textsuperscript{5,14–16} shifting to online instruction\textsuperscript{17} while redeploying residents away from specialty training toward intensive care units and emergency departments,\textsuperscript{5} in accordance with Accreditation Council for Graduate Medical Education (ACGME) guidelines.\textsuperscript{18} Meanwhile, as younger, lower-salaried, early-career physicians, trainees may also be more susceptible to the ripple effects of a failing economy and missed specialty training opportunities.\textsuperscript{5} Furthermore, prior to the pandemic, trainees often faced long hours, mistreatment at work,\textsuperscript{19} and a burdensome electronic health record system\textsuperscript{20–22} thought to contribute to high levels of burnout and depression.\textsuperscript{23–25}
With this study, we sought to understand the unique experience of trainees working and learning during the height of the pandemic at the Mount Sinai Hospital (MSH), an urban tertiary care hospital in New York City (NYC), the initial epicenter of the COVID-19 pandemic in the United States. The first patient diagnosed with COVID-19 in NYC was evaluated at MSH on February 29, 2020. By March 25, trainees were redeployed to COVID units, and on April 9, COVID-positive inpatients in the Mount Sinai Health System (MSHS) reached a peak of 1,988. The last fellow ended their COVID redeployment on June 1.

With 1,134 beds at normal capacity, MSH is the largest hospital in the MSHS, which houses the largest graduate medical education (GME) program in the country. Although previous studies have assessed the psychological outcomes of health care workers during the COVID-19 pandemic, with some focusing on specific GME populations, this study is the first to our knowledge to specifically evaluate the risk for psychopathology and burnout experienced by trainees during COVID-19 across specialties, and the occupational and personal correlates of such outcomes. By examining the relationship of work-related and personal factors with psychiatric symptoms and burnout, as well as assessing trainee worries and desired interventions, we hope to highlight opportunities for intervention and aid leaders in combating trainee distress during and after the crisis. We hypothesized that trainees who expressed personal and career worries, worked longer hours, and had more direct engagement with COVID-19 patients would be at a greater risk for psychological symptoms and burnout, and those who felt team camaraderie and valued by supervisors would be at a decreased risk of these outcomes.
Method

Sample

We collected data between April 14 and May 11, 2020 using an electronically administered, anonymous instrument. The study period shortly followed the peak of the MSHS pandemic curve on April 9. Our trainee study sample was drawn from a larger cohort of 3,360 frontline health care workers who participated in the same survey assessing the psychological impact of working during the NYC COVID-19 pandemic surge. We sent the survey electronically to 991 MSH residents and fellows in programs that were directly involved in the care of patients with COVID-19, either in their standard training environments or during redeployment. Eligible participants included trainees in the following ACGME categories: hospital-based programs (anesthesia and emergency medicine, interventional radiology), internal medicine and medicine subspecialties (cardiology, endocrinology, gastrointestinal medicine, geriatrics and palliative care, hematology/oncology, hospital medicine, infectious diseases, internal medicine, nephrology, and pulmonary/critical care medicine), other medical specialties (dermatology, neurology, internal medicine–pediatrics, pediatrics, psychiatry, and triple board), and surgical-based programs (general surgery, neurological surgery, obstetrics–gynecology, orthopedics, ophthalmology, otolaryngology, plastic surgery, thoracic surgery, urology, and vascular surgery). Ineligible participants included trainees not expected to be caring for patients with COVID-19 directly (e.g., pathology, medical genetics) and those whose email invitations could not be delivered.

Participants provided informed consent and received a $25 gift card after survey completion. Funding for this study came from discretionary philanthropic COVID-19-related funds from the
Office of the Dean. The study was approved and given exempt status by the institutional review board at the Icahn School of Medicine at Mount Sinai.

**Study instrument**

The survey contained 169 fields, including demographic questions, tools with validity evidence, and questions related to the COVID-19 pandemic. We assessed psychiatric symptoms using screening measures for major depressive disorder (MDD), generalized anxiety disorder (GAD), and COVID-19-related posttraumatic stress disorder (PTSD) over the preceding 2-week period. These screening instruments alone cannot determine diagnosis without a clinical interview, but do detect psychological symptoms and associated potential for a mental disorder diagnosis. We assessed symptoms of MDD and GAD using the Patient Health Questionnaire-8 (PHQ-8)\(^3\) (Cronbach’s \(\alpha = 0.85\)) and the Generalized Anxiety Disorder-7 (GAD-7)\(^{35}\) instrument (Cronbach’s \(\alpha = 0.88\)), respectively, with cutoff scores on both metrics of \(\geq 10\) to indicate a positive screen. We assessed symptoms of COVID-19-related PTSD using the 4-item PTSD-Checklist (PCL4-5)\(^{36}\) (Cronbach’s \(\alpha = 0.80\)), an abbreviated version of the PTSD-Checklist-5 (PCL-5),\(^{37}\) with questions modified to ascertain symptoms related to COVID-19 exposure. A score of \(\geq 8\) indicated a positive screen. The PHQ-8 or 9, GAD-7, and PCL are among the most widely used metrics to assess depressive, anxiety and PTSD symptoms, including in the context of disaster.\(^{38-42}\) For simplicity and to increase statistical power by reducing the number of outcome variables, we considered psychiatric symptoms to be present if a participant met the screening cut-off for 1 or more of the 3 disorders. Results from the 3 screening measures separately are reported in Supplemental Digital Appendix 1, available at [http://links.lww.com/ACADMED/B169](http://links.lww.com/ACADMED/B169). All participants received a list of available mental
health services following survey completion, and those who screened positive received a message within the survey that they might be experiencing distress.

We assessed burnout using the single-item Mini-Z question rated on a 5-point scale, with an accompanying definition of burnout. A rating of 3 (definitely burning out), 4 (symptoms of burnout won’t go away) or 5 (completely burned out) indicated presence of burnout. We used the single-item Mini-Z because it assessed current burnout rather than burnout over the past year and correlates with the emotional exhaustion subscale of the Maslach Burnout Inventory (MBI), with a correlation of 0.64 ($P < .001$). The Mini-Z is a widely used tool to assess physician burnout with emerging evidence for use in disaster context.

We attained a resilience score using the 2-item Connor-Davidson Resilience Scale (CD-RISC), Cronbach’s $\alpha = 0.81$.

Participants rated 21 worries related to the COVID-19 pandemic on a scale from 1 (“Not worried at all”) to 5 (“Worried nearly all the time”). A team of researchers and clinicians (R.H.P., S.S., A.F., L.P., J.R., J.H.F.) with expertise in internal medicine, psychiatry, psychology, and disaster mental health developed this worries assessment. We then grouped items into 4 categories (COVID infection, infecting others at work, duty-related, personal and career) using factor analysis, and factor-based mean scores were calculated. Participants selected their 3 most commonly used coping strategies to cope with their COVID-19 experiences. They chose from a 14-item pre-defined list, modified from the Brief COPE. We grouped items into 7 categories (avoidance, positive emotion focused, social, self-blame, active, substance abuse, or religious coping) based on previous factor analytic work and research on the relationship between items.

We evaluated interventions wanted by trainees by asking participants about interventions they would want or use to mitigate COVID-19 stressors and included 15 answer options from which
respondents checked all that applied. Items included interventions around basic needs, personal household support, preparation, and mental health support. Finally, participants answered questions regarding sociodemographic and occupational characteristics (e.g., training program, years of training, redeployment).

**Statistical analysis**

The 2 outcome variables were a positive screen on 1 or more of the 3 screening measures for psychiatric symptoms (PHQ-8, GAD-7, PCL4-5) and for burnout, dichotomized using the cutoff described above. We imputed missing data (< 3%) in the outcome variables using multiple imputation by chained equations.\(^{50}\) Descriptive statistics were calculated to summarize prevalence of the outcome variables. Bivariate chi-square and independent samples t-tests were conducted to examine the association of personal history factors, COVID-related work factors, coping strategies, and worries with the outcome variables. We conducted separate multivariable logistic regressions for psychiatric symptoms and burnout. For each regression, we only included variables found to be significantly associated with the outcomes in the bivariate analysis at \(P < .05\). We conducted post hoc analyses to further explain significant results from the regressions. Finally, to provide greater insight into actionable interventions, we calculated the endorsement frequency of each survey item related to worries, coping strategies, and interventions desired. We used R 4.0.2 statistical software (R Core Team, Vienna, Austria) for all analyses and to generate figures.

**Results**

Of the 991 trainees invited to participate in the survey, 561 (56.6%) responded. In comparison, 3,360 (55.8%) participants responded out of 6,062 who were invited to complete the survey in the full cohort. One participant was excluded due to missing data on both outcome variables that
could not be imputed; therefore, we included 560 trainees in the analyses. Nonresponse bias was examined by comparing basic demographics from the included sample with that of the target population using records from GME administration. Chi-square tests showed that the sample and population did not differ significantly in age ($P = .23$), gender ($P = .16$), or program ($P = .85$), suggesting that the sample is representative of the target population. A total of 166 (29.7%) respondents screened positive for MDD, GAD, and/or PTSD and 200 (35.8%) for burnout, with some overlap between categories. Of the 259 (44.9%) who screened positive for psychiatric symptoms or burnout, 107 (41.3%) screened positive for both.

**Bivariate associations**

Descriptive statistics and bivariate associations are presented in Table 1. A positive screen for psychiatric symptoms was associated with female gender, history of mental health disorder, worries about becoming infected with COVID-19, worries about infecting others at work, duty-related worries, personal and career worries, positive emotion-focused coping, coping by substance use, resilience, level of camaraderie at work, and feeling valued by immediate supervisors. Burnout was also associated with those same variables as well as training program, increase in work hours during the pandemic, coping by avoidance, and coping by self-blame and venting.

**Multivariable associations**

Results of multivariable logistic regression models are presented in Table 2. Higher odds of screening positive for psychiatric symptoms were associated with a history of a mental health diagnosis, having duties-related and personal and career worries due to COVID-19, and using substances to cope; lower odds of a positive screen were associated with using positive emotion-focused coping and feeling valued by immediate supervisors. Higher odds of burnout were
associated with the internal medicine specialty and surgical programs, history of a mental health diagnosis, increased work hours, having duty-related, personal and career worries due to the pandemic, coping by self-blame and venting, and coping by substance use, whereas lower odds of burnout were associated with feeling valued by immediate supervisors.

Post hoc analyses showed that internal medicine trainees faced greater exposure to acutely ill patients than all other specialties, and treated significantly more COVID-positive patients than other medical specialty trainees (mean=71.3 patients vs. 24.8, \( P < .001 \)), and that trainees with a history of mental illness were significantly more likely to request mental health interventions (39.4% vs. 29.2%, \( P = .03 \)).

For prevalence and bivariate/multivariable results reported separately for each psychiatric disorder, see Supplemental Digital Appendices 1 and 2, at

http://links.lww.com/ACADMED/B169. Briefly, 19.1% of participants screened positive for depression, 17.5% for anxiety, and 13.3% for PTSD. Coping by substance use, having personal and career worries, or having a past mental health diagnosis were risk factors for 2 of the 3 disorders. Feeling valued by immediate supervisors was protective against screening positive for depression and anxiety.

**Top worries, coping strategies, and desired interventions**

The 3 worries most frequently endorsed as “often worried” or “worried nearly all of the time” were infecting family (63.2%), getting infected (51.5%), and not being able to visit or assist loved ones who are ill or become ill (51.0%; Figure 1). The 3 most frequently used coping strategies were self-distraction (65.8%), emotional support from others (44.3%), and venting (38.8; Figure 2). The most frequently requested sources of support were access to personal protective equipment (PPE, 75.4%), food (70.9%), and financial support (67.4%; Figure 3).
Discussion

At the height of the pandemic in the United States epicenter, 29.7% of trainees surveyed at MSH screened positive for psychiatric symptoms of MDD, GAD, and/or COVID-19-related PTSD, and 35.8% reported burnout. While one might expect psychological distress and burnout to be markedly higher than normal during the peak of a crisis, surprisingly, these rates of psychiatric symptoms were consistent with data gathered during pre-pandemic periods. Indeed, previous studies have reported that 28.8% of residents exhibited depressive symptoms, and 15.9% endorsed symptoms of anxiety. Burnout in our sample was actually lower than expected when compared with trainee burnout prevalence that has been documented between 35.7%–60% across specialties in national cohorts.

Multiple factors may play a role in explaining these unexpected rates. The burnout rate in our study may in part be explained by the difference in the instrument being used, as previous work has found that the Mini-Z used in our study, which most aligns with the emotional exhaustion domain of burnout, may capture lower burnout rates relative to the gold standard MBI-22. Our lower reported prevalence of burnout and psychological distress may reflect the significant trainee well-being resources devoted locally at MSHS both before and during the pandemic.

Furthermore, trainees may have experienced an elevated sense of purpose and duty, perhaps related to the personal accomplishment domain of burnout as measured by the MBI, potentially decreasing acute perception of burnout and psychiatric symptoms. We also recognize that the most distressed trainees may not have had the motivation to complete the survey, skewing our sample. Though these findings do not suggest a dramatic increase in psychological distress compared with a national baseline, the chronicity of these symptoms remains unknown.
Furthermore, the worries endorsed and interventions desired suggest that trainee distress during a
time of crisis is both unique and actionable.

Compared to trainees in the other medical specialty category, those in the internal medicine
specialty and surgical programs were more likely to experience burnout, which, according to
post hoc results, is likely in part due to greater exposure to acutely ill and higher numbers of
COVID-positive patients than other programs. Additionally, some internal medicine trainees had
increased responsibility involving the management of resident teams redeployed from other
specialties to inpatient medicine units.

Trainees with a prior history of mental illness (22.9% of the sample) were significantly more
likely than those without to screen positive for both psychiatric symptoms and burnout, and to
request mental health interventions. This group may be more vulnerable to psychological distress
and benefit from availability of psychosocial support. However, mental health support was not a
commonly desired intervention, perhaps reflecting a combination of the distinct needs of trainees
during the acute pandemic response, i.e., basic needs, as well as the stigma surrounding help-
seeking among medical professionals. Nevertheless, the prevalence of psychiatric symptoms
serves as an indicator for GME leadership to augment mental health care provisions, particularly
following the apex of the crisis when trainees begin to process their experiences.

Endorsing substance use as a coping strategy was associated with nearly a 4-fold greater odds of
screening positive for psychiatric symptoms, and over a 2-fold greater odds of burnout. Though
fewer than one in 10 trainees reported coping in this way, a lower prevalence than seen among
trainees pre-pandemic, the effect size of the association highlights how substance use can be an
important sign of deeper distress. As psychosocial interventions are scaled for trainees,
screening tools and systems to help those at risk for substance use disorders may be warranted.
Interventions aimed at decreasing maladaptive coping strategies such as substance use, self-blame, and venting, and instead promoting others such as positive emotion-focused coping, may be helpful.

The relationship between burnout and hours worked per week has been described previously.\textsuperscript{23,63–65} Thus, it is not surprising that the nearly 1 in 5 trainees whose hours increased during the pandemic had over 2-fold greater odds of experiencing pandemic-related burnout. Given that 50% of trainees surveyed were redeployed, these additional hours may have been spent caring for patients outside of the trainee’s intended specialty. These findings underscore the importance of adhering to the ACGME Pandemic Emergency Status, which states that even at the height of the pandemic (Phase 3), duty hour limits must be maintained.\textsuperscript{18}

Feeling valued by immediate supervisors was associated with 66% lower odds of psychiatric symptoms and 59% lower odds of burnout. In the context of this crisis, it is clear that leadership support is essential, perhaps even more essential than peer support or camaraderie, which did not emerge as significant in the multivariable models. This may be a crisis-related phenomenon, given that peer support has previously been demonstrated as highly beneficial among physicians,\textsuperscript{66} and a predictor of physician well-being.\textsuperscript{67} While this is a challenging time to be a leader in health care, GME leadership, including program directors and chief residents, may be empowered to know that trainees could significantly benefit from their frequent and genuine communication, affirmation, and demonstration of support.

Endorsing personal and career worries (e.g., schedule uncertainty, personal relationships, career, finances) as well as duty-related worries (e.g., not being able to do enough for patients, not having adequate knowledge to treat COVID patients) were correlates of both burnout and psychiatric symptoms. Program directors can address feelings of inadequate preparation for this
unprecedented event through open conversations and didactic sessions dedicated to COVID-19 preparedness. Furthermore, if feasible, leadership might consider providing crisis pay, which demonstrates the value of trainees and can help offset pandemic-related financial concerns, including additional transportation expenses, loss of spousal income, and cost of quarantine accommodations. While institutional leadership can address certain worries (ensuring access to food, PPE, and financial support), others may be better addressed through communication from program directors and chief residents (effect on career, scheduling logistics) through scheduling clarity and “office hour” discussions normalizing and addressing career worries.

Based on our findings of risk and protective factors associated with psychological outcomes and burnout and the most frequently desired interventions, we recommend GME leadership focus resources toward the following interventions:

- Support trainees’ basic needs including advocating for adequate access to PPE, scrubs, and food provisions.
- Create schedules that avoid increasing trainee work hours.
- Advocate for crisis pay to financially support trainees and show appreciation, especially when workstreams are outside of specialty training areas.
- Make direct efforts to communicate with trainees and demonstrate value through town halls, direct messaging, and acts of appreciation.
- Bolster psychosocial and mental health services including psychoeducation, support groups, and treatment aimed at maladaptive coping, while enhancing adaptive coping skills (positive emotion-focused coping).

Many of these interventions were implemented at Mount Sinai during and after the peak of the pandemic and have been previously described.58
This study has several limitations. Our findings may be limited by the study’s single-site nature, therefore limiting generalizability. The survey was conducted throughout a month of rapid change. Thus, trainees may have responded differently depending on when during the study period they completed the survey, thereby introducing heterogeneity that we did not account for in our analysis. Though a majority of eligible trainees responded, the results may have been affected by self-selection bias. Stigma may also have caused underreporting of psychological symptoms and burnout. Lastly, the cross-sectional nature of the study precludes firm conclusions about causality related to psychiatric symptoms.

**Conclusions**

As the pandemic has surged in cities beyond NYC, we hope that hospital systems can learn from the trainee experience at MSH to plan interventions that reduce negative psychological consequences for trainees. Based on our findings, GME leadership should consider supporting trainees through the provision of basic needs, open lines of communication and support, crisis pay, clear scheduling hours, and psychoeducation surrounding coping strategies. Further research should monitor the long-term psychological effects of the crisis on trainees and assess the impact of implemented interventions.
References


Figure Legends

Figure 1
Worries endorsed by 560 trainees at The Mount Sinai Hospital in New York City during the peak of the COVID-19 pandemic in spring 2020. Percentages represent trainees who rated that they were “often worried” or “worried nearly all of the time” about each concern related to the COVID-19 pandemic.

Abbreviation: PPE, personal protective equipment.

Figure 2
Individual coping strategies endorsed by 560 trainees at The Mount Sinai Hospital in New York City during the peak of the COVID-19 pandemic in spring 2020. Percentages represent trainees who selected each coping strategy as 1 of 3 they most commonly used to help them cope with experiences related to the COVID-19 pandemic.

Figure 3
Interventions desired by 560 trainees at The Mount Sinai Hospital in New York City during the peak of the COVID-19 pandemic in spring 2020. Percentages represent trainees who selected each support resource as being of greatest benefit to reduce stress around COVID-19 in a select-all-that-apply format.

Abbreviations: PPE, personal protective equipment; HR, human resources.
Table 1

Descriptive Statistics and Bivariate Analyses of Positive Screens for Psychiatric Symptoms and Burnout\(^a\) of 560 Trainees, The Mount Sinai Hospital in New York City During the Peak of the COVID-19 Pandemic, Spring 2020

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total(^b)</th>
<th>Psychiatric symptoms(^+)</th>
<th>Burnout(^+)</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td>Measure(^b) (P) value</td>
<td>Measure(^b) (P) value</td>
</tr>
<tr>
<td><strong>Total, no.</strong></td>
<td>560</td>
<td>166 (29.7)</td>
<td>200 (35.8)</td>
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<tr>
<td><strong>Age, no. (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 35</td>
<td>512 (91.4)</td>
<td>147 (28.8)</td>
<td>180 (35.2)</td>
</tr>
<tr>
<td>≥ 35</td>
<td>48 (8.6)</td>
<td>19 (39.6)</td>
<td>20 (41.7)</td>
</tr>
<tr>
<td><strong>Gender, no. (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>278 (49.8)</td>
<td>69 (24.9)</td>
<td>82 (29.6)</td>
</tr>
<tr>
<td>Female</td>
<td>280 (50.2)</td>
<td>95 (34.1)</td>
<td>117 (41.8)</td>
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<tr>
<td><strong>Relationship, no. (%)</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>140 (25.0)</td>
<td>46 (33.1)</td>
<td>49 (35.3)</td>
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<tr>
<td>Partnered</td>
<td>420 (75.0)</td>
<td>120 (28.6)</td>
<td>151 (36.0)</td>
</tr>
<tr>
<td><strong>Years in practice, no. (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 3</td>
<td>207 (41.4)</td>
<td>56 (27.1)</td>
<td>76 (36.7)</td>
</tr>
<tr>
<td>≥ 3</td>
<td>293 (58.6)</td>
<td>90 (30.7)</td>
<td>98 (33.6)</td>
</tr>
<tr>
<td><strong>Program, no. (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other medical specialty</td>
<td>95 (17.3)</td>
<td>24 (25.5)</td>
<td>27 (28.7)</td>
</tr>
<tr>
<td>Internal medicine</td>
<td>186 (33.9)</td>
<td>65 (34.9)</td>
<td>87 (46.8)</td>
</tr>
<tr>
<td>Surgical</td>
<td>143 (26.0)</td>
<td>40 (28.0)</td>
<td>46 (32.2)</td>
</tr>
<tr>
<td>Hospital-based</td>
<td>125 (22.8)</td>
<td>29 (23.4)</td>
<td>33 (26.4)</td>
</tr>
<tr>
<td><strong>Mental health history, no. (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>428 (77.1)</td>
<td>112 (26.2)</td>
<td>138 (32.3)</td>
</tr>
<tr>
<td>Yes</td>
<td>127 (22.9)</td>
<td>53 (41.7)</td>
<td>62 (48.8)</td>
</tr>
</tbody>
</table>

\(^a\) \(P\) values are from two-tailed Chi-square tests unless otherwise noted. \(^b\) \(P\) values are from two-tailed Fisher's exact tests.
<table>
<thead>
<tr>
<th>Table:</th>
<th>Description</th>
<th>No</th>
<th>Yes</th>
<th>Table Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased hours, no. (%)</td>
<td></td>
<td>449 (80.6)</td>
<td>130 (29.0)</td>
<td>143 (31.9)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>268 (50.2)</td>
<td>75 (28.2)</td>
<td>101 (37.8)</td>
</tr>
<tr>
<td>Redeployed, no. (%)</td>
<td>Yes</td>
<td>108 (19.4)</td>
<td>35 (32.7)</td>
<td>56 (51.9)</td>
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<tr>
<td>Coworker exposure, no. (%)</td>
<td></td>
<td>373 (67.9)</td>
<td>107 (28.8)</td>
<td>134 (36.0)</td>
</tr>
<tr>
<td></td>
<td>0 coworkers hospitalized/ICU/died</td>
<td>122 (22.2)</td>
<td>37 (30.3)</td>
<td>41 (33.6)</td>
</tr>
<tr>
<td>Worries, mean (SD)</td>
<td>1 coworker hospitalized/ICU died</td>
<td>54 (9.8)</td>
<td>19 (35.2)</td>
<td>19 (35.2)</td>
</tr>
<tr>
<td></td>
<td>≥1 coworker hospitalized/ICU</td>
<td>373 (67.9)</td>
<td>107 (28.8)</td>
<td>134 (36.0)</td>
</tr>
<tr>
<td></td>
<td>≥1 coworker died</td>
<td>268 (50.2)</td>
<td>75 (28.2)</td>
<td>101 (37.8)</td>
</tr>
<tr>
<td></td>
<td>COVID-19 infection worries</td>
<td>3.23 (.96)</td>
<td>3.55 (1.01)</td>
<td>&lt; .001&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Infected by others at work worries</td>
<td>3.13 (1.08)</td>
<td>3.28 (1.13)</td>
<td>.03&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Personal and career worries</td>
<td>2.76 (.73)</td>
<td>3.12 (.74)</td>
<td>&lt; .001&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Coping strategies, no. (%)</td>
<td>Avoidance coping</td>
<td>391 (69.8)</td>
<td>124 (31.8)</td>
<td>151 (38.7)</td>
</tr>
<tr>
<td></td>
<td>Positive emotion-focused coping</td>
<td>314 (56.1)</td>
<td>69 (22.0)</td>
<td>&lt; .001&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Social coping</td>
<td>270 (48.2)</td>
<td>85 (31.6)</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>Self-blame and venting</td>
<td>223 (39.8)</td>
<td>76 (34.1)</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>Active coping</td>
<td>195 (34.8)</td>
<td>51 (26.3)</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>Coping by substance use</td>
<td>49 (8.8)</td>
<td>28 (57.1)</td>
<td>&lt; .001&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Religious coping</td>
<td>31 (5.5)</td>
<td>7 (22.6)</td>
<td>0.37</td>
</tr>
<tr>
<td>Resilience, mean (SD)</td>
<td>6.52 (1.30)</td>
<td>6.16 (1.32)</td>
<td>&lt; .001&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6.26 (1.34)</td>
</tr>
<tr>
<td>Camaraderie, no. (%)</td>
<td>Avoidance coping</td>
<td>391 (69.8)</td>
<td>124 (31.8)</td>
<td>151 (38.7)</td>
</tr>
<tr>
<td></td>
<td>Positive emotion-focused coping</td>
<td>314 (56.1)</td>
<td>69 (22.0)</td>
<td>&lt; .001&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Social coping</td>
<td>270 (48.2)</td>
<td>85 (31.6)</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>Self-blame and venting</td>
<td>223 (39.8)</td>
<td>76 (34.1)</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>Active coping</td>
<td>195 (34.8)</td>
<td>51 (26.3)</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td>Coping by substance use</td>
<td>49 (8.8)</td>
<td>28 (57.1)</td>
<td>&lt; .001&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Religious coping</td>
<td>31 (5.5)</td>
<td>7 (22.6)</td>
<td>0.37</td>
</tr>
<tr>
<td>Resilience, mean (SD)</td>
<td>6.52 (1.30)</td>
<td>6.16 (1.32)</td>
<td>&lt; .001&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6.26 (1.34)</td>
</tr>
<tr>
<td>Camaraderie, no. (%)</td>
<td>Low/medium</td>
<td>244 (43.6)</td>
<td>85 (34.8)</td>
<td>109 (44.7)</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>316 (56.4)</td>
<td>81 (25.8)</td>
<td>91 (28.9)</td>
</tr>
<tr>
<td>Valued by immediate supervisor, no. (%)</td>
<td></td>
<td>&lt;.001$^c$</td>
<td>&lt;.001$^c$</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>---</td>
<td>-----------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>Not at all/slightly</td>
<td>67 (12.0)</td>
<td>38 (56.7)</td>
<td>42 (62.7)</td>
<td></td>
</tr>
<tr>
<td>Moderately/very much</td>
<td>492 (88.0)</td>
<td>128 (26.1)</td>
<td>158 (32.2)</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviation: ICU, intensive care unit.

$^a$Psychiatric symptoms+ indicates those with a positive screen for depression using the Patient Health Questionnaire-8, anxiety using the Generalized Anxiety Disorder-7, or PTSD-Checklist-5. Burnout+ indicates those considered to be experiencing burnout using the single-item Mini-Z. Resilience was assessed using the Connor-Davidson Resilience Scale.

$^b$Numbers may not add to 560 because some respondents did not answer all questions.

$^c$P value <0.05.
Table 2

Multivariable Logistic Regressions of Psychiatric Symptoms and Burnout for 560 Trainees, The Mount Sinai Hospital in New York City During the Peak of the COVID-19 Pandemic, Spring 2020

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Psychiatric symptoms+</th>
<th>Burnout+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR (95% CI)</td>
<td>P value</td>
</tr>
<tr>
<td>Gender (ref: male)</td>
<td>1.25 (0.80, 1.96)</td>
<td>.34</td>
</tr>
<tr>
<td>Program (ref: other medical specialty)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal medicine specialty</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Surgical</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Hospital based</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Mental health history</td>
<td>1.89 (1.14, 3.13)</td>
<td>.01b</td>
</tr>
<tr>
<td>Increased hours</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Worries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COVID-19 infection worries</td>
<td>1.07 (0.80, 1.44)</td>
<td>.65</td>
</tr>
<tr>
<td>Infecting others at work worries</td>
<td>0.89 (0.7, 1.12)</td>
<td>.32</td>
</tr>
<tr>
<td>Duty-related worries</td>
<td>1.45 (1.03, 2.06)</td>
<td>.04b</td>
</tr>
<tr>
<td>Personal and career worries</td>
<td>2.46 (1.68, 3.66)</td>
<td>&lt; .001b</td>
</tr>
<tr>
<td>Coping strategies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance coping</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Positive emotion-focused coping</td>
<td>0.55 (0.35, 0.86)</td>
<td>.009b</td>
</tr>
<tr>
<td>Self-blame and venting</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Coping by substance use</td>
<td>3.98 (1.96, 8.26)</td>
<td>&lt; .001b</td>
</tr>
<tr>
<td>Resilience</td>
<td>0.88 (0.74, 1.04)</td>
<td>.14</td>
</tr>
<tr>
<td>Camaraderie</td>
<td>1.05 (0.67, 1.65)</td>
<td>.84</td>
</tr>
<tr>
<td>Valued by immediate supervisors</td>
<td>0.34 (0.18, 0.62)</td>
<td>&lt; .001b</td>
</tr>
<tr>
<td>Nagelkerke pseudo $R^2$</td>
<td>0.29</td>
<td>0.31</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------</td>
<td>------</td>
</tr>
</tbody>
</table>

Abbreviations: OR, odds ratio; 95% CI, 95% confidence interval.

*aPsychiatric symptoms+ indicates those with a positive screen for depression using the Patient Health Questionnaire-8, anxiety using the Generalized Anxiety Disorder-7, or PTSD-Checklist-5. Burnout+ indicates those considered to be experiencing burnout using the single-item Mini-Z. Resilience was assessed using the Connor-Davidson Resilience Scale.

*bIndicates $P$ value <0.05.
Figure 1

[Bar chart showing various worries such as infecting family, getting infected, not knowing if infected, becoming seriously ill, dying, infecting colleagues, infecting patients, not being able to do enough, not having enough knowledge, not having sufficient PPE, not having sufficient equipment, becoming overwhelmed with workload, having to make difficult prioritizing decisions, not being able to visit ill loved ones, uncertainty of my schedule, effect on my personal relationships, effect on my career, access to healthy food at work, effect on my finances, ability to care for my dependents, accommodations for isolation, with percentages indicated for each worry.]
Figure 2
Figure 3