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# The Psychological Well-Being of Medical Versus Dental GME Residents During the COVID 19 Pandemic: A Cross-Sectional Study

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**Purpose:** Trainees are facing isolation and burnout, due to the fear of contracting and transmitting novel coronavirus-19 (COVID-19). There has been a reduction in clinical activities of residents. The purpose of this paper is to measure and compare the psychological well-being of dental versus medical residents during the COVID-19 outbreak.

**Methods:** This is a cross-sectional study whereby trainees of a hospital in New York City were sent a questionnaire. Participants were from the dental and medical departments. Psychological measures of depression and post traumatic stress disorder were assessed utilizing the Patient Health Questionnaire-9 (PHQ-9) and The Impact of Event Scale–Revised (IES-R) questionnaire. Other variables compared were age, gender, smoking status, living situation and comorbidities. Data analysis utilized chi-squared ( $\chi^2$ ) and t-tests. Bivariate correlation and linear regression analyses were also utilized.

**Results:** The survey was sent to 19 dental (Dental) and 171 medical (MD) residents. There were 66 participants. The response rate was 63.16 and 35.09% for the Dental and MD residents, respectively. The mean age for the Dental and MD residents, respectively, was  $29.62 \pm 2.09$  and  $34.82 \pm 9.32$  ( $P = .014$ ). Eighty-one percent of the Dental respondents were male and 33.3% of the MD respondents were male ( $P < .001$ ). The mean PHQ-9 score was  $18.29 \pm 2.88$  vs  $7.24 \pm 7.41$  for Dental and MD residents, respectively ( $P < .001$ ). A higher score represents increased severity of depression. The Dental residents scored  $61.9 \pm 3.90$  on the IES-R vs  $30.36 \pm 24.67$  ( $P < .001$ ). A higher score indicates a greater frequency of intrusive thoughts and avoidance. Forty-two percent of Dental and 13.3% of MD residents tested positive; 25% of Dental and 28.9% of MD residents self-reported symptoms for COVID-19. Being positive or symptomatic resulted in statistically significant higher IES-R and PHQ-9 scores.

**Conclusions:** Dental residents and being positive or symptomatic for COVID-19 resulted in higher PHQ-9 and IES-R scores. Being aware of the impact of COVID-19 is an important step in providing intervention.

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*J Oral Maxillofac Surg* 79:1828.e1–1828.e8, 2021

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Conflict of Interest Disclosures: There is no conflict of interest for any of the authors.

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Received November 27, 2020

Accepted April 14, 2021.

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0278-2391

<https://doi.org/10.1016/j.joms.2021.04.016>

On December 31, 2019, China reported cases of pneumonia associated with a seafood market in Wuhan, Hubei Province. On January 7, 2020, it was reported that the cause of these cases was the novel coronavirus-19 (COVID-19). Initially, it was reported that the virus originated from an animal species. Subsequently, person to person transmission was discovered.

COVID-19 spread rapidly to other countries. The first case of COVID-19 was diagnosed in the United States of America on January 20, 2020. As per the New York State Department of Health, the first case reported in New York State was on March 1, 2020. By April 26, 2020, there were 293,991 diagnosed cases of COVID-19 and 22,275 deaths due to COVID-19 in New York State. As of August 2020, there are close to 6,000,000 diagnosed cases in the country and 460,000 diagnosed cases in New York State.

During the early days of the spread of COVID-19 within New York State, government officials and healthcare workers were unaware of the high transmission rate of the virus. As a result, many civilians and healthcare workers succumbed to the virus. Some fell severely ill while others died.

COVID-19 is suspected to spread via respiratory droplets.<sup>1-4</sup> The virus has been demonstrated to be present in aerosols for hours.<sup>1-4</sup> In laboratory settings, the virus has been found on surfaces for days.<sup>1-4</sup> Rotary dental and surgical instruments can create a spray comprised of particles of microorganisms, blood, and saliva. A surgical mask will not provide protection against inhalation of these agents.<sup>1-4</sup> Data from the literature suggest that health professionals that treat the upper aerodigestive tract are at equal risk of contracting COVID-19 as their colleagues in the Emergency Department and Intensive Care Unit.<sup>1-4</sup> The first professionals to contract the virus in China and the UK dealt with the upper aerodigestive tract.<sup>1-4</sup>

A review of the literature reveals that healthcare workers suffered anxiety, depression, stress, insomnia, and distress during prior pandemics.<sup>1-4</sup> Certain studies found that the psychological burden can exist for years after the pandemic ended.<sup>1-4</sup>

Another consideration is the effect of the pandemic on resident training.<sup>1-4</sup> The pandemic has resulted in a reduction in clinical activities of trainee programs.<sup>1-4</sup> This is due to concern for risk of transmission of COVID-19 and need for preservation of personal protective equipment.<sup>1-4</sup>

During the pandemic, per New York State, the capacity of the intensive care unit (ICU) floors was increased. Elective services and surgeries were shut down. Help was needed in managing COVID positive patients on the medical and ICU floors. Residents from all departments including general dentistry, oral and maxillofacial surgery, podiatry, pediatrics,

obstetrics-gynecology, and general surgery were deployed to these floors.

Lastly, issues with personal protective equipment (PPE) have been reported worldwide.<sup>1-4</sup> There have been periods of time when healthcare workers have used garbage bags as a substitute for PPE.<sup>1-4</sup>

These circumstances can lead to psychological distress to physicians, dentists and oral and maxillofacial surgeons. The aim of this study is to examine the psychological impact of the COVID-19 outbreak on hospital trainees. The investigators hypothesize that Dental residents will score significantly higher on the Patient Health Questionnaire-9 (PHQ-9) and The Impact of Event Scale-Revised (IES-R) questionnaire as compared to their MD colleagues. The investigators also hypothesize older trainees, trainees with comorbidities, those who smoke and those who live with a partner and/or children, will score higher on the PHQ-9 and IES-R questionnaire. The specific aim of this study is to (1) to design and implement a survey instrument to measure well-being in a sample of Graduate Medical Education (GME) trainees, and (2) to estimate and compare well-being measures between medical and dental GME trainees.

## Methods

### STUDY DESIGN/SAMPLE

To address the research purpose, the investigators designed and implemented a cross-sectional survey. All trainees who were on service during the outbreak were invited to participate. The study population was composed of trainees from the oral and maxillofacial surgery, general dentistry, and medical departments. The trainees from the medical departments included, but were not limited to, internal medicine, family medicine, general surgery, pediatrics, podiatry, and obstetrics-gynecology. The trainees from the Dental department included general dentistry and oral and maxillofacial surgery residents. The survey was collected through an anonymous questionnaire distributed via email between April 14, 2020 and April 28, 2020. The questionnaire had 3 sections—demographics, PHQ-9, and IES-R (Fig. 1). The survey link was administered online; also allowing residents who were at home, in quarantine, to respond.

To be included in the study sample, participants had to be a current trainee of an urban hospital in New York and submit a complete survey. Individuals were excluded as study subjects if they were not a trainee and did not complete the survey in its entirety.

### VARIABLES

The primary predictor is clinical training—whether a trainee is a Dental or MD resident. The outcome

This is an anonymous survey. This will be strictly used for research purposes only. The goal of this study is to find gaps in our healthcare worker's mental

Consent for survey participation:

Participation in this study is completely voluntary. If you decide not to participate there will not be any negative consequences. Please be aware that if you decide to participate, you may stop participating at any

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

### I. About yourself

Age: \_\_\_\_\_ years old

Gender: [1] Male [2] Female  
 Living situation: [1] Single [2] Married but no children [3] Married living with children [4] Married with children but not living together  
 Role in the healthcare: [1] Doctor [2] Nurse [3] PCA [4] other: (plz specify) \_\_\_\_\_  
 Have you been tested for COVID-19? [1] Tested positive [2] Tested negative [3] Not tested but had symptoms [4] Never tested, nor symptomatic  
 Do you have any of the condition that need medication? (check all applies) [1] Diabetes [2] Lung disease [3] High blood pressure [4] Depression/ Anxiety  
 Do you smoke? [1] Yes [2] No, exsmoker [3] Never smoked

### II. Over past 2 weeks, how have you been bothered by any of the following problems?

	Not at all	Several days	more than half of the days	Nearly everyday
1) I have little interest or pleasure in doing things	[1]	[2]	[3]	[4]
2) I am feeling down, depressed, or hopeless	[1]	[2]	[3]	[4]
3) I have trouble falling or staying asleep, or sleeping too much	[1]	[2]	[3]	[4]
4) I am feeling tired or having little energy	[1]	[2]	[3]	[4]
5) I have poor appetite or overeating	[1]	[2]	[3]	[4]
6) I am feeling bad about myself, feeling that I am a failure, or have let your family down	[1]	[2]	[3]	[4]
7) I have trouble concentrating on things, such as reading the newspaper or watching television	[1]	[2]	[3]	[4]
8) I am moving or speaking so slowly that other people could have noticed. Or the opposite being so fidgety or restless that you have been moving around a lot more than usual	[1]	[2]	[3]	[4]
9) I had thoughts of would be better off dead, or of hurting yourself	[1]	[2]	[3]	[4]

### III. Past seven days, how much were you bothered by these difficulties dealing with

	Not at all	A little bit	Moderately	Quite a bit	Extremely
1) Reminders brought back feelings about it	[1]	[2]	[3]	[4]	[5]
2) I had trouble staying asleep	[1]	[2]	[3]	[4]	[5]
3) Other things kept making me think about it	[1]	[2]	[3]	[4]	[5]
4) I felt irritable and angry	[1]	[2]	[3]	[4]	[5]
5) I avoided letting myself get upset	[1]	[2]	[3]	[4]	[5]
6) I thought about it when I didn't mean to	[1]	[2]	[3]	[4]	[5]
7) I felt that it hadn't happened or it wasn't real	[1]	[2]	[3]	[4]	[5]
8) I stayed away from reminders about it	[1]	[2]	[3]	[4]	[5]
9) Pictures about it popped into my head	[1]	[2]	[3]	[4]	[5]
10) I was jumpy and easily startled	[1]	[2]	[3]	[4]	[5]
11) I tried not to think about it	[1]	[2]	[3]	[4]	[5]
12) I was aware I still had a lot of feelings	[1]	[2]	[3]	[4]	[5]
13) My feelings about it were kind of numb	[1]	[2]	[3]	[4]	[5]
14) I felt like I was acting or feeling like I was back	[1]	[2]	[3]	[4]	[5]
15) I had trouble falling asleep	[1]	[2]	[3]	[4]	[5]
16) I had waves of strong feelings about it	[1]	[2]	[3]	[4]	[5]
17) I tried to remove it from my memory	[1]	[2]	[3]	[4]	[5]
18) I had trouble concentrating	[1]	[2]	[3]	[4]	[5]
19) Reminders caused me to have physical reactions	[1]	[2]	[3]	[4]	[5]
20) I had dreams about it	[1]	[2]	[3]	[4]	[5]
21) I felt watchful and on guard	[1]	[2]	[3]	[4]	[5]

### IV. Is there anything that you think we can do to improve the situation? Please share if you have any suggestions, concerns, complaints, or any comments below

Thank you so much for your participation. I hope we can identify any gaps in healthcare workers and solve those problems if any. We are all

### FIGURE 1. Three part questionnaire.

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variables are scores on the PHQ-9 and IES-R questionnaire. Other variables of interest included age, gender, presence of co-morbid conditions, living status, and smoking condition.

### DATA COLLECTION METHOD

The questionnaire consisted of: basic demographic data, the Impact of Event scale and the Personal Health Questionnaire. A questionnaire was created via Survey Monkey. A link to the questionnaire was sent to an associate at GME. The associate forwarded the survey link to all residents. The results were received anonymously by the investigators.

### DEMOGRAPHICS

Information about the living situation, medical comorbidities, smoking status, and exposure to COVID-19 was collected. The medical comorbidities included hypertension, lung disease, diabetes, and depression/anxiety. These medical conditions increase the chances of contracting COVID-19. At the time of the questionnaire, all trainees were working in the emergency department, medical floors, or ICU.

### IES-R

The IES-R is a self-reporting measure used to assess emotions following a traumatic event. Literature

demonstrates that once a traumatic event has occurred, an individual can initially respond with an avoidance phenomenon alternated by intrusive thoughts. This can occur until the individual has psychologically assimilated to the traumatic event. In addition, an individual can also experience hyperarousal symptoms such as an exaggerated startle response, decreased concentration and hypervigilance. A higher score indicates a greater frequency of intrusive thoughts, attempts at avoidance, and hyperarousal.

We rate the 21 items on a 5-point frequency scale (0, not at all; 1, a little bit; 2, moderately; 3, quite a bit; 4, extremely). A higher score indicates a greater frequency of intrusive thoughts, attempts at avoidance, and hyperarousal.

#### PHQ-9

The PHQ-9 is a 9-item questionnaire designed to designate the severity of depression an individual is experiencing. A higher score on PHQ-9 questionnaire represents increased severity of depression. Its validity has been confirmed by 2 studies—3,000 patients in 8 primary care clinics and 3,000 patients in 7 obstetrics-gynecology clinics. We rated the 9 items on a 4 point frequency (0, not at all; 1, several days; 2, more than half the days; 3, nearly everyday) in relation to the healthcare worker's past 2 weeks.

#### DATA ANALYSES

Statistical analysis on data gathered was completed using IBM Corp. SPSS Statistics Version 26.0. Participant demographics, scores on questionnaires, and other variables of interest were compared between Dental and MD residents utilizing chi-squared ( $X^2$ ) and t-tests. Bivariate correlation and linear regression analyses were used to determine predictive variables for scores on questionnaires. For these analyses, some variables of interest were modified into binary (yes or no) variables. Smoking history was classified yes if a participant is a current smoker or has ever smoked. Living with a partner or children was classified as a no if a participant answered "single" or "married w/ kids but not living together." Presence of any comorbidity was categorized as yes in that subgroup. Participants who answered "tested positive" or "not tested, symptomatic" were classified as yes for COVID-19 positive or symptomatic variable.

IRB approval was received for this study by the hospital's IRB board.

## Results

The survey was sent to 19 Dental and 171 MD residents. There were 66 participants (12 Dental and 54

MD residents) (Table 1). The response rate for the Dental trainees was 63.16%, whereas for the MD group was 35.09%

In the Dental residents group, the mean age  $29.62 \pm 2.09$  whereas in the MD group, mean age was  $34.82 \pm 9.32$  ( $P$ value .014). Eighty-one percent of the Dental residents were male, whereas 33.3% MD residents were male ( $P$ value <.001). About 57.1% of Dental residents never smoked and 33.3% were ex-smokers; 84.4% MD residents reported never smoking; and 6.7% reported current smoking ( $P$ value .45; Table 1).

In the Dental resident group, 58.3% were single, 25% were married with no children, 17% were married and living with children; 57.8% of the MD residents were single, 15.6% were married with no children, 17.8% were married and living with children ( $P$ value .153). The Dental residents had no comorbid conditions; in the MD group, several participants had health conditions (1 lung disease, 3 hypertension, 4 depression/anxiety) (Table 1).

Interestingly, in the Dental residents group, 41.6% tested positive for COVID-19 and another 25% self-reported having symptoms but not getting tested; In the MD residents group, 13.3% tested positive for COVID-19 virus and 28.9% were reported symptoms but did not get tested ( $P$ value .002; Table 1).

Table 2 demonstrates a statistically significant correlation for gender, history of smoking and type of residency. Specifically, it demonstrates that a higher PHQ-9 score correlated with being male, history of smoking and being a Dental resident. Age, living with a partner and comorbid condition did not correlate with higher scores. When considering the IES-R scores, history of smoking and type of residency was statistically significant.

Due to the high positivity and symptoms rate of COVID-19 in the residents, a bivariate correlation analysis of PHQ-9 and IES-R scores with COVID-19 positivity or symptoms was generated. Being COVID-19 positive and/or symptomatic correlated with a statistically significant higher PHQ-9 and IES-R score as seen in Table 2.

As seen in Table 3, the mean score on the PHQ-9 questionnaire was higher for the Dental residents as compared to MD residents ( $18.29 \pm 2.88$  vs  $7.24 \pm 7.41$ ,  $P < .001$ ). Likewise, for the IES-R questionnaire, the Dental residents scored higher than the MD group ( $61.9 \pm 3.90$  vs  $30.36 \pm 24.67$ ,  $P < .001$ ).

As depicted in Table 4, a linear regression analysis was conducted for PHQ-9 and IES-R for all predictor variables. When controlling for all predictor variables, only type of resident remained statistically significant. Dental residents were predicted to score 8 times higher on the PHQ-9 score compared to high MD

**Table 1. DEMOGRAPHICS OF THE DENTAL AND MD RESIDENTS**

	Dental Residents	MD Residents	P Value
Total	12	54	
Age	29.62 ± 2.09	34.82 ± 9.32	.014
Gender			<.001
Male	81.0%	33.3%	
Female	19.0%	66.7%	
Smoking			.045
Yes	9.5%	6.7%	
No, ex-smoker	33.3%	8.9%	
Never smoked	57.1%	84.4%	
Living situation			.153
Single	58.3%	57.8%	
Married w/ no kids	25%	15.6%	
Married w/ kids (living together)	17%	17.8%	
Married w/ kids (not living together)	0%	6.7%	
Comorbidity			NA
Diabetes	0%	0%	
Lung Disease	0%	2.2%	
Hypertension	0%	6.7%	
Depression/Anxiety	0%	8.9%	
COVID status			.002
Tested positive	41.67%	13.3%	
Tested negative	8.3%	22.2%	
Not tested, symptomatic	25%	28.9%	
Never tested, nor symptomatic	25%	35.6%	

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**Table 2. BIVARIATE CORRELATION ANALYSIS OF PHQ-9 AND IES-R SCORES VERSUS PREDICTOR VARIABLES**

	PHQ-9		IES-R	
	Pearson's r	P Value	Pearson's r	P Value
Age (years)	-0.085	.495	-0.082	.510
Gender (0: male, 1: female)	-0.336	.007	-0.203	.108
History of smoking (0: no, 1: yes)	0.327	.008	0.399	.001
Living w/ partner or children (0: no, 1: yes)	0.068	.588	0.119	.347
Comorbidity (0: no, 1: yes)	-0.012	.925	0.202	.104
COVID positive or symptomatic (0: no, 1: yes)	0.505	<.001	0.578	<.001
Type of resident (0: MD, 1: Dental)	0.635	<.001	0.587	<.001

A statistical significance of  $P < .05$  was accepted.

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residents (beta = 8.637,  $P < .001$ ). The overall model fit was  $R^2 = 0.515$ . Additionally, dental residents were predicted to score 26 times higher on the IES-R score compared to high MD residents (beta = 26.465,  $P < .001$ ). The overall model fit was  $R^2 = 0.599$ .

Lastly, due to the high prevalence of COVID-19 positivity and symptoms among residents, a linear regression analysis was conducted for PHQ-9 and IES-R scores and COVID-19 positivity or symptoms. This variable remained statistically significant. Being

positive or symptomatic, resulted in a 4 times higher PHQ-9 score (beta = 4.407,  $P = .25$ ), and a 16 times higher IES-R score (beta = 16.762,  $P = .002$ ).

## Discussion

The coronavirus outbreak has morphed into a massive worldwide public health crisis.<sup>5</sup> In August 2020, there were 6,000,000 diagnosed cases in the



**Table 3. AVERAGE SCORES ON PHQ-9 AND IES-R (PRIMARY OUTCOME VARIABLE) IN THE PRIMARY PREDICTIVE VARIABLE (TYPE OF RESIDENT)**

	PHQ-9 Mean Score		IES-R Mean Score	
	no. ± SD (range)	P Value	No. ± SD (range)	P Value
Type of resident				
Dental	18.29 ± 2.88 (12-23)	<.001	61.90 ± 3.90 (57-68)	<.001
Medical	7.24 ± 7.41 (0-27)		30.36 ± 24.67 (0-84)	

A statistical significance of  $P < .05$  was accepted.

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**Table 4. LINEAR REGRESSION ANALYSIS OF PHQ-9 AND IES-R SCORES VERSUS PREDICTOR VARIABLES**

	PHQ-9		IES-R	
	B-coefficient	P Value	B-coefficient	P Value
Age (years)	0.169	.124	0.448	.131
Gender (0: male, 1: female)	-2.051	.265	-1.446	.769
History of smoking (0: no, 1: yes)	1.139	.581	3.821	.492
Living w/ partner or children (0:no, 1:yes)	-0.196	.907	1.518	.736
Comorbidity (0: no, 1: yes)	1.193	.662	1.490	.390
COVID positive or symptomatic (0: no, 1: yes)	4.407	.025	16.762	.002
Type of resident (0: MD, 1: Dental)	8.637	<.001	26.465	<.001

A statistical significance of  $P < .05$  was accepted.

The overall adjusted model fit for PHQ-9 was  $R^2 = 0.515$ .

The overall adjusted model fit for IES-R was  $R^2 = 0.599$ .

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United States and 460,000 diagnosed cases in the state of New York.<sup>5</sup> The death count has since increased considerably, and is still increasing.<sup>5</sup> Residents are facing isolation, burnout, and a fear of contracting and transmitting the coronavirus. There are also concerns about inadequate training (clinical and didactic).

The aim of this study is to examine the psychological impact of the COVID-19 outbreak on hospital trainees. The investigators hypothesize that Dental residents will score significantly higher on the PHQ-9 and IES-R questionnaire compared to their medical colleagues. The investigators also hypothesize that trainees who are older, live with a partner and/or children, have comorbidities, or are smokers will score higher on the PHQ-9 and IES-R questionnaire. The aim of this study is to measure and then compare the variables of interest.

The results of our study are consistent with previous studies that found an increased level of anxiety, depression, and post traumatic stress disorder (PTSD) following a pandemic. Our study, however, is specific to the medical and dental specialties within a hospital setting.

## INTERPRETATION OF RESULTS

### Demographics

As seen in Table 1, the majority of the Dental residents were male and the majority of the MD residents were female. The marital status of the Dental residents and the MD residents were fairly similar—58.3 and 57.8% of the Dental and MD residents, respectively, were single. Twenty-five percent of Dental residents and 15.8% of MD residents were married with no kids. Seventeen percent of Dental residents and 17.8% of MD residents were married and living with their children. None of the Dental residents reported a comorbid condition. Nine of the 54 surveyed MD residents reported a comorbid condition.

In the Dental resident group, 57.1% never smoked, and 33.3% were ex-smokers; 84.4% of MD residents reported never smoking, and 6.7% reported current smoking. In the Dental resident group, 41.6% tested positive for COVID-19 and another 25% self-reported having symptoms but not being tested. In the MD residents group, 13.3% tested positive for COVID-19 and 28.9% reported symptoms but were not tested.

In the MD resident group, 66.7% were female (Table 1). However, gender did not have a statistically significant impact on the scores. Previous studies report that females experience higher levels of depression and distress. At the time of the survey, per request from the state of New York, hospitals were required to expand the capacity of their ICU floors. All residents transitioned from managing patients of their respective specialties to COVID-19 patients. It was not known how long the pandemic would last, how long other services would be suspended, and whether didactic learning would continue as it had previously. This uncertainty led to a negative impact on all residents, males and females.

As previously mentioned, the COVID-19 positivity rate was 41.6% in the Dental residents group versus 13.3% in the MD residents (seen in Table 1). The investigators speculate that this number is skewed due to the difference in response rate between the 2 groups. The response rate was 63.16 and 35.09%, respectively, for the Dental and MD residents. In addition, the residents of the Dental department work more closely with each other in proximity—the Dental department is located on 1 floor of the hospital. The MD residents work on different floors of the hospital. The investigators speculate that if 1 Dental resident was positive for COVID-19 at the start of the pandemic, they infected fellow Dental residents.

#### *Bivariate Correlation Analysis*

From the bivariate correlation analysis in Table 2, gender (male), history of smoking, and type of resident (Dental) demonstrated a statistically significant correlation with higher PHQ-9 scores. History of smoking and type of resident (Dental) demonstrated a statistically significant correlation with higher IES-R scores. Though initially not considered to be an outcome variable, testing positive for COVID-19 or having symptoms was also included in the analysis. This was due to the high prevalence in both resident groups. Testing positive for COVID-19 or having COVID-19 symptoms correlated with statistically significantly higher IES-R and PHQ-9 scores.

As seen in Table 3, the mean score on the PHQ-9 questionnaire was higher for Dental residents compared to MD residents (18.9 vs 7.24,  $P < .001$ ). On the IES-R questionnaire, the Dental residents group scored higher than the MD group (61.9 vs 30.36,  $P < .001$ ). Dental residents work in closer proximity to the oropharynx in comparison with residents of most other medical specialties. During the pandemic, Dental trainees were deployed to the medical and ICU floors given the pressing need for help in these units. Elective outpatient clinics and surgeries were suspended for the safety of patients and hospital workers. The medical and ICU floors were a new setting

for most of the aforementioned trainees, some of whom had recently graduated from dental school. This survey was conducted during the months of March and April 2020, when New York was the epicenter of the pandemic.

#### *Linear Regression Analysis*

As seen in Table 4, when a linear regression analysis was conducted and all variables of interest were controlled for, resident type correlated with a statistically significant higher PHQ-9 and IES-R score. Specifically, the Dental resident was likely to score 8 times higher than the MD resident on the PHQ-9 questionnaire and 26 times higher on the IES-R questionnaire.

Because COVID-19 status demonstrated a statistically significant effect on PHQ-9 and IES-R scores in bivariate correlation analysis, it was included in the linear regression analysis. Testing positive for COVID-19, or having symptoms, resulted in a PHQ-9 score that was 4 times higher, and an IES-R score that was 16 times higher (seen in Table 4). At the time of the survey, there was little known about the COVID-19 virus, and residents experienced fear of transmitting the virus to their family, friends, and co-workers. The progression of the disease was unknown, which led to higher levels of PTSD and depression.

#### *Literature Review*

Multiple studies have already examined the impact of coronavirus on health care workers. Lai et al conducted a survey on 1,257 health care workers from 34 hospitals in China from January 20 to February 3, 2020.<sup>6-9</sup> Participants completed the Chinese version of PHQ-9, the Generalized Anxiety Disorder scale, the Insomnia Severity Index, and IES-R.<sup>6-9</sup> Forty percent of the participants were frontline workers<sup>6-9</sup>; 70, 50, and 45%, respectively, reported distress, depression, and anxiety.<sup>6-9</sup> Kang et al conducted a survey on health care workers in Wuhan between January 29 and February 4, 2020.<sup>6-9</sup> Nine hundred ninety-four medical personnel filled out questionnaires for PHQ-9, Generalized Anxiety Disorder scale, and IES-R<sup>6-9</sup>; 34.4, 22.4, and 6.2%, respectively, experienced mild, moderate, and severe symptoms.<sup>6-9</sup> Maher et al emailed a questionnaire to the members of the French Association of Urologists in Training in March, and 92% of the participants reported being stressed, with a medium-to-high level of stress in 56.5% of the respondents.<sup>6-9</sup> Sixty percent of respondents believed that the pandemic was impacting the quality of their training<sup>6-9</sup>

Multiple studies have examined sociodemographic variables that are more likely to result in negative psychological impacts. Lai et al demonstrated that women experience higher anxiety, depression, and



distress.<sup>10-12</sup> They also reported that staff under age 30 had a higher self-reported depression score.<sup>10-12</sup> Cai et al reported that younger doctors were more concerned about infecting their family, whereas older doctors were more affected by the death of patients.<sup>10-12</sup> Older doctors also reported increased exhaustion from longer work hours and increased stress from the lack of PPE.<sup>10-14</sup> Lai et al found that the healthcare workers at the epicenter of the pandemic scored statistically higher on the IES.<sup>10-12</sup>

#### STRENGTHS AND LIMITATIONS

IES-R and PHQ-9 questionnaires have been used previously to assess psychological impact. The validity of the PHQ-9 scale has been confirmed by 2 studies: 1 involving 3,000 patients in 8 primary care clinics, and the other involving 3,000 patients in 7 obstetrics-gynecology clinics.

Limitations include the relatively small sample size and low response rate from the MD specialties. Additionally, when the questionnaire was presented, Dental trainees were deployed to the medical and ICU floors. This is a new environment and potentially outside the comfort zone of the majority of the Dental residents. As a result, the impact of the COVID-19 pandemic may not be the only factor impacting the Dental and oral-maxillofacial surgery residents, thus biasing the statistical analysis.

A selection bias is built into the design. The variance observed between Dental residents and their MD colleagues is less clear. The investigators recommend finding data on the impact of the pandemic on Dental residents who provide only emergency dental and oral and maxillofacial surgery care during the pandemic.

Finally, since 1 of the reasons for increased PHQ-9 and IES-R scores in the Dental residents is proximity to the aerodigestive tract, the authors recommend conducting a study comparing ENT and Dental providers. The investigators did not find a study comparing the 2 groups.

In conclusion, higher PHQ-9 and IES-R scores were observed among Dental residents as well as residents (Dental and MD) who either tested positive for COVID-19 or were symptomatic. An awareness of the impact that the coronavirus has had on trainees is an important first step in providing interventions that may prevent the high levels of depression and PTSD that have been observed. Larger studies involving

multimodal interventions could uncover additional effective interventions.

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