

## Impact of COVID-19 on Burnout in Clerkship Medical Students

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### ABSTRACT

Burnout among physicians is more prevalent than other fields and begins as early as medical school. The aim of this study was to characterize the impact of COVID-19 on different aspects of burnout in third-year medical students at a minority-serving medical school at the U.S.-Mexico border. A Comparative study was conducted in 2022. Participants included those in the classes of 2019 through 2023. Data from the classes of 2019-2021 represented the period before COVID-19 curriculum changes and was compared to classes 2022-2023, which represented the period after the onset of COVID-19. The data on the classes of 2023 was compared between the two integrated rotation blocks to evaluate if non-COVID-related experiences might contribute to an increase in burnout in one block versus the other. Lastly, all data were compared to a general population sample to screen for the possibility of systemic deficiencies relative to other health professions.

The Maslach Burnout Inventory Human Services Survey (MBI-HSS), which determines the scores for emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA), was administered to third-year medical students during their clinical rotations.

Data were analyzed using a paired or unpaired t-test if they followed a normal distribution or the Mann-Whitney test if this was not the case. Scores for EE ( $P < 0.0001$ ), DP ( $P < 0.0001$ ), and PA ( $P = 0.02$ ) decreased after the onset of COVID-19. No statistically significant differences were found between the rotation blocks. However, when we compared the individual rotation blocks to the general population, the OBGYN/Pediatrics/Surgery blocks had a higher EE score ( $P = 0.0003$ ) than the Internal Medicine/Family Medicine/Psychiatry block. Before COVID-19, EE ( $P < 0.01$ ), DP ( $P < 0.0001$ ), and PA ( $P < 0.05$ ) appeared to be improved compared to the general population. After the onset of COVID-19, EE was less than the general population ( $P < 0.0001$ ). A broader assessment of burnout in medical students across the nation is warranted. Identification of specific COVID-19 influences and clerkship-related factors would prompt targeted actions to reduce burnout in this medical student population. Interventions are suggested to be designed to lessen the degree of burnout in clerkship students, possibly in other medical schools experiencing similar challenges.

**Keywords:** Education, Burnout, Psychological, Students, Medical, Emotional exhaustion, COVID-19

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## Main Text

Burnout syndrome (BS) is a frequent disorder related to individuals that feel a deterioration in their daily activities due to highly demanding psychological requirements in their workplaces (1). BS is defined under three dimensions that involve emotional exhaustion (EE), which is the progressive loss of energy (including fatigue); depersonalization (DP) manifested as a distant attitude towards others; and low levels of self-efficacy or sense of personal accomplishment (PA) (2).

Burnout among physicians is more prevalent than other healthcare providers (3). It is expressed as irritability, dissatisfaction with one's job, absenteeism, lower quality of care provided, lack of productivity, and major medical errors (4). Burnout in physicians appear to exhibit lower quality performance and an increased rate of quitting their jobs, both of which are believed to contribute to physician shortage and the cost of healthcare (4). Studies in other fields outside of medicine have provided evidence that burnout may be linked to poorer physical health as well (4). The time spent performing non-clinical tasks, such as electronic medical record documentation, seems to be a major consistent contributor to burnout among physicians in the literature (4). Physicians experiencing burnout symptoms and depressive symptoms are not likely to seek help for various reasons such as social stigma against mental health and possibly a lack of time to do so.

It is important to recognize that systemic problems, such as burnout, develop over time. To counteract it, we also need to understand how it begins. Burnout begins as early as medical school years. A meta-analysis estimated that, worldwide, one out of two medical students is burned out, without significant differences between genders and with slight differences among countries (5). Although prevalence of burnout ranges widely from 7.0% to 75.2%, depending on various factors specific to the individual studies (6), it is clear that burnout frequently occurs in medical schools internationally and this should be considered a major concern.

The transition from preclinical years to clerkship is a major shift in medical education. Various studies provide evidence that higher levels of burnout may occur around the time of clinical rotations. It has been reported that medical student burnout increases from 17% to 38% (7, 8). The more the number of years spent in medical school, the higher the scores of burnout scales (9). DP, which in the case of medical students, is defined as cynicism towards the utility or importance of what they are studying, and a lack of PA or self-efficacy, poses a severe problem since their sense of self-value is lost due to the academic work, so their performance decreases. Thus, the initial clerkship year is possibly the most stressful time during medical school, and it is critical to investigate the degree and origins of burnout therein.

The coronavirus disease 19 (COVID-19) pandemic had a large impact on burnout and overall mental health of medical students. Not only did mental health deteriorate, but also DP and EE increased; the latter occurs particularly in final year students, who struggle with the lack of clinical experience (10). Reports have not been consistent though. One study found that a switch to online curriculum during COVID-19 was associated with a decreased burnout (11). On the other hand, another study found that the majority of students surveyed preferred to return to clinical activities (12). How curriculum and environmental changes due to COVID-19 have impacted burnout during clinical rotations has yet to be clarified.

As the COVID-19 pandemic posed unique challenges for medical students, we aimed to compare medical students' wellness before and during the COVID-19 pandemic. We decided to screen our students for burnout, as a first step in investigating how the curriculum might be modified to best serve the students. We hypothesized that all comparisons would yield statistically significant differences. The findings from this study would help to design further studies and interventions aiming at lowering burnout levels and optimizing medical school curriculum.

The Maslach Burnout Inventory Human Services Survey (MBI-HSS) (Mind Garden Inc.), a widely used tool for measuring burnout levels, was administered either electronically through an emailed survey link or in person on paper. Survey instructions stated that participation was voluntary and anonymous, and that there were no consequences or rewards for taking or not taking the survey.

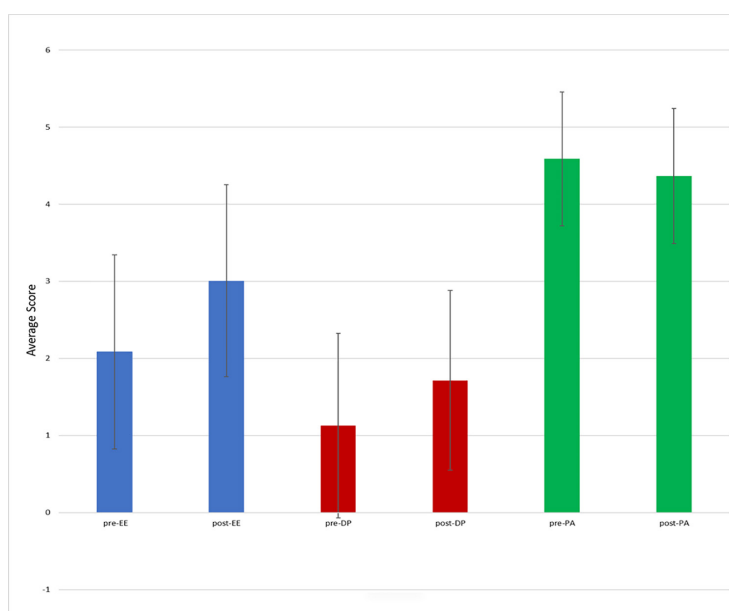
The MBI-HSS survey was offered to all third-year medical students during their rotations from the classes of 2019 through 2023. Burnout scores from the third-year medical students were determined before and during the COVID-19 pandemic and compared to data from the general population. Data from the third-year class of 2023 was also compared between the OBGYN/Pediatric/Surgery rotation block and the Internal Medicine/Family Medicine/Psychiatry rotation block. Lastly, we compared the current third-year student data to those collected from previous third-year medical students to find out if the new COVID-19 environment had an impact on burnout levels.

The MBI-HSS survey consists of 22 statements categorized into the subscales of emotional exhaustion (9 items), depersonalization (5 items), and personal accomplishment (8 items). Frequencies for every statement were assigned to indicate

how often the students experienced the perception defined by the statement. The students rated the frequency using a Likert scale (0-6): 0 (never), 1 (once a year or less), 2 (once a month or less), 3 (a few times a month), 4 (once a week), 5 (a few times a week), and 6 (every day).

Data was submitted to the makers of the survey (Mind Garden), to obtain general population data, and statistical services. The website generated raw data excel sheets including EE, DP, and PA scores for each survey, as well as reports summarizing these scores among survey participants and in the general population. The obtained burnout scores were then used for further statistical analysis.

To assess the impact of COVID-19 environment on burnout levels, we then compared pre- vs. post-COVID data. To determine if burnout levels differed with rotation block experiences, we compared post-COVID OBGYN/Peds/Surgery data vs. post-COVID IM/FM/Psych data. Lastly, to assess burnout levels relative to the general population, we compared all data to the general population. The data were analyzed using unpaired t-test if the data followed a normal distribution or the Mann-Whitney test if this was not the case. All p-values less than 0.05 were considered statistically significant.



**Figure 1:** Pre- vs. Post-COVID-19 emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA) scores

We first assessed the impact of the COVID-19 environment on burnout levels by comparing pre- vs. post-COVID data. We observed that scores for EE (P<0.0001), DP (P<0.0001), and PA (P=0.0246) decreased after the onset of COVID-19 (Figure 1). Pre-COVID-19 vs. post-COVID-19 scores are presented in Table 1.

The above data illustrate a statistically significant increase in EE and DP scores and a statistically significant decrease in PA scores after the onset of COVID-19. The mean score for each burnout subscale and the statistical test results are reported in the tables.

No statistically significant differences were found between IM/FM/Psych (IFP) vs. OBGYN/Peds/Surg (OPS) clinical clerkship blocks (Figure 2). However, the comparison of individual rotation blocks to the general population showed that the OBGYN/

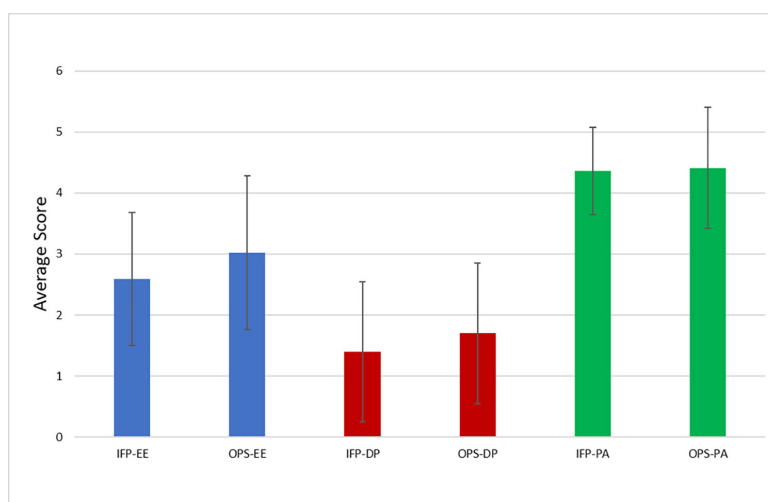
Pediatrics/Surgery block had a higher EE score (P=0.0003) than the Internal Medicine/Family Medicine/Psychiatry block (Figure 3). Before COVID-19, EE (P<0.0099), DP (P<0.0001), and PA (P=0.0307) appeared to be improved compared to the general population. After the onset of COVID-19, EE for us was greater/higher than EE for general population after COVID onset (P<0.0001). Table 2 shows that there was no difference in the three BS dimensions (EE, DP, and PA) between the two clerkship blocks.

We then compared pre-COVID data to the general population and found that EE and DP scores were lower, and PA scores were higher (Figure 3). Comparing post-COVID data to the general population showed that the EE scores were higher. Lastly, when we compared each of the two rotation blocks individually to the general

**Table 1:** Pre-COVID-19 vs. Post-COVID-19 Scores

	pre-EE	post-EE	pre-DP	post-DP	pre-PA	post-PA
Average Score	2.08 [±1.3]	3.00 [±1.3]	1.12 [±1.3]	1.71 [±1.1]	4.58 [±1.0]	4.36 [±1.0]
Mann Whitney exact P value	<0.0001		<0.0001		0.02	

EE: emotional exhaustion; DP: depersonalization; PA: personal accomplishment

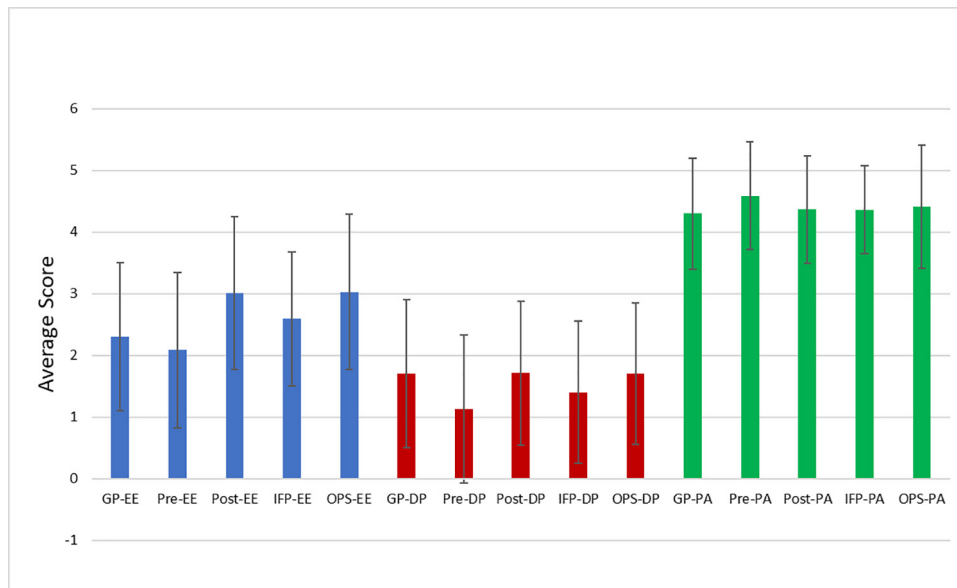


**Figure 2:** Emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA) scores between IM/FM/Psych (IFP) vs. OBGYN/Peds/Surg (OPS) clinical clerkship blocks. The comparison showed that there were no statistically significant differences between the blocks. The mean score for each burnout subscale and the statistical test results are reported in the tables.

**Table 2:** IM/FM/Psych vs. OBGYN/Peds/Surg

	IFP-EE	OPS-EE	IFP-DP	OPS-DP	IFP-PA	OPS-PA
average score	2.59 [±1.2]	3.02 [±1.2]	1.40 [±1.3]	1.70 [±1.2]	4.36 [±0.7]	4.41 [±0.9]
unpaired T test P value	0.18		0.24		0.88	

EE: emotional exhaustion; DP: depersonalization; PA: personal accomplishment



**Figure 3:** Emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA) scores between integration rotation blocks (All Data) vs. general population (GP) during COVID-19 pandemic. The mean score for each burnout subscale and the statistical test results are reported in the tables. Values highlighted in yellow are statistically significant.

population, the OBGYN/SURG/PEDS block had a higher emotional exhaustion score than the general population. Table 3 shows the pre- and post-COVID-19 onset periods and integrated rotation blocks vs. general population.

Burnout is prevalent during medical school, and major US multi-institutional studies have estimated that at least half of all medical students might be affected by burnout during their medical education (13). Before COVID-19, the estimated prevalence values for EE, DP, and PA were 40,8%, 35.1%, and 27.4%, respectively (5). Another meta-analysis investigating all medical students across various countries reported data obtained using the MBI-HSS. The data showed mean values of 22.93 (SD=10.25) for EE, 8.88 (SD=5.64) for DP, and 35.11

(SD=8.03) for PA (6). DP increases from 13% to 35%, and EE increases from 5% to 22%, across the 4 years of medical education (7). Interestingly, the same study also observed that EE peaked after the first year of medical school, at 45%, and after the third year, at 44% of the respondents, with improvement after summer break and residency match (7). Similarly, another study found that third-year medical students had significantly higher levels of EE and DP and lower levels of PA, compared to the first-year medical students, and that “regrets about entering medicine” were also higher in third-year students (14).

The findings of the present study could be the results of COVID-19-related changes that might have directly contributed to burnout in medical students in the clerkship year, but at the same time it could also be

**Table 3:** Pre- and Post-COVID-19 Onset Periods and Integrated Rotation Blocks vs. General Population

	GP-EE	Pre-EE	Post-EE	IFP-EE	OPS-EE	GP-DP	Pre-DP	Post-DP	IFP-DP	OPS-DP	GP-PA	Pre-PA	Post-PA	IFP-PA	OPS-PA
Avg Score	2.3	2.08	3.00	2.59	3.02	1.7	1.12	1.71	1.4	1.70	4.3	4.58	4.36	4.36	4.41
un-paired T test P value	[±1.5]	[±1.3]	[±1.3]	[±1.1]	[±1.3]	[±1.2]	[±1.3]	[±1.2]	[±1.3]	[±1.0]	[±0.9]	[±0.9]	[±0.8]	[±0.7]	[±0.9]
		0.009	0.0001	0.15	0.0003		0.0001	1	0.15	1		0.03	0.302	0.52	0.48

EE: emotional exhaustion; DP: depersonalization; PA: personal accomplishment

related to the challenges of COVID-19 which revealed obstacles that were already present. It is likely that the statistically significant differences between pre- and post- COVID-19 are due to COVID-19-related environmental and curriculum changes, and, as expected, student scores in these areas worsened after the onset of the pandemic. Comparison of the pre-COVID data to the general population revealed that EE and DP scores were lower, while PA scores were higher. This suggests that our school was performing better in these categories than the general population before the COVID-19 pandemic. When we compared post-COVID data to the general population, we found that the EE scores were higher, suggesting that our medical students performed worse regarding EE than the general population before COVID. It is possible that COVID-19 negatively affected these medical students to a relatively higher degree than the general population regarding EE. Comparison of the two rotation blocks showed there were no differences. However, after comparing each rotation block individually to the general population, the OBGYN/SURG/PEDS block had a higher EE score than the general population. Probably, there are experiences in this block that contribute to greater emotional exhaustion that are not related to COVID-19.

Some limitations of the analysis include the use of “General Population” data, which comprises responses from over 11,000 people in the human services professions before COVID-19. Not all practicing healthcare professionals are under the same kind of pressure or workload as medical students; thus, one could argue that this data is less than ideal to be used for comparison. The other issue with such data is that it was collected before the arrival of COVID-19, and we had to use it for not only pre-COVID-19 data, but also the post-COVID-19 data comparison as well, which would be more ideally compared to a post-COVID-19 general population.

Another concern is that the pre- vs. post-COVID-19 analysis compared the third-year medical students from different class years,

rather than the same class before and after COVID-19. These classes did not share the same longitudinal integrated curriculum structure, and it is possible that this variable itself could influence the analysis. Also, the pre-COVID-19 pool of data was relatively larger (n=246) compared to the post-COVID pool (n=87). The class of 2022 was the only group surveyed via an e-mailed electronic link, which they could access in the comfort of their home at any time over several months. Out of the 100 people invited to participate electronically, only 15 responded. This left the class of 2022, which may have suffered the most dramatic COVID-19-related changes, under-represented in the survey data. Lastly, there is a concern for response bias. Generally, students who are more burned out may be more likely to fill out the survey. The majority of the third-year medical students were surveyed in person on paper, and almost everyone filled out the survey. However, they were also sitting side by side in the medical school environment. One could argue that this scenario could account for environmental pressure on the students to respond as though they were not struggling, so as not to appear less capable than their peers or ungrateful for their education.

What could be done to counteract burnout in medical students? Recently medical schools have been introducing longitudinal integrated clerkship (LIC) experiences where different fields are mixed as an alternative to traditional curriculum, and each field is contained within one rotation block. There is evidence to show that LICs may improve the students’ satisfaction (15), continuity of care (15), patient-centered care (15), professional identity development (16), and establishment of meaningful relationships among students, patients, and educators (17). However, there is little evidence assessing the impact of LICs on the students’ burnout.

In the future, it would be useful to collect post-COVID-19 burnout data from medical students with a distinction between pre-clerkship and clerkship years across the country, so that other institutions could use

this as a baseline to which they can compare their school data. We could also use this new baseline to re-analyze this data. It would be interesting to create a follow-up survey to identify specific COVID-19-related factors that the students believed were contributing to their burnout. Using the information from a follow-up student survey, an institution could design interventions to help remedy contributing factors.

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This study is exempted from IRB approval (IRB NUMBER: E21088). The IRB acknowledges that this project met the criteria for exemption from formal IRB review in accordance with 45 CFR 46.104(d)(2)(i): The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects. A waiver of documentation of informed consent has been approved per 46.117(c)(1)(ii).

### Authors' Contribution

MB and ST conceptualized the study. MB and HV conducted survey and gathered the data. JC and MB analyzed the data. MB and JC wrote the manuscript.

**Conflict of Interest:** None declared.

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