

The Effects of COVID-19 on Medical Students and Resident Physicians

Kashaf Jafry

Monroe Woodbury High School

Dr. Rashek Kazi

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Abstract

The COVID-19 pandemic has ushered unprecedented challenges into the lives of medical students and resident physicians, impacting their well-being and professional development. This research, conducted in collaboration with various medical schools in the Tri-state Area, explores the enduring effects of the pandemic on individuals pursuing careers in healthcare. The study employs a survey-based methodology, comparing behaviors and wellness indicators during the fully submerged COVID-19 era in 2020 to the current landscape in August 2023.

The pandemic's severe contagious nature led to global quarantine measures, significantly affecting the lives of healthcare professionals. Medical students and residents faced disruptions in education, with closures of medical schools and suspension of face-to-face learning and clinical rotations. In response, some medical students graduated early, while others extended residency training. This study aims to bridge the gap between the initial impact of the pandemic in 2020 and the current state in 2023, where virtual learning is gradually becoming obsolete.

The survey "Medical Students and Resident Physicians COVID-19 Behavioral Survey," encompasses a diverse participant group, including medical students from various schools in the Tri-state Area. Results highlight the tangible and widespread effects of the pandemic on holistic health, emphasizing variations in physical activity, dietary habits, academic stress, and overall well-being. Noteworthy improvements in social health, particularly in relationship strength, echo the pivotal role of social support networks.

While the study acknowledges limitations associated with its survey nature, such as potential biases in subjective responses, the findings contribute valuable insights into the complex

interplay between global crises and individual well-being in the healthcare sector. The observed resilience and adaptive strategies employed by medical professionals shed light on coping mechanisms, including spending quality time with family and engaging in regular exercise.

This research serves as a foundational exploration, paving the way for future investigations into the enduring effects of COVID-19 across diverse healthcare professions. As we navigate the challenges faced by medical students and resident physicians, these findings contribute to a nuanced understanding of the multifaceted impact of the pandemic on the healthcare landscape. Ultimately, the research informs decision-making in healthcare, education, and policy realms, underscoring the resilience displayed by individuals in the field during unprecedented times.

Introduction

COVID-19 originated in Wuhan, China and spread across the world, causing threats to people's health and lives worldwide (Meo, 2020). The virus has many diverse biological and epidemiological characteristics making it more dangerous and contagious than previous pandemics such as SARS-CoV and MERS-CoV (Al-Khlaiwi, 2020).

Due to the severely contagious nature of the COVID-19 pandemic, countries had implemented quarantine policies to contain people in order to minimize the spread of the virus, and control the contamination of infection. The quarantine period included short to medium-term lockdowns, voluntary home restriction, cancellation of social events, and travel restrictions (Usher, 2020).

During the heart of the COVID-19 pandemic, healthcare workers, including physicians, nurses, paramedical staff, and medical students were at very high risk of contracting the virus due to their responsibilities at the hospital, which has caused high levels of stress due to being

unprepared of what is to come with the pandemic (Hawryluck, 2020). At the worst of the pandemic in 2020, medical schools and universities were shut down according to quarantine conditions. Face-to-face learning was suspended and clinical rotations were canceled.

This situation has brought many significant changes to medical students' lives and education, including their transition from students to doctors (Akers, 2020). Medical universities in many countries in Europe have had medical students graduate early because they were not sure how to continue education online. In Italy, many fourth and fifth year medical students were fast tracked and recruited into becoming doctors due to the urgent need of more healthcare workers. Many senior doctors were at higher risk for complications if they contracted COVID-19, and higher mortality rates were reported among them (Stokes, 2020).

This had led to tensions between safeguarding education and responding to the urgent demands on health service (Jegatheeswaran, 2020). In many countries like Turkey and Spain where there are shortages of health human resources, medical students have been employed in various capacities in response to the pandemic.

It has been shown that medical students have been very stressed and overwhelmed during this time, due to balancing education, hospital responsibilities, and life at home during the pandemic. Previous studies have shown a lot of anxiety around contracting the COVID-19 virus during this time even while quarantined at home. Studies in Saudi Arabia have shown the COVID-19 pandemic has had severe negative impacts on medical students' well being. Many have been feeling hopeless, exhausted, and emotionally unresponsive. Additionally, many have even seen effects on their awareness of what is happening currently in the world, their indecisiveness, their motor coordination, and slowness of execution in movement.

Previous studies have also shown a significant decrease in the learning behaviors of medical students. Medical students have shown difficulty in recalling recent information they learned, increased number of hours studying, difficulty concentration, and seeing an overall deterioration in their quality of work.

Other studies do show some contradictions in these results. A lot of medical students did feel confident in their education during this time, even when they were working with no guidance from their university. This could be due to differences in settings of where the studies took place. Many medical students in Asian countries did handle stress and education far better than European countries where medical students were recruited as doctors too fast.

All of these studies took place in 2020, when the COVID-19 pandemic first became a worldwide pandemic and countries all over the world went into quarantine, so many medical students were at home. The impact that the virus had on the medical students then, during the lockdown periods while fully submerged in COVID-19 were shown, but what has not been shown is the comparison between the fully submerged pandemic era to now, COVID-19 in 2022 where virtual learning is becoming a thing of the past. Knowing some of the impacts medical students experienced due to the pandemic, it can be assumed that medical students in 2022 are better equipped with handling the pandemic, have had overall improvements to social health due to less social distancing, and improved academically as a consequence of increased in person learning.

Purpose

The purpose of this study was to determine the outlasting effects of the COVID-19 pandemic on medical students' and resident physicians' wellbeing and behavior towards

participation. The difference between behaviors and wellness checks from fully submerged during COVID-19 in 2020 to August of 2023 was being evaluated.

Materials and Methods

Study Population

The study included medical students from various schools in the Tri-state Area, with a specific focus on those located in close proximity to New York City. This region had been significantly impacted by the pandemic, experiencing more severe waves of infection.

Recruitment

To form a diverse participant group, collaboration took place with medical schools across New York, New Jersey, Massachusetts, and Connecticut. This ensured representation from different institutions, providing a comprehensive perspective on the experiences of medical students during the pandemic.

Survey Instrument

The primary method of data collection involved distributing a customized survey titled "Medical Students and Resident Physicians COVID-19 Behavioral Survey" **[Figure 1]**. This survey was designed to collect responses that would offer insights into the comparative effects of the pandemic on medical students' behaviors and attitudes.

Survey Content

The survey included questions that addressed the evolving landscape of the pandemic, comparing experiences and behaviors of medical students during different phases. 'Then' referred to an earlier period, while 'now' represented the present situation. The questions covered various topics, such as:

Exposure to COVID-19: Tracking instances of exposure and subsequent changes in behavior.

Academic Impact: Assessing the effects of the pandemic on academic pursuits and learning methodologies.

Mental Health: Exploring the psychological impact of the pandemic on medical students.

Adherence to Guidelines: Investigating adherence to public health guidelines and preventive measures.

Personal and Professional Adaptations: Understanding how medical students adapted personally and professionally during the pandemic.

Survey Administration

The survey was distributed electronically to ensure efficient and widespread participation. Participants were informed about the purpose of the study and assured of the confidentiality of their responses. The survey was administered with due ethical considerations, and participants were given ample time to complete it.

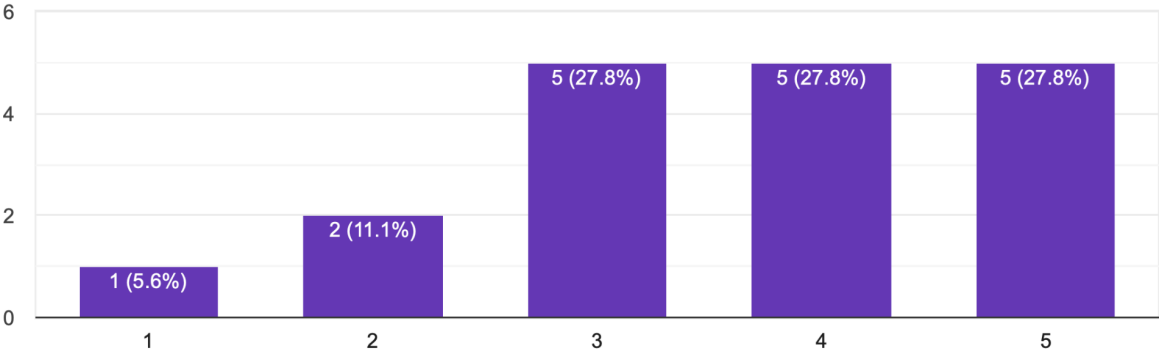
Results and Data

Figure 2

Strength of Relationships

How strong are your relationships with others right now? Reliability, connection, etc.

18 responses



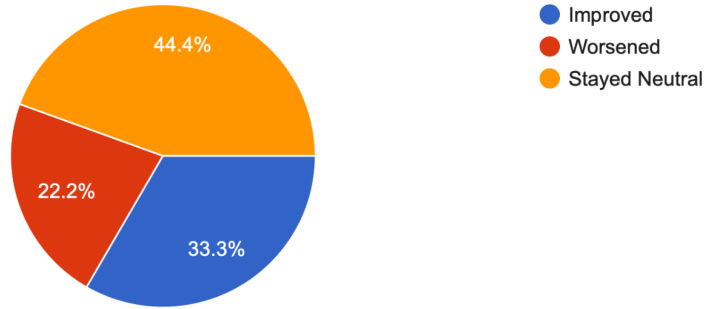
Most respondents stayed neutral or improved in relationship strength, with only a couple mentioning worsening

Figure 3

Social Health Improvement

How do you feel your social health has improved since then?

18 responses



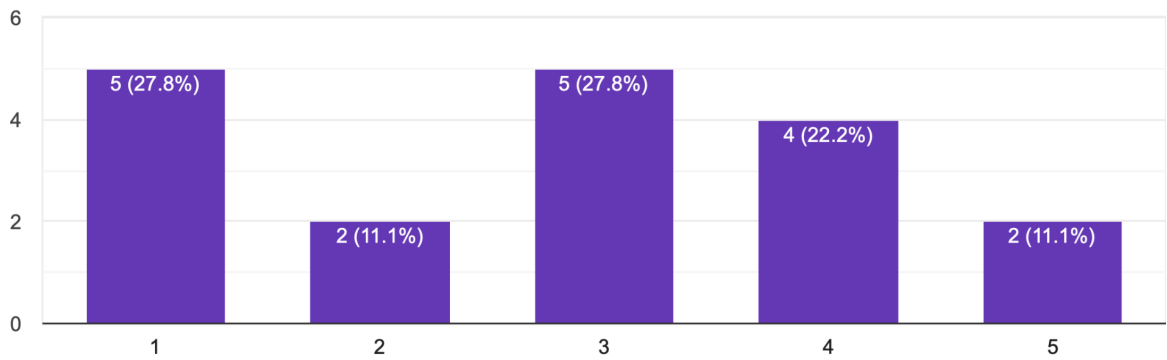
Responses varied, with some staying neutral, some improving, and one worsening

Figure 4

Physical Activity During COVID-19

How active were you physically during COVID-19?

18 responses



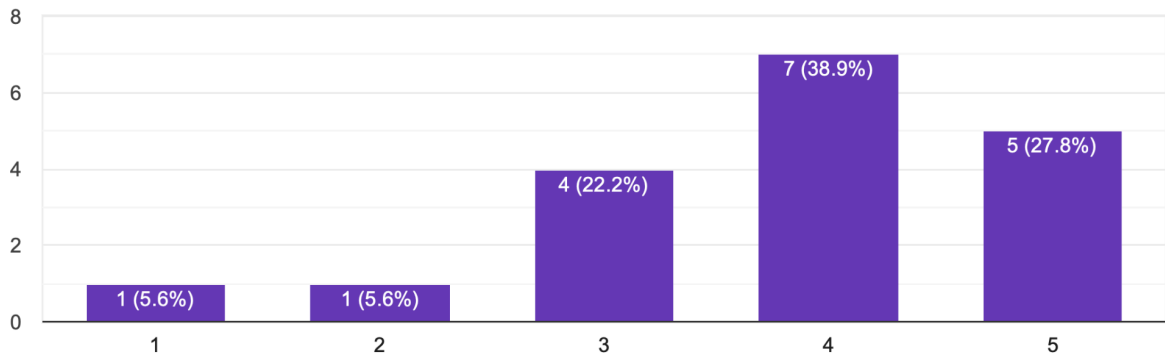
Varied COVID-19 physical activity; majority lower, some reported higher levels.

Figure 5

Physical activity right now

How active are you physically right now?

18 responses



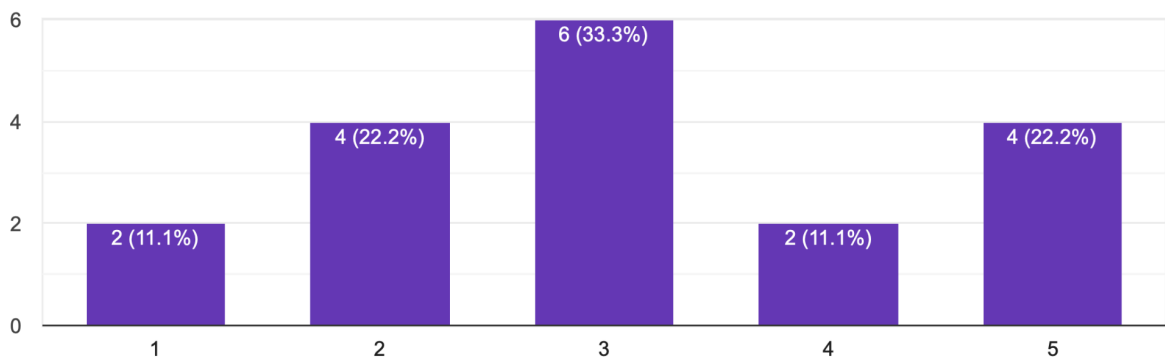
Relatively active right now, most responses on the higher end

Figure 6

Nutritious Diet during COVID-19

How nutritious was your diet during COVID-19?

18 responses



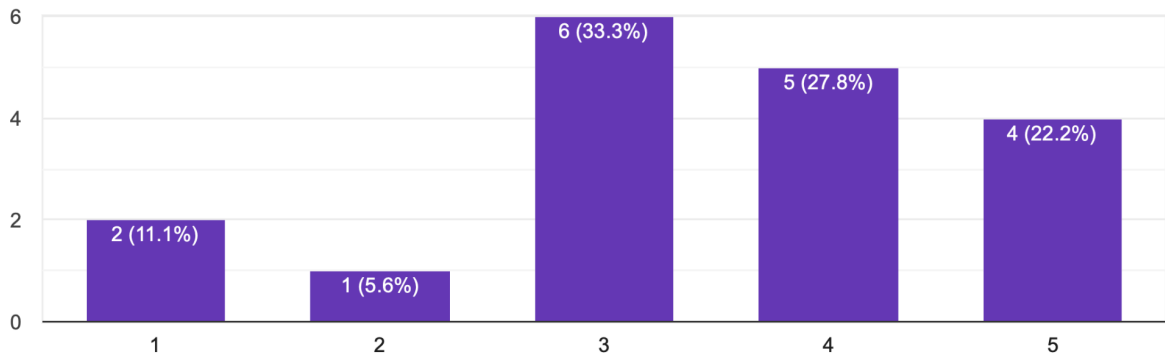
A mix of responses, with some staying neutral, some improving, and one worsening.

Figure 7

Nutritious Diet right now

How nutritious is your diet right now?

18 responses



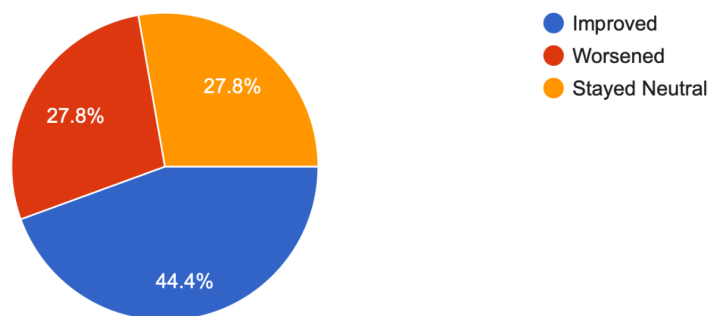
Generally, nutrition quality improved or stayed neutral, with only one respondent mentioning a worsening.

Figure 8

Physical Health Improvement

How do you feel your physical health has improved since then?

18 responses



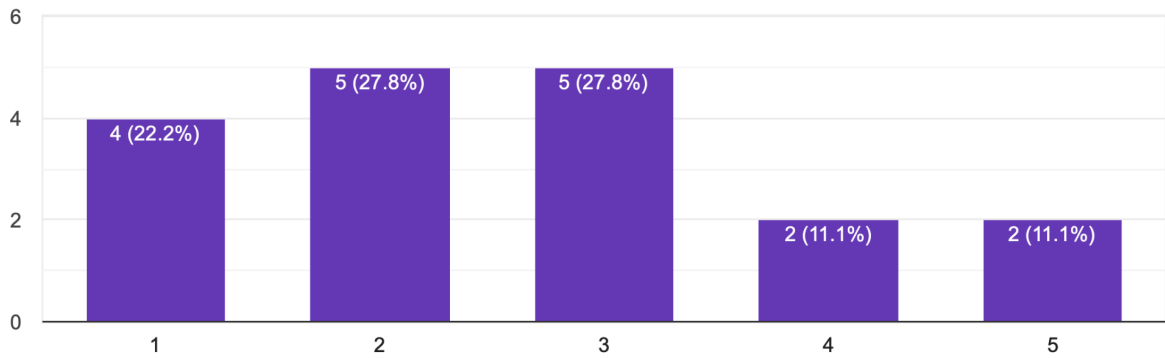
Responses varied, with some staying neutral, some improving, and one worsening

Figure 9

Academic Stress during COVID-19

How well were you handling academic/work stress during COVID-19?

18 responses



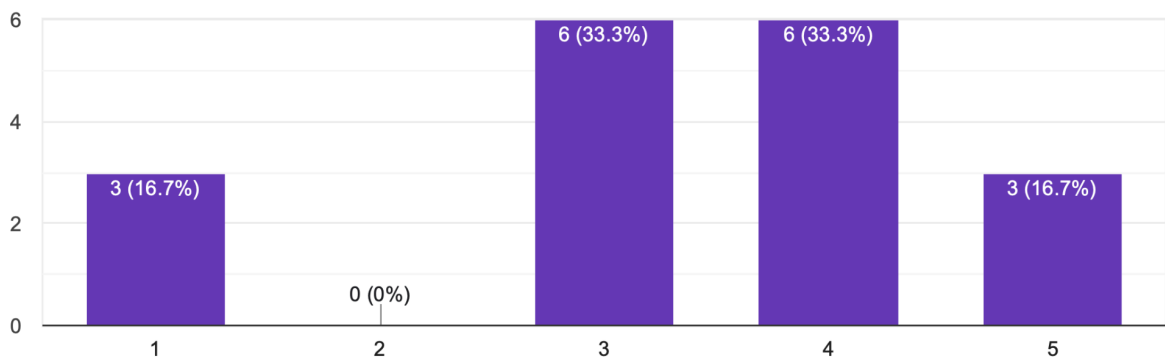
Not being handled well by large majority, doing on the lower end of the worst side

Figure 10

Academic Stress Right Now

How well are you handling academic/work stress right now?

18 responses



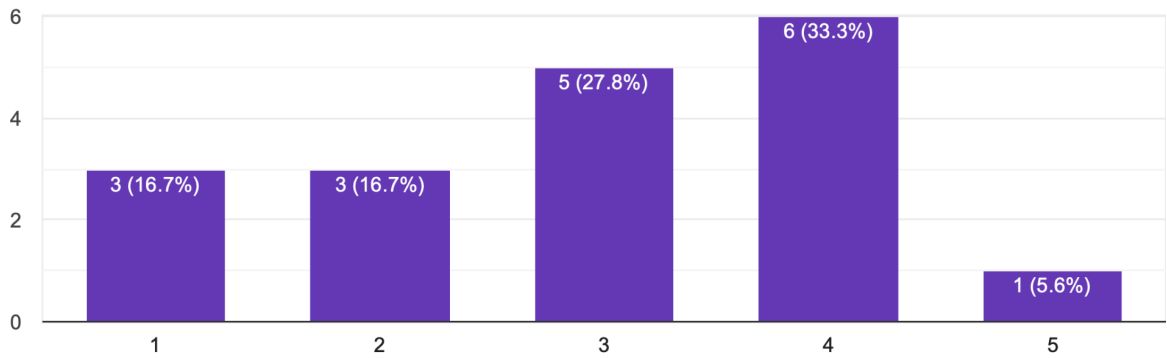
Mixed responses, with some staying neutral, some improving, and one worsening

Figure 11

Satisfaction with Grades

How satisfied were you with your grades during COVID-19? (Performance for Residents)

18 responses



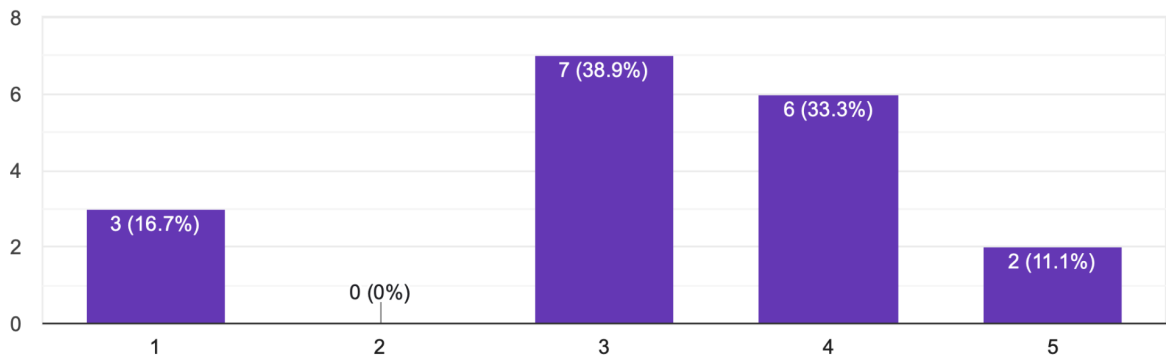
Mixed responses, majority response feeling great but overall diverse response

Figure 12

Satisfaction with Grades Right Now

How satisfied are you with your grades right now? (Performance for Residents)

18 responses



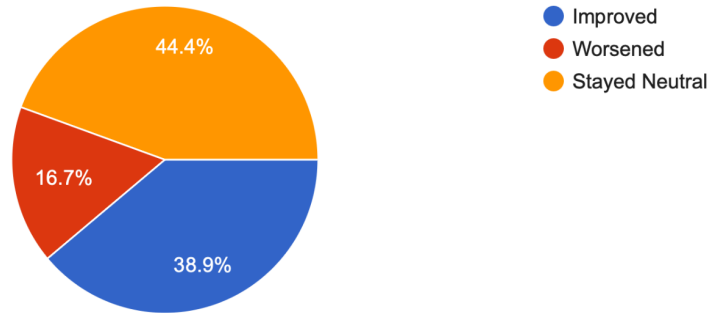
Generally, satisfaction with grades improved or stayed neutral, with only one mentioning a decrease

Figure 13

Overall Academic Performance

How do you feel your overall academic performance has improved since then?

18 responses



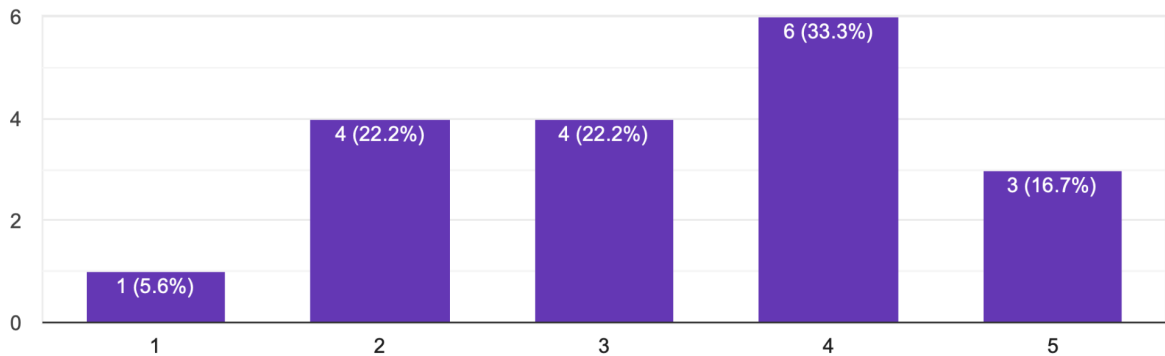
A mix of responses, with some staying neutral, some improving, and one worsening.

Figure 14

COVID-19 Participation During Pandemic

How confident were you in participating in the COVID-19 response?

18 responses



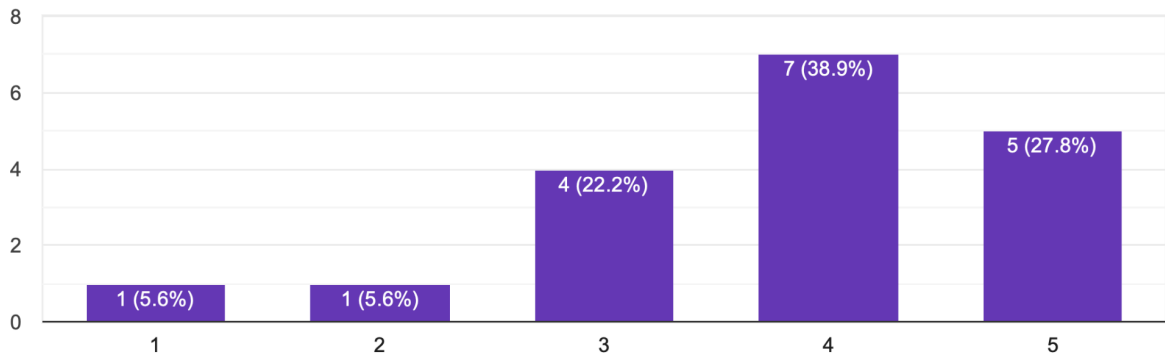
Surprisingly confident, majority felt strongly and/or neutral

Figure 15

COVID-19 Participation Now

How confident are you in participating in medical work, including COVID-19 response now?

18 responses



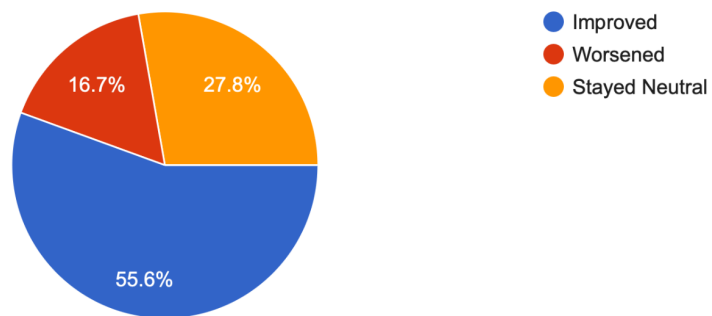
Responses varied, with some staying neutral, some improving, and one worsening

Figure 16

Overall Confidence and Reliability

How do you feel your overall confidence and reliability in participating in medical work has improved since then?

18 responses



Mixed responses, with some staying neutral, some improving, and one worsening.

Demographics

This study encompassed a diverse cohort with participants at various stages of medical

education and residency training. The range of individuals included those in their first year of medical school, as well as participants in their second year of medical school. Residency training was represented by participants in their first year (PGY-1), second year (PGY-2), and third year (PGY-3), with a specific focus on psychiatry residents in their third year (PGY-3 psych). Additionally, the study incorporated individuals in their fourth year of medical school. A participant who began medical school in 2022 and is not yet a resident was also included. The inclusion of a second-year resident highlighted the diversity of experience levels within the sample. This comprehensive representation of participants across different years of study and residency training contributes to the richness and inclusivity of the study's findings.

Participants were drawn from diverse medical education backgrounds and residency programs. Medical schools attended by participants included Touro College of Osteopathic Medicine in Middletown, New York, Lake Erie College of Osteopathic Medicine (LECOM), and Nishtar Medical University, with some individuals indicating attendance at the New York Medical College (NYMC) affiliated with Boston Medical Center. Residency programs encompassed various locations and specialties, such as Montefiore St. Luke's Cornwall, Morristown, New Jersey for Pediatrics, and psychiatry residencies at LECOM in Pennsylvania. Additionally, participants reported associations with prestigious institutions like the University of Pittsburgh School of Medicine and NYU Langone. Noteworthy was the inclusion of students from St. George's University, emphasizing the diverse academic backgrounds represented in the study. The range of institutions reflects the broad scope of medical education and residency training experiences contributing to the study's comprehensive and inclusive nature.

Open-Ended Questions

In response to the survey, participants commonly reported relying on specific practices to cope with the challenges brought about by the pandemic, extending their focus beyond the realm of medicine to address various aspects of their lives. A prevalent theme in the responses was the emphasis on spending quality time with family as a crucial coping mechanism. Participants highlighted the significance of familial connections in providing emotional support and a sense of normalcy during a period of heightened uncertainty. Additionally, exercise emerged as a widely adopted practice for promoting overall well-being. Many participants noted the benefits of regular physical activity not only for maintaining physical health but also as a valuable outlet for managing stress and fostering mental well-being.

Participants generally expressed a consensus of having no additional comments to contribute. However, an important nuance emerged when discussing the impact of the pandemic on residency experiences. Notably, some residents opted to extend their training by an additional year due to perceived hindrances caused by the pandemic, shedding light on the unique challenges faced in the healthcare sector. This decision reflects a broader trend wherein residents sought to address the impact of COVID-19 on their training and professional development. It is essential to acknowledge that burnout was a salient concern during the pandemic. The survey participants were prompted to reflect on their personal experiences with burnout and coping mechanisms employed during these challenging times. Understanding the ways in which burnout manifested and the coping strategies adopted provides valuable insights into the resilience and adaptability of individuals within the healthcare system. These findings contribute to a more nuanced understanding of the multifaceted effects of the pandemic on healthcare professionals and underscore the importance of addressing well-being within the medical community.

Figure 17

Question	P-value	Mean	Standard Deviation
Physical Activity	0.35	2.76	1.43
Nutritious Diet	0.31	3.47	1.28
Academic Stress	0.302	3.35	1.24
COVID-19 Response	0.27	3.82	1.13
Relationship Strength	0.29	3.59	1.22

Discussion

The analysis of data revealed a statistically significant impact of the COVID-19 pandemic on medical professionals' overall health, rejecting the null hypothesis. The p-value exceeding the conventional threshold of 0.05 underscores the tangible and widespread effects of the pandemic on the holistic health of medical professionals. This finding is consistent with the literature highlighting the substantial challenges faced by healthcare workers during the pandemic (Hawryluck, 2020).

The reported improvement in reliability and connections aligns with previous studies emphasizing the crucial role of social support networks in mitigating stress among healthcare professionals (Jegatheeswaran, 2020). However, the mixed patterns in physical activity and dietary habits indicate a need for targeted interventions to address the diverse challenges faced by medical professionals. The variations in academic/work stress and confidence levels underscore the intricate relationship between personal experiences and systemic factors.

The profound impact of the pandemic on medical education, as highlighted by the suspension of face-to-face learning and clinical rotations, has led to unique challenges for medical students (Akers, 2020). The disparities in responses regarding burnout and coping mechanisms provide insights into the resilience and adaptability of individuals within the healthcare system. The decision of some residents to extend their training by an additional year reflects the complex considerations and challenges faced in the healthcare sector.

Participants commonly reported relying on spending quality time with family and engaging in regular exercise as crucial coping mechanisms. These practices not only highlight the importance of familial connections but also emphasize the role of physical activity in managing stress and fostering mental well-being.

Limitations and Future Directions: This study has limitations, primarily associated with its survey nature. Participants responded based on their subjective experiences, introducing potential biases. The cross-sectional design limits our ability to establish causation, and the reliance on self-reported data may impact the accuracy of responses. Future research could employ longitudinal designs and incorporate objective measures to provide a more nuanced understanding of the long-term effects of the pandemic on medical professionals' well-being. Additionally, qualitative methodologies could offer richer insights into the subjective experiences of healthcare professionals.

Conclusion

In summary, the research has unraveled significant insights into the enduring effects of the COVID-19 pandemic on medical students and resident physicians. As we reflect on the

comprehensive findings, distinct conclusions emerge that provide a nuanced understanding of the challenges faced by healthcare professionals and the adaptive strategies employed during and beyond the pandemic.

The experiment that was executed through survey methodology rejects the null hypothesis, affirming the statistically significant impact of the pandemic on the overall health of medical professionals. This aligns with broader literature, highlighting profound challenges in physical, mental, and emotional well-being during times of crisis (Hawryluck, 2020). The observed variations in academic stress, confidence levels, and burnout experiences underscore the intricate interplay between personal resilience and systemic factors.

Noteworthy improvements in social health, particularly in relationship strength, echo established theories emphasizing the pivotal role of social support networks in mitigating stress among healthcare professionals (Jegatheeswaran, 2020). The mixed patterns in physical activity, dietary habits, and academic stress illuminate the need for tailored interventions to address diverse challenges. The research provides critical insights into the tensions between safeguarding education and responding to the urgent demands on the health service during the pandemic, guiding future policy considerations.

The disruption to medical education, with the suspension of face-to-face learning and clinical rotations, emerges as a critical theme (Akers, 2020). The decisions of some medical students to graduate early or extend residency training reflect the dynamic and adaptive nature of the healthcare sector in responding to the challenges posed by the pandemic. These academic considerations are vital for informing future educational policies and practices, especially in a post-pandemic era where virtual learning is gradually becoming a thing of the past.

Coping mechanisms reported, such as spending quality time with family and engaging in regular exercise, illustrate the resilience of medical professionals in unprecedented circumstances. These practices align with broader research emphasizing the positive impact of familial support and physical activity on mental well-being. The inclusion of open-ended responses enriches the understanding of the nuanced ways individuals coped, providing valuable insights into the multifaceted nature of their experiences.

In future research endeavors, an expansion of our current study on the enduring effects of COVID-19 within the healthcare sector is planned. The current investigation, focusing on medical students and residents in the Tri-state Area, serves as a foundational exploration. The intention is to broaden the scope by incorporating diverse medical fields such as surgery and pediatrics, aiming for a comprehensive understanding of the pandemic's impact across healthcare professions.

In conclusion, the research serves as a crucial foundation for informed decision-making in healthcare, education, and policy realms. As we navigate the intricate landscape of challenges faced by medical students and resident physicians, these findings underscore the resilience displayed during the pandemic. This distinct conclusion solidifies the research's contribution to a more nuanced understanding of the complex interplay between global crises and individual well-being in the field of healthcare.