



# Psychological Responses of Chinese Medical Students to the COVID-19 Pandemic: Empirical Research Qualitative

Siyu Fan<sup>1,\*</sup>, Yu Zhao<sup>1,\*</sup>, Shiyu Wang<sup>1,\*</sup>, Na Zhang<sup>1,\*</sup>, Zhi Li<sup>1,\*</sup>, Hongyuan Liu<sup>1</sup> , Yaodi Wei<sup>1</sup>, Yunhui Yu<sup>1</sup>, Yifeng Gu<sup>2</sup>, Qun Wei<sup>3</sup>, Weijuan Ye<sup>4</sup>, Ninghan Feng<sup>5</sup>, Fengping Liu<sup>1</sup> 

<sup>1</sup>Wuxi School of Medicine, Jiangnan University, Wuxi, Jiangsu, People's Republic of China; <sup>2</sup>Collaborative Innovation Center for Diagnosis and Treatment of Infectious Diseases, State Key Laboratory for Diagnosis and Treatment of Infectious Diseases, School of Medicine, The First Affiliated Hospital, Zhejiang University, Hangzhou, Zhejiang, People's Republic of China; <sup>3</sup>Department of Surgical Oncology, Institute of Clinical Medicine, Sir Run Run Shaw Hospital, School of Medicine, Zhejiang University, Hangzhou, People's Republic of China; <sup>4</sup>Lishui Maternal and Child Health center, Lishui, Zhejiang, People's Republic of China; <sup>5</sup>Department of Urology, Jiangnan University Medical Center, Wuxi, Jiangsu, People's Republic of China

\*These authors contributed equally to this work

Correspondence: Ninghan Feng, Department of Urology, Jiangnan University Medical Center, Wuxi, Jiangsu, 214002, People's Republic of China, Email n.feng@njmu.edu.cn; Fengping Liu, Wuxi School of Medicine, Jiangnan University, Wuxi, Jiangsu, 214122, People's Republic of China, Email liulaoshiyc@jiangnan.edu.cn

**Aim:** This study aims to explore the psychological reactions of medical students during the pandemic.

**Design:** A qualitative study.

**Methods:** A purposive sampling technique was employed, and a qualitative approach was adopted. Semi-structured questionnaires were utilized, and online interviews were conducted. Forty medical students were selected as participants for the interviews. The interview data were analyzed using Colaizzi's seven-step analysis method.

**Results:** The study identified five themes related to the psychological reactions of medical students during the pandemic. Firstly, COVID-19's influence on medical careers was characterized by increased interest and determination in pursuing medical professions, heightened admiration for frontline workers, reinforced commitment to a medical career due to the pandemic, and recognition of the significance of medical education. Secondly, challenges and concerns in medical career pursuit were identified, including negative sentiments towards medical careers during COVID-19 and hesitations and concerns about entering the medical field amidst the pandemic. Thirdly, the impact on mental well-being encompassed diverse anxieties expressed by participants regarding control, transmission, treatment, and intentional spreading of the virus. Participants experienced an emotional progression from calmness to fear and anxiety, with heightened anxiety when relatives or acquaintances contracted COVID-19. Academic delays also contributed to anxiety among medical students. Fourthly, changes in behaviors and mindset were observed, including altered behaviors and mindset in response to the pandemic, as well as increased attention to personal hygiene and disease prevention measures. Lastly, expectations of medical students from government, public, and parents were explored.

**Conclusion:** Understanding the psychological reactions of medical students during public health emergencies is crucial for their well-being and professional development. The findings have implications for medical education and the development of strategies to enhance the psychological well-being of medical students during similar crises.

**Keywords:** COVID-19, medical students, psychological reactions, pandemic, mental health

## Introduction

According to a report released by the World Health Organization (WHO) on May 14, 2023, the global death toll from the novel coronavirus disease (COVID-19) has reached 7.66 million.<sup>1</sup> In China, as of January 8, 2023, at 24:00, the government has reported a total of 503,302 confirmed cases, with 379,053 cases recovered and discharged, and 5272 deaths.<sup>2</sup>

During public health emergencies, such as outbreaks of infectious diseases, the general public often experiences negative emotions, including anxiety and depression. It has been reported that during the outbreak of H7N9 avian influenza, the public faced psychological crises and displayed a range of stress reactions.<sup>3</sup> Moreover, research studies have found that stress and negative emotions during the H1N9 avian influenza outbreak had an impact on people's mental health.<sup>4-6</sup> Similarly, the outbreak of the Ebola virus also significantly affected the psychology and behavior of the public.<sup>7</sup> Research on H7N9 avian influenza and the Ebola virus has indicated that medical students generally have a low level of knowledge about such diseases.<sup>8,9</sup> Therefore, it is important to understand the psychological reactions of medical students during the global outbreak of COVID-19, as it may significantly impact their professional identity.

There are several reasons why understanding the psychological reactions of medical students towards the COVID-19 outbreak is crucial. Firstly, medical students are essential members of healthcare systems and will become future healthcare professionals responsible for managing similar crises. Gaining insight into their experiences during this pandemic can inform the development of appropriate training and support programs to better prepare them for future public health emergencies. Secondly, the emotional well-being of medical students is vital for their personal growth, resilience, and the delivery of high-quality patient care. Identifying factors that influence their emotional well-being can contribute to the implementation of interventions aimed at promoting their mental health and mitigating the negative consequences of stress and burnout. Therefore, this study aims to explore the psychological reactions of medical students during the COVID-19 pandemic. By identifying the specific challenges, concerns, and changes in behaviors and mindset experienced by medical students, we can provide valuable insights into their experiences. These findings can contribute to the development of targeted support programs and interventions to promote their mental health and resilience, ultimately enhancing their well-being and professional development in the face of public health emergencies.

## Methods

### Methodological Design and the Method

The phenomenological approach was chosen as the research method for this study because "phenomenological approach is well suited to studying affective, emotional responses".<sup>10</sup> The phenomenological approach can be divided into two main Methods: descriptive (Husserlian) and interpretive (Heideggerian).<sup>11</sup> The descriptive method assumes the researcher to be "without presuppositions" and should discover the objective reality as a blank slate, while the interpretive method recognizes the impossibility of fully eliminating researcher bias and proposes the interaction between the interviewer and interviewee as a way to achieve more accurate interpretation of experiences.<sup>12</sup> Given that the researchers are experienced academic teachers, and the undergraduate interviewers and interviewees share similar learning and life experiences, making it easier for them to open up and express their true feelings, the second (Heideggerian) method was adopted in this study.<sup>11</sup>

The study was conducted from February 10th, 2020, to March 14th, 2020, utilizing semi-structured interviews with medical students in Chinese hospitals. The research specifically focuses on Chinese medical students currently enrolled in their programs and employs purposive sampling. The inclusion criteria for participants are as follows: (1) Students studying in a medical field: Participants must be currently enrolled in a medical degree program, including, but not limited to, undergraduate medical education, postgraduate medical education, or other medical-related disciplines such as nursing, dentistry, or pharmacy. (2) Residing in China following the outbreak of Covid-19. (3) Voluntary participation and consent for the study: Participants must express their willingness to take part in the study and engage in interviews voluntarily.

To prioritize epidemiological safety, the interviews were conducted through WeChat video chatting. The procedure consisted of several steps: explaining the study protocol to the respondents, addressing any questions or concerns they had, obtaining their informed consent for participation, and documenting the entire process. Following each interview, the recordings and demographic data of the participants were promptly encoded and subjected to further anonymous processing.

### Data Collection Process

In this study, in-depth online interviews were conducted with the participants to gather comprehensive and detailed information regarding their psychological reactions, concerns, and professional attitudes towards the COVID-19

outbreak. The interview questions were carefully designed to explore various aspects of psychological reactions: (1) What were your psychological reactions upon learning about the infectious nature of COVID-19? (2) Did you experience any physical discomfort when you learned that COVID-19 is an infectious disease? (3) What worries and concerns did you have when you learned that COVID-19 is an infectious disease? (4) Which psychological reactions, in your opinion, influenced changes in your behavior? (5) What factors do you think influenced the aforementioned psychological reactions and behavior changes? (6) What measures do you think the country should take to alleviate these psychological reactions? (7) What measures do you think parents should take to alleviate the aforementioned psychological reactions? (8) In your opinion, how will the current COVID-19 pandemic impact your career planning? (9) How do you think the current COVID-19 pandemic will affect your career planning? (10) In your view, what impact do you think the current COVID-19 pandemic will have on students' choice of medical professions? Each interview lasted approximately 20 to 30 minutes, allowing for a detailed exploration of the participants' experiences. The sample size was determined based on information saturation achieved during the interview process.

## Data Analysis Process

Following the survey, the collected data underwent a meticulous process of summarization and analysis. Our team of researchers performed coding and theme extraction, diligently addressing any disagreements through thorough Discussions. The analysis was conducted using Colaizzi's seven-step analysis method,<sup>13</sup> while NVivo software (version 12.0) was utilized for the classification and coding of the interview data, enabling the generation of meaningful themes.<sup>14</sup>

## Ethical Issues

Rigorous measures were undertaken to uphold the highest ethical standards throughout this study, despite its non-involvement in medical experiments. The interviewers provided a comprehensive explanation of the study's objectives to the participants, assuring them of the strict confidentiality of their information. Additionally, the researchers confirmed that all participants were of legal age and obtained their informed consent, emphasizing the voluntary and anonymous nature of their participation. The participants' informed consent included the publication of anonymized responses. In addition, stringent precautions were taken during the questionnaire collection process to safeguard the anonymity of the collected data, demonstrating a commitment to ethical practices.

## Results

### Characteristics of Medical Students

A total of 40 medical students participated in the interviews, representing a diverse range of medical disciplines. The participants included 18 nursing students, 17 clinical medicine students, and 5 students from other medical fields, such as preventive medicine and acupuncture, and tuina (Table 1). The Results of our study extracted 5 themes and 15 sub-themes (Table 2).

### Theme I COVID-19's Influence on Medical Careers

#### Increased Interest and Determination in Pursuing Medical Professions

Some participants expressed the belief that the pandemic would serve as a catalyst for increased interest in pursuing medical professions among students. For instance, participant S9 shared, "The COVID-19 outbreak has sparked my interest in the field of epidemiology. It has motivated me to explore related areas of study in epidemic management". Additionally, participants S14 and S38 concurred that there would be a surge in the number of individuals opting for medical professions.

#### Heightened Admiration for Healthcare Professionals and Frontline Workers

Several participants expressed a heightened admiration and respect for healthcare professionals and frontline workers in light of the pandemic. For instance, participant S20 acknowledged, "Throughout this epidemic, my admiration for healthcare workers and those on the front lines has deepened". Similarly, participant S35 stated, "I believe that many students will develop a genuine appreciation for the dedication and allure of healthcare workers". Additionally,

**Table 1** Characteristics of Subjects

| Respondents' Number | Gender | Age (years) | Major                 | Education | Experiencing Clinical Internship |
|---------------------|--------|-------------|-----------------------|-----------|----------------------------------|
| S1                  | Female | 18          | Nursing               | Bachelor  | No                               |
| S2                  | Female | 19          | Clinical Medicine     | Bachelor  | Yes                              |
| S3                  | Female | 18          | Clinical Medicine     | Bachelor  | Yes                              |
| S4                  | Female | 19          | Clinical Medicine     | Bachelor  | No                               |
| S5                  | Male   | 19          | Nursing               | Associate | Yes                              |
| S6                  | Male   | 19          | Clinical Medicine     | Bachelor  | No                               |
| S7                  | Female | 19          | Nursing               | Bachelor  | No                               |
| S8                  | Male   | 19          | Optometry             | Bachelor  | No                               |
| S9                  | Male   | 20          | Clinical Medicine     | Bachelor  | Yes                              |
| S10                 | Female | 20          | Nursing               | Bachelor  | No                               |
| S11                 | Female | 21          | Medical Imaging       | Associate | No                               |
| S12                 | Female | 20          | Nursing               | Bachelor  | No                               |
| S13                 | Female | 18          | Clinical Medicine     | Bachelor  | Yes                              |
| S14                 | Male   | 19          | Clinical Medicine     | Bachelor  | No                               |
| S15                 | Female | 19          | Clinical Medicine     | Bachelor  | No                               |
| S16                 | Female | 18          | Nursing               | Bachelor  | No                               |
| S17                 | Female | 21          | Preventive Medicine   | Bachelor  | Yes                              |
| S18                 | Female | 20          | Nursing               | Bachelor  | No                               |
| S19                 | Male   | 18          | Clinical Medicine     | Bachelor  | No                               |
| S20                 | Female | 19          | Clinical Medicine     | Bachelor  | No                               |
| S21                 | Female | 19          | Nursing               | Bachelor  | No                               |
| S22                 | Female | 20          | Nursing               | Bachelor  | No                               |
| S23                 | Female | 19          | Nursing               | Bachelor  | Yes                              |
| S24                 | Female | 19          | Nursing               | Bachelor  | Yes                              |
| S25                 | Female | 20          | Clinical Medicine     | Bachelor  | No                               |
| S26                 | Female | 21          | Preventive Medicine   | Bachelor  | No                               |
| S27                 | Female | 19          | Nursing               | Bachelor  | No                               |
| S28                 | Female | 20          | Nursing               | Bachelor  | No                               |
| S29                 | Female | 19          | Acupuncture and Tuina | Bachelor  | No                               |
| S30                 | Female | 19          | Clinical Medicine     | Bachelor  | No                               |
| S31                 | Male   | 22          | Clinical Medicine     | Bachelor  | No                               |
| S32                 | Male   | 20          | Nursing               | Bachelor  | No                               |
| S33                 | Male   | 20          | Nursing               | Bachelor  | No                               |
| S34                 | Female | 18          | Nursing               | Bachelor  | No                               |
| S35                 | Female | 19          | Nursing               | Bachelor  | No                               |
| S35                 | Female | 19          | Nursing               | Bachelor  | No                               |
| S36                 | Female | 18          | Nursing               | Bachelor  | No                               |
| S37                 | Female | 18          | Clinical Medicine     | Bachelor  | Yes                              |
| S38                 | Female | 19          | Clinical Medicine     | Bachelor  | No                               |
| S39                 | Female | 19          | Clinical Medicine     | Bachelor  | No                               |
| S40                 | Male   | 19          | Clinical Medicine     | Bachelor  | No                               |

participant S21 highlighted the expectation that medical professions would garner increased respect and recognition, thus elevating the social status of doctors.

### Reinforced Commitment to a Medical Career Due to the Pandemic

Some participants shared that the COVID-19 outbreak has had a profound effect on their determination to pursue a medical career. For instance, participants S30 expressed

**Table 2** Psychological Responses of Chinese Medical Students to the COVID-19 Pandemic-The System of Codes and Themes

| Theme   | Sub-Theme   |
|---|---|
| COVID-19's Influence on Medical Careers           | Increased interest and determination in pursuing medical professions<br>Heightened admiration for healthcare professionals and frontline workers<br>Reinforced commitment to a medical career due to the pandemic<br>Recognizing the significance of medical education  |
| Challenges and Concerns in Medical Career Pursuit | Negative sentiments towards medical careers during COVID-19<br>Hesitations and concerns about entering the medical field amidst the pandemic  |
| Impact on Mental Well-being                       | Participants expressed diverse anxieties about control, transmission, treatment, and intentional spreading<br>Emotional progression from calmness to fear and anxiety<br>Heightened anxiety when relatives or acquaintances contract COVID-19<br>Academic delays and their impact on anxiety among medical students |
| Changes in Behaviors and Mindset                  | Altered behaviors and mindset in response to the pandemic<br>Increased attention to personal hygiene and disease prevention measures  |
| Expectations for Government, Public, and Parents  | Expectations for government actions to protect citizens and healthcare workers<br>Encouraging the public to seek reliable information and avoid spreading rumors<br>Parental role in providing comfort and setting a positive example for children  |

The pandemic has reinforced my commitment to studying medicine and joining the healthcare field, instilling a stronger sense of responsibility and mission towards the medical profession.

S34 shared,

The outbreak has intensified the desire of some students to pursue medicine. They aspire to contribute in combating COVID-19 and feel a strengthened belief and courage to enhance their knowledge and professional abilities to make sound judgments in similar situations in the future.

Furthermore, some participants mentioned their aspiration to excel as frontline healthcare workers, contributing to society and the nation during viral infections. For instance, S13 mentioned,

I hope to be as excellent as the frontline healthcare workers and contribute to society and the nation in times of viral infections. This epidemic has revealed a lack of scientific researchers in the country for breakthroughs in viral infections. Therefore, I have decided to pursue postgraduate studies after my undergraduate degree to improve my medical skills.

A similar view was expressed by S35. Then, S40 stated,

I believe the pandemic has influenced my choice to pursue medicine, strengthening my dedication to this path. I hope to contribute to my country and society through diligent learning and relieve my family of future worries.

### Recognizing the Significance of Medical Education

The COVID-19 outbreak has shed light on the inadequacies of China's healthcare system, prompting medical students to recognize the significance of medical education. During the investigation, participant S20 mentioned, "The COVID-19 pandemic makes more students recognize the significance of medical education". S25 emphasized, "During this crisis and even beyond, doctors bear a tremendous responsibility". Similarly, S39 expressed their aspiration to contribute to the field through research, stating,

The COVID-19 pandemic has revealed the formidable nature of viruses. I am motivated to delve into related topics through my own learning. In the event of future situations, I aspire to be actively involved in research.

Additional, S19 eloquently articulated this sentiment, stating, "It has been a wake-up call for me, highlighting the nobility of the medical profession. I believe it is crucial to excel in my medical studies".

## Theme 2 Challenges and Concerns in Medical Career Pursuit

### Negative Sentiments Towards Medical Careers During COVID-19

The COVID-19 outbreak has evoked negative sentiments among participants regarding the pursuit of a medical career, primarily attributed to the deterioration of doctor-patient relationships and incidents of verbal or physical harm directed towards healthcare workers. For instance, S35 remarked,

Throughout this epidemic, prominent media outlets have extensively portrayed videos and images depicting healthcare workers risking their lives to save patients, even witnessing the tragic loss of young lives due to viral infections. This exposure may lead many students to shy away from pursuing a medical profession when deciding on their career paths.

Furthermore, participants S9 emphasized,

One of the most significant factors influencing this is the verbal and physical harm inflicted upon doctors, which may discourage students considering a career in medicine. Moreover, witnessing the infection and sacrifice of medical staff may also deter individuals from entering the medical field.

In line with these perspectives, participant S7 highlighted that “some students may develop a sense of fear and aversion towards medicine”.

### Hesitations and Concerns About Entering the Medical Field Amidst the Pandemic

Several participants voiced concerns and reservations regarding the pursuit of a medical career in light of the COVID-19 outbreak. Participant S3 candidly expressed, “I am considering not continuing in the field of fever clinic”. Similarly, participants S21 shared the belief that “there may be a decrease in the number of individuals choosing medical professions”. Additionally, Participants S13 expressed,

Due to various challenges faced by healthcare workers in COVID-19, including physical and mental exhaustion and the immense responsibility they bear, my enthusiasm for pursuing a medical career has diminished. I am now hesitant about entering the healthcare field and concerned about the lack of assurance regarding personal safety.

In line with these perspectives, participant S29 and S39 suggested that concerns regarding personal safety could dissuade some students from pursuing medicine. Such as S29 stated,

Some students may be dissuaded from pursuing medicine due to concerns about their personal safety. We perceive the industry as inherently high-risk and may choose safer job alternatives.

## Theme 3 Impact on Mental Well-Being

### Participants Expressed Diverse Anxieties about Control, Transmission, Treatment, and Intentional Spreading

During the COVID-19 pandemic, we observed that some participants may experience mild, moderate, or severe anxiety during this period. For instance, S27 expressed concerns and dissatisfaction regarding certain behaviors. S16 stated,

I feel slightly anxious and experience discomfort in my throat. I worry about the effectiveness of disease control measures, the potential expansion of transmission, and the availability of adequate treatment for infected patients.

Participants S19 mentioned feeling “a bit panicked and worried, constantly monitoring the progress of epidemic control”. S21 expressed, “concern about individuals intentionally spreading the virus in society”.

### Emotional Progression from Calmness to Fear and Anxiety

Some participants described a progression of emotions from initial calmness to fear and anxiety as the COVID-19 situation evolved and became more serious in their area. S29 mentioned,

Initially, there wasn't much change because the situation wasn't too severe in our area. But as the number of cases gradually increased, I started feeling a bit scared, afraid of getting infected. I also felt anxious while watching the news at home. Later, I began following the news and monitoring the situation on a daily basis.



S34 stated,

When it wasn't severe before, we didn't feel much, especially when the number of cases was still low. However, as we saw the number of cases rise day by day and heard about transmission through the air and other modes, we became fear and anxiety.

### Heightened Anxiety When Relatives or Acquaintances Contract COVID-19

The COVID-19 outbreak has placed substantial psychological pressure on medical students, with our findings indicating that when their relatives or acquaintances contract COVID-19, it can result in heightened anxiety among these students. S8 articulated, "Upon realizing the severity, my concerns extend to the well-being and safety of both myself and my family, along with potential disruptions to social order". Likewise, several respondents, such as S22, S23, S25, S29, S39 and S40, expressed feelings of nervousness, anxiety, and fear stemming from the uncontrollable contagiousness of the disease and the potential risk of their loved ones becoming infected.

### Academic Delays and Their Impact on Anxiety Among Medical Students

We found that the COVID-19 pandemic and resulting academic delays have led to anxiety among medical students. For example, participant S9 stated, "I'm afraid that we won't be able to start classes". Participant S30 expressed, "I am concerning about the potential impact on my academic performance".

## Theme 4 Changes in Behaviors and Mindset

### Altered Behaviors and Mindset in Response to the Pandemic

In response to COVID-19, medical students' emotions are not the sole aspect impacted; their behaviors are also subject to influence. Participant S13 acknowledged, "My family and I have implemented necessary protective measures". S27 expressed, "I choose to stay at home and stock up on groceries from the supermarket".

The accounts of various participants shed light on the impact of the COVID-19 pandemic on their behaviors and mindset. S3 said, "I lose my appetite, wear a mask when going out, wash hands frequently, and constantly monitor the latest epidemic situation". Participant S9 stated, "I have increased my attention to the epidemic". Participant S13 mentioned, "I frequently follow the news and stay updated on the latest developments related to hot topics and the epidemic". Participant S23 said, "I often worry and frequently check the confirmed case numbers online". Participant S38 stated, "It makes me pay more attention to relevant news and any information related to COVID-19[.]"

### Increased Attention to Personal Hygiene and Disease Prevention Measures

Participant S6 said,

I consciously judge whether I have contracted COVID-19 based on symptoms. When going out, I must wear a mask and gloves. When entering my house, I must wash my hands and disinfect them. I pay attention to personal hygiene and start preventing diseases from myself.

Participant S7 mentioned,

I took early protective measures, bought masks, actively promoted awareness of protection to my parents and family members, washed hands frequently, and wore masks when going out.

Participant S8 stated, "I prioritize disease prevention, try to minimize going outside, wear masks when necessary, and avoid crowded places". Participants S40 mentioned, "At home, we pay more attention to hygiene, wash hands more frequently, and ventilate the room every morning. We also measure our body temperature regularly". Participant S35 shared,

Throughout this period, I limit my outings to essential needs, take precautions such as layering clothing to prevent fever or cold, and engage in daily skipping rope exercises to enhance my physical well-being.

## Theme 5 Expectations for Government, Public, and Parents

### Expectations for Government Actions to Protect Citizens and Healthcare Workers

In the face of the COVID-19 pandemic, medical students hope that the government will actively respond to the outbreak by promptly supplying resources and rapidly developing vaccines and therapeutic drugs to protect citizens. For instance, participant S1 suggested that the government should “timely disclose the situation of the epidemic and ensure the timely supply of resources”. S35 expressed his hope “the government should respond actively to the epidemic and provide daily updates on positive news regarding overcoming the outbreak”. Participant S19 believed that the government should “restrict population movement and implement effective protective measures”. Additionally, participant S2 suggested that the government should “actively develop vaccines against the novel coronavirus and implement preventive measures”. S8 believed that the government should “quickly develop vaccines, properly manage patients and suspected cases, and intensify screening”. S27 suggested that there should be “rapid research on effective treatment drugs, formulation of relevant policies, and prevention of price gouging”.

Similarly, medical students also hope that the government can supply medical supplies in time to ensure the safety of healthcare workers. S3 believed that the government should “provide timely medical resources and guarantee support for frontline doctors in various regions”. S24 suggested giving “more support, especially in terms of medical supplies, to isolated individuals”. S29 believes that the government should “dispatch more personnel to the frontlines, assist epidemic areas, and ensure sufficient supplies”. While, participants S7 and S38 expressed the view that the government should

improve the social status of healthcare workers, increase their salaries, ensure their personal safety, establish relevant laws to punish excessive acts of violence against medical personnel, provide accident insurance for healthcare workers, and genuinely respect them.

### Encouraging the Public to Seek Reliable Information and Avoid Spreading Rumors

Participant S20 suggested “strengthening the crackdown on individuals who do not comply with the rules during the epidemic and severely punishing opportunistic behaviors”. S22 believed that “self-media should provide real-time updates on the progress of the epidemic and describe detailed information about COVID-19 on their platforms”. S40 suggests

strengthening psychological counseling, understanding that the fatality rate of COVID-19 is not very high, and promoting nationwide unity in the fight against the epidemic.

Additionally, through the investigation discover that people’s anxiety can be relieved by watching epidemic prevention videos. For example, participant S1 suggested “organizing psychological lectures”. S18 suggested that

we can watch experts explain the current situation of the epidemic and preventive measures, especially the rescue measures implemented by the government in Hubei province.

### Parental Role in Providing Comfort and Setting a Positive Example for Children

Medical students hope that their parents can engage in effective communication, reduce their focus on pandemic-related news, and minimize the spread of negative emotions. For example, S6 suggested that

parents should engage in reasonable and effective communication with their children, emphasizing personal hygiene and helping them understand the importance of maintaining a calm mindset in the face of the epidemic rather than succumbing to panic and fear.

S22 suggested, “Parents should not frequently emphasize news about this disease at home”. S34 believed that

parents should not overly emphasize the new coronavirus. They should not bring their fearful emotions to their children but instead talk about happy things and engage in recreational activities.

S38 stated, “Parents should refrain from mentioning the tragic news of healthcare workers’ deaths in front of me”. S39 and S40 suggested,



Don't always bring up COVID-19, avoid fearmongering, refrain from spreading rumors, protect oneself, avoid unnecessary outings, wash hands frequently, ensure proper ventilation, and wear masks.

Additionally, the way parents respond to the pandemic can serve as a positive example for their children to cope with the situation proactively. For example, participant S33 suggested, "Parents should start with themselves, reduce going out and social activities". S29 believe that

parents should lead by example, stay at home, keep updated with the news, communicate with their children, facilitate dialogue, and care for and supervise their children's lives and studies.

## Discussion

The findings of this study provide valuable insights into the influence of the COVID-19 pandemic on medical careers, mental well-being, and changes in behaviors and mindset among medical students. The results reveal a multifaceted impact on medical career pursuits, with both positive and negative aspects.

One prominent finding is the increased interest and determination among participants to pursue medical professions. The pandemic has acted as a catalyst, sparking interest in fields such as epidemiology and epidemic management. This finding is in line with previous research that suggests global health crises can generate a surge of interest in healthcare professions.<sup>15</sup> The admiration and respect for healthcare professionals and frontline workers have also grown, highlighting the dedication and allure of these professions. This finding aligns with studies that have shown increased appreciation for healthcare workers during the pandemic.<sup>16</sup> The COVID-19 outbreak has reinforced the commitment of some participants to a medical career, instilling a stronger sense of responsibility and mission towards the medical profession. Similar findings have been reported, with the pandemic intensifying the desire of individuals to contribute in combating COVID-19 and enhancing their professional abilities.<sup>17</sup>

Furthermore, the pandemic has shed light on the significance of medical education, as participants recognize the importance of acquiring knowledge and skills in response to future crises. The recognition of the formidable nature of viruses and the need for scientific research underscores the aspiration of participants to contribute to the field through research and excel in their medical studies. This finding is consistent with studies emphasizing the importance of medical education in preparing healthcare professionals for future pandemics.<sup>18</sup>

On the other hand, challenges and concerns in pursuing a medical career during the pandemic were also evident. Negative sentiments towards medical careers emerged due to the deterioration of doctor-patient relationships and incidents of harm directed towards healthcare workers. Fear, aversion, and hesitations were expressed, influenced by media portrayals of the risks and sacrifices faced by medical staff. Concerns about personal safety and the high-risk nature of the industry were cited as potential deterrents for some individuals considering a medical career. These findings are supported by studies highlighting the psychological impact of the pandemic on healthcare workers and the need to address their safety concerns.<sup>19,20</sup>

The impact on mental well-being during the pandemic was reflected in participants' diverse anxieties related to disease control, transmission, treatment, and intentional spreading. The progression of emotions from calmness to fear and anxiety mirrors the evolving nature of the pandemic and the increasing severity of the situation. Anxiety was heightened when relatives or acquaintances contracted COVID-19, reflecting the personal impact of the disease on participants. Academic delays resulting from the pandemic also contributed to anxiety among medical students. These findings align with studies reporting increased levels of anxiety and psychological distress during the pandemic.<sup>21</sup>

Changes in behaviors and mindset were observed as participants implemented necessary protective measures and adjusted their routines. Increased attention to personal hygiene and disease prevention measures, such as wearing masks, frequent handwashing, and monitoring the epidemic situation, became common practices. These behavioral changes are consistent with recommendations from health authorities to prevent the spread of the virus.<sup>22</sup>

Expectations for government actions were high, with participants emphasizing the need for timely responses, supply of resources, development of vaccines and therapeutic drugs, and support for healthcare workers. Encouraging the public to seek reliable information, avoid spreading rumors, and providing psychological support were seen as crucial in

managing the pandemic. These findings align with the role of governments in implementing effective public health measures and communication strategies during health crises.<sup>23</sup>

The role of parents in providing comfort and setting a positive example for children was highlighted, emphasizing the importance of effective communication, minimizing the spread of negative emotions, and promoting a calm mindset. Parents were expected to lead by example, reduce focus on pandemic-related news, and engage in recreational activities. These findings align with research on the parental influence on children's mental well-being during the pandemic.<sup>24</sup>

While our findings corroborate those of previous quantitative studies on similar themes, this study uniquely captures the personal and emotional nuances of medical students' experiences during the COVID-19 pandemic. Through in-depth interviews, we were able to gather rich, detailed narratives that highlight the internal and external conflicts students faced, their coping mechanisms, and the profound impact on their career trajectories and mental health. This qualitative approach not only enriches the quantitative data available but also provides a comprehensive understanding of the underlying factors influencing students' responses to the pandemic. Such insights are crucial for developing targeted interventions aimed at supporting medical students in similar future crises.

In addition, the insights gleaned from this study suggest several implications for policies and practices aimed at supporting medical students during public health crises. Educational institutions should consider implementing structured mental health support systems, including counseling services and stress management workshops, tailored specifically for medical students. Furthermore, the development of crisis management training within the medical curriculum could prepare students more effectively for the psychological demands of handling future health emergencies. Policymakers should also take these findings into account, promoting regulations that ensure adequate psychological support and resources are available to medical students during pandemics or similar crises.

In conclusion, this study hopes that how the medical specialty should develop after the epidemic and how to solve the psychological problems of medical students when facing epidemic diseases will provide a reference basis for the government, the public and parents' practices.

## Limitations and Future Directions

There are some limitations to this study. Firstly, the participants interviewed were only undergraduate medical students and did not include graduate students, so the Conclusions of this study may not represent the perspectives of all medical students. This suggests a lack of diversity in the participants, and future participants could include graduate students and interview a multi-educated population. Secondly, due to the restrictions of quarantine policies during the pandemic, the interviews conducted for this study were done online, which means that we were unable to capture the meanings conveyed through participants' facial expressions and body language. This limitation may impact the comprehensiveness of the results. Then, given the qualitative nature of the study and the specific context of the pandemic, caution should be exercised in generalizing the findings to other populations or settings without considering the unique socio-cultural and institutional factors at play. Additionally, interviews were generally conducted with individuals of the same age, sample sizes were determined based on information saturation, and the 40 individuals interviewed for this study were a small number of interviews and therefore not applicable to all groups of medical students.

Building on the findings and limitations of this study, we recommend several future research directions to deepen the understanding of the psychological impacts of pandemics on medical students. Future studies could explore longitudinal changes in medical students' psychological responses to assess the persistence and evolution of psychological effects over time. Additionally, expanding the demographic scope to include medical students from various geographical regions and educational stages will enable a comparison of psychological impacts across different contexts. It would also be beneficial to employ mixed methods approaches, integrating qualitative insights with quantitative data, to provide a more comprehensive understanding of these impacts. Including both graduate and undergraduate students as participants will ensure a diverse range of perspectives, enriching the research outcomes and enhancing the generalizability of the findings.

## Conclusions

Overall, this study provides valuable insights into the complex interplay of factors affecting medical careers, mental well-being, and behaviors during the COVID-19 pandemic. It highlights the need for support mechanisms, effective

communication strategies, and proactive measures to address the challenges and concerns faced by individuals pursuing medical careers in these challenging times.

## Abbreviations

COVID-19, the novel coronavirus disease; WHO, World Health Organization; SARS, Severe acute respiratory syndrome.

## Data Sharing Statement

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

## Ethics Approval and Consent to Participate

This study was conducted in accordance with the Helsinki Declaration. Ethical approval for the study was obtained from the ethics committee of the Affiliated Jiangnan University Medical Center (ref. 202002). During the interview process, the purpose of the study was explained to the participants, and informed consent was obtained from all participants.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors declare that they have no conflicts of interest in this work.

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