ORIGINAL RESEARCH

# Employment Intention of Chinese Medical Students During the COVID-19 Epidemic: A Cross-Sectional Survey

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## ABSTRACT

**Context** • In the process of combating the coronavirus disease 2019 (COVID-19) epidemic, medical personnel were at the forefront of the fight. As the future medical workforce, medical students often experienced firsthand how their seniors and teachers had to commit to working hard in combating the epidemic. Many were directly involved in the front line of the fight and that experience could easily have affected their intention to seek employment in a medically related career.

**Objective** • The study intended to evaluate the impact of the COVID-19 pandemic on Chinese medical students' employment intentions and the factors associated with them to put forward relevant suggestions to provide a basis for medical education in the future.

**Design** • The research team conducted a cross-sectional study, using an anonymous online questionnaire.

**Setting** • The study took place in many provinces and cities in China and was conducted in an online questionnaire.

**Participants** • Participants were 1114 college students studying clinical medicine, college students studying nursing, and students interning during standardized resident training, medical interns.

**Outcome Measures** • The participants completed a self-administered questionnaire, which investigated their psychological statuses related to anxiety and depression as well as COVID-19's impact on their intentions related to job searches, regarding their willingness to engage in clinical or basic research in epidemic-related specialties and epidemic-related work.

**Results** • Compared to college students studying clinical medicine, the employment intentions of nursing students and medical interns were more vulnerable to the epidemic. Females and nursing students were more reluctant to choose clinical work, and the choice was associated with depression. Nursing college students and medical interns were significantly less willing to engage in infection medicine, respiratory medicine, and intensive care medicine (all $P < .001$). Medical students with a bachelor's degree and postgraduate degrees were significantly less willing to engage in infection medicine and respiratory medicine (all $P < .001$), but medical students from regions with stable epidemics were more willing to engage in intensive care medicine. Medical students with a bachelor's degree were significantly less likely to be involved in epidemiology-related work than undergraduate students, and students from severe epidemic regions were significantly less willing to work in isolation wards or to go to Wuhan as volunteers.

**Conclusions** • Participants' psychological statuses related to anxiety and depression, genders, degrees, current educational statuses, and regions affected employment intentions during the epidemic. (*Altern Ther Health Med.* 2023;29(2):191-199)

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In December 2019, a form of pneumonia called coronavirus was identified in Wuhan, China. The epidemic quickly turned into a major public-health event worldwide.[1,2] The World Health Organization (WHO) subsequently named the virus coronavirus disease-2019 (COVID-19).[3]

In the process of combating the epidemic, medical personnel were at the forefront of the fight. Countless medical personnel remained at their posts, met their responsibilities, and played a pivotal role in the battle against the virus. However, due to the high risk of infection by the virus, doctors feared spreading the virus from themselves to their families.[4,5] In addition, inadequate personal protective equipment, overwork, frustration, discrimination, isolation, negative attitudes of some patients, lack of contact with family members, and exhaustion had a large influence on medical staffs' psychological statuses.[6]

As the epicenter of the COVID-19 outbreak, Hubei Province and other high-risk areas suffered the most severe attack of the epidemic in China, and many patients were admitted to hospitals, resulting in a shortage of beds and a lack of medical resources that made medical staff feel powerless and helpless.[7] Physicians were exhausted, and they had little time to recover and rest due to the long hours and sparse staffing.[8]

Many studies have reported the impact of the COVID-19 pandemic on the general population's mental health or that of medical workers. Lu et al[9] conducted a survey to assess the psychological status of the medical workforce during the COVID-19 pandemic and found that most medical staff showed no anxiety (74.5%) or depression (87.9%).

As the future medical workforce, medical students experienced firsthand how their seniors and teachers had to commit to working hard in combating the epidemic and what life was like during the epidemic. Many were directly involved in the front line of fighting the virus, and as a result, their psychological statuses often fluctuated. This could easily have affected their intention to seek employment in a medically related career. Some of them may have wavered and expressed ideas of giving up their pursuit of a medical career, which could lead to a waste of medical-education resources and talents.

However, few researchers have studied the effects of the epidemic on medical students, especially focusing on medical students' job-search intentions.[10] The current study intended to evaluate the impact of the COVID-19 pandemic on Chinese medical students' employment intentions and the factors associated with them to put forward relevant suggestions to provide a basis for medical education in the future.

## METHODS

### Participants

The research team conducted a cross-sectional study, using an anonymous online questionnaire to assess the employment intentions of medical students in many provinces and cities in China during the epidemic of COVID-19. Potential participants were college students currently studying clinical medicine, college students currently studying nursing, and students currently interning during standardized resident training, medical interns. We promoted the questionnaire among the students of Tongji University Medical College and the doctors in the standardized training of residents in Shanghai first, and then contacted more teachers, medical students and residents in other provinces and cities through many teachers and students of Tongji University. The inclusion of the questionnaire should meet the requirements of medical students and residents. All the respondents were contacted through WeChat questionnaires.

### Procedures

**Survey administration.** The study took place between 8:00 am on March 3, 2020 and to 24:00midnight on March 10, 2020, The study used a self-report questionnaire that the team had modified from a previously developed questionnaire. The questionnaire was designed by the author and distributed to the respondents in the form of WeChat forwarding. After the questionnaire is completed, the data will be collected and summarized through the software called WJX. That original survey targeted at medical students who hadn't graduated or who had just graduated from a university.

**Survey contents.** Yang et al's study[11] found that the top three factors affecting medical students' career selection were academic interests, competencies, and controllable lifestyles or flexible work schedules. The current survey included 34 questions. The questions covered participants' demographic and background characteristics, including gender, current educational status, academic degree, and region. It also included questions about COVID-19's impact on their intentions related to job searches, regarding their willingness to engage in clinical or basic research in epidemic-related specialties and epidemic-related work.

***Gender.*** Research conducted during the outbreaks of the Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS) found that women were more likely to perceive risk.[12,13] Most nurses are women; Bukhari et al found that women were more worried and afraid of viral infection than men.[14] Baloglu et al also found that women appeared to be more fearful and anxious than men, and they admitted this anxiety.[15]

Women are also one of the most vulnerable populations in terms of attaining employment.[16,17] Hempenstall et al[17] noted that gender variations existed in job-seeking behaviors. Those researchers pointed out that women in their study were integrated with the notion of family, based on the belief that they should give priority to family in their daily lives. Therefore, the two competing gender roles of work and family involved conflict. Women will give more consideration more to the impact of employment on the family, and they may try to avoid selecting a stressful job.

***Current educational status.*** The research team divided the variable evaluating academic degrees into undergraduate

students, students with a bachelor's degree, and postgraduate students, including those obtaining master's and doctoral degrees.

***Region.*** Wang et al found that the job intentions of social-work graduates varied significantly across different areas such as provinces and regions.[18]

The research team divided China's geographical regions into provinces and cities with severe epidemics or high risks and regions with stable epidemics. The areas with severe epidemics included Hubei, Henan, Zhejiang, Hunan, and Anhui, based on those areas' rankings related to the cumulative number of diagnosed patients according to the National Health and Health Commission in the current period (the division of serious provinces and cities is based on the cumulative number of patients diagnosed by the National Health Commission of the People's Republic of China as of 15th March 2020.This data is timely updated).

The nationally recognized first-tier cities, including Beijing, Shanghai, and Guangdong, were considered to have high risks during the epidemic because of their large populations and significant flows of people. Other provinces and cities were believed to have a stable epidemic situation.

**Mental health evaluation.** The research team also evaluated participants' mental health conditions related to anxiety and depression using the seven-item Generalized Anxiety Disorder Scale (GAD-7)[19] and the Center for Epidemiological Studies Depression Scale (CES-D),[20] respectively.

***GAD-7.***[19] The scale examines the frequency of each of the seven central symptoms of generalized anxiety disorder, evaluated over the two weeks prior to the testing. Response options were: not at all = 0, several days = 1, more than half the days = 2, and nearly every day = 3. The GAD-7 scores range from 0 to 21, with ≥5, ≥10, and ≥15 representing mild, intermediate, and severe levels of anxiety symptoms.[21] Cronbach's α coefficient of this scale was 0.919.

***CES-D.***[20] The scale includes 20 items related to depressive symptoms, rated on a four-point scale from 0 to 3, where 0 = rarely or none of the time, 1 = some or a little of the time, 2 = occasionally or a moderate amount of time, and 3 = most or all the time. The score ranges from 0-60, and mental health practitioners typically employ a score of ≥16 to diagnose clinical depression.[22] Cronbach's α coefficient for this scale was 0.955.

**Survey analysis.** The contents of the questionnaire were automatically converted into Excel tables, which were sorted and analyzed by the author. For the methods of statistical analysis, see Statistical Analysis for details.

### Outcome Measures

The research team divide the investigation of employment intention into four independent questions and the options for the answers into two categories. The first question related to the epidemic's impact on participants' job-search intentions, and the responses were no impact or have impact. The other questions related to participants' willingness: (1) to choose clinical work or basic research after graduation; (2) to participate in an epidemic-related subspecialty after graduation, such as work in an infection department, respiratory department, or critical illness or emergency department; and (3) to perform epidemic-related work, such as work in isolation wards or as volunteers in Wuhan. The options for the answers to those three questions were willing or unwilling.

### Statistical Analysis

The research team analyzed the data using SPSS 23.0 (IBM, Armonk, NY, USA). The team: (1) described the study's categorical variables using frequencies and percentages, (2) expressed the continuous values as medians—interquartile ranges [IQRs], (3) assessed the reliability of related variables using Cronbach α, (4) employed a Chi-Square test to determine if a significant association existed between categorical variables, and (5) entered continuous data and categorical variables for which $P < .05$ in the univariate analysis, into a multivariate logistic regression analysis to explore factors influencing employment intention. A two-sided $P < .05$ was considered to be statistically significant.

## RESULTS

### Participants

The research team sent questionnaires to and received completed questionnaires from 1163 medical students. The team excluded 49 questionnaires from analysis due to the inadequate information that the respondents had provided, including about their degrees. The research team included 1114 participants in the study and statistically analyzed their data (Table 1).

**Table 1.** Participants' Demographic Characteristics According to the Survey (N = 1114)

| Characteristics | n (%) Quartile P50 (P25;P75) |
|---|---|
| Gender | |
| Male | 393 (35.28) |
| Female | 721 (64.72) |
| Degree | |
| Undergraduate | 602 (54.04) |
| Bachelor's degree | 337 (30.25) |
| Postgraduate | 175 (15.71) |
| Current Educational Status | |
| College students—Clinical medicine | 391 (35.10) |
| College students—Nursing | 211 (18.94) |
| Medical interns | 512 (45.96) |
| Region | |
| With severe epidemic or high risk | 838 (75.22) |
| With stable epidemic | 276 (24.78) |
| GAD-7 Score | 2 (0; 5) |
| CES-D score | 3 (0; 11) |

**Abbreviations:** CES-D, Center for Epidemiological Studies Depression Scale; GAD-7, Generalized Anxiety Disorder Scale -7.

**Table 2.** Impact on Medical Students' Employment Intention, Using the Chi-square Test and Logistic Regression Analysis (N = 1114)

| | Chi-square Test | | | Logistic Regression Analysis | |
|---|---|---|---|---|---|
| **Independent Variable** | **No Impact n = 636 n (%)** | **Impact n = 478 n (%)** | ***P* value** | **OR (95%CI)** | ***P* value** |
| Gender | | | | | |
| Male | 225 (35.38) | 168 (35.15) | .950 | | |
| Female | 411 (64.62) | 310 (64.85) | | | |
| Degree | | | | | |
| Undergraduate | 359 (56.45) | 243 (50.84) | .156 | | |
| Bachelor's degree | 185 (29.09) | 152 (31.80) | | | |
| Postgraduate | 92 (14.46) | 83 (17.36) | | | |
| Current Educational Status | | | | | |
| College students—Clinical medicine | 256 (40.25) | 135 (28.24) | <.001[a] | Reference group | |
| College students—Nursing | 103 (16.20) | 108 (22.59) | | 1.67 (1.17-2.39) | .005[b] |
| Medical interns | 277 (43.55) | 235 (49.17) | | 1.57 (1.18-2.08) | .002[b] |
| Region | | | | | |
| With severe epidemic or high risk | 472 (74.21) | 366 (76.57) | .400 | | |
| With stable epidemic | 164 (25.79) | 112 (23.43) | | | |
| GAD-7 Score | | | | 1.08 (1.02-1.13) | .004[b] |
| CES-D Score | | | | 1.03 (1.01-1.05) | .002[b] |

[a]$P < .05$, indicating based on the Chi-square test that participants' educational statuses had a significant impact on employment intention

[b]$P < .05$, indicating based on the logistic regression analysis that participants' educational statuses, GAD-7 scores, and CES-D scores had a significant impact on employment intention

**Abbreviations:** CES-D, Center for Epidemiological Studies Depression Scale; GAD-7, Generalized Anxiety Disorder Scale-7.

Of the 1114 medical students: (1) 393 were male (35.28%), and 721 were female (64.72%); (2) 602 were undergraduate students (54.04%), 337 had a bachelor's degree (30.25%), and 175 had postgraduate degrees (15.71%); (3) 391 were studying clinical medicine (35.10%), 211 were nursing students (18.94%), and 512 were hospital interns (45.96%); and (4) 838 were from provinces and cities with a severe or high risk of epidemic (75.22%), and 276 were from provinces and cities with stable and controlled epidemics. Respondents' anxiety levels, measured using GAD-7, revealed a sample quartile of 2 (0; 5) (P50 (P25, p75). The depression levels, measured by CES-D, showed a sample quartile of 3 (0; 11) (P50 (P25, p75).

## Impact on the Job Search

As Table 2 shows, the Chi-Square test revealed that participants' educational statuses had a significant impact on employment intention ($P < .001$). The test also showed that participant's genders, degrees, and regions didn't significantly impact employment intention ($P > .05$).

The multiple logistic regression analysis indicated that the factors influencing job intention during the epidemic were: (1) current educational status, with $P = 0.005$ for nursing students and $P = .002$ for medical interns; (2) score on the GAD-7, with OR = 1.08, 95% CI: 1.02-1.13, and $P = .004$; and (3) score on the CES-D, with OR = 1.03, 95% CI: 1.01-1.05, and $P = .002$.

The outbreak's impact on the job-search intentions of nursing students and medical interns was 1.67 and 1.57 times greater, respectively, than that on clinical-medicine students. For the nursing students, OR = 1.67, 95%CI: 1.17-2.39 and $P = .005$, and for the medical interns, OR = 1.57, 95% CI: 1.18-2.08 and $P = .002$.

## Clinical Work After Graduation

As Table 3 shows, based on the Chi-Square test, that 88.4% of the 1114 participants, 361 males and 624 females were willing to engage in clinical work, and the remaining 11.6% were willing to engage in scientific research work. Men were significantly more likely to pursue a clinical career after graduation than women ($P = .008$), and significant differences existed between participants working on different degrees ($P = .01$) and having different educational statuses ($P < .001$), but none existed between participants from different regions ($P > .05$).

Multiple logistic regression analysis indicated that female gender ($P = .041$), educational status as a nursing student ($P < .001$), and score on the CES-D (OR = 0.97, 95% CI: 0.94-1.00, and $P = .037$) were the key factors for choosing scientific

**Table 3.** Medical Students' Willingness to Choose Clinical Work, Using the Chi-square Test and Logistic Regression Analysis (N = 1114)

| | Chi-square Test | | | Logistic Regression Analysis | |
|---|---|---|---|---|---|
| **Independent variable** | **Unwilling n = 129(11.6%) n (%)** | **Willing n = 985(88.4%) n (%)** | ***P* value** | **OR (95%CI)** | ***P* value** |
| Gender | | | | | |
| Male | 32 (24.81%) | 361 (36.65%) | .008[a] | Reference group | |
| Female | 97 (75.19%) | 624 (63.35%) | | 0.63 (0.41-0.98) | .041[b] |
| Degree | | | | | |
| Undergraduate | 85 (65.89%) | 517 (52.49%) | .01[a] | Reference group | |
| Bachelor's degree | 31 (24.03%) | 306 (31.07%) | | 0.70 (0.41-1.22) | .209 |
| Postgraduate | 13 (10.08%) | 162 (16.44%) | | 0.87 (0.44-1.74) | .696 |
| Current Educational Status | | | | | |
| College students—Clinical medicine | 27 (20.93%) | 364 (36.95%) | <.001[a] | Reference group | |
| College students—Nursing | 58 (44.96%) | 153 (15.53%) | | 0.21 (0.13-0.35) | <.001[b] |
| Medical interns | 44 (34.11%) | 468 (47.52%) | | 0.87 (0.44-1.74) | .696 |
| Region | | | | | |
| With severe epidemic or high risk | 94 (72.87%) | 744 (75.53%) | .52 | | |
| With stable epidemic | 35 (27.13%) | 241 (24.47%) | | | |
| GAD-7 Score | | | | 1.05(0.98-1.14) | .190 |
| CES-D Score | | | | 0.97(0.94-1.00) | .037[b] |

[a]*P* < .05, indicating based on the Chi-square test that participants' genders, degrees, and current educational statuses made a significant differences in their willingness to choose clinical work
[b]*P* < .05, indicating based on the logistic regression analysis that female gender, educational status as a nursing student, and score on the CES-D made a significant difference in participants' willingness to choose clinical work

**Abbreviations:** CES-D, Center for Epidemiological Studies Depression Scale; GAD-7, Generalized Anxiety Disorder Scale-7.

**Table 4.** Medical Students' Willingness to Engage in Epidemic-related Subspecialty After Graduation, Using the Chi-square Test (N = 1114)

| | Infection Department | | | Respiratory Department | | | Critical Illness/ Emergency Department | | |
|---|---|---|---|---|---|---|---|---|---|
| **Variables** | **Willing n = 499 n (%)** | **Unwilling n = 615 n (%)** | ***P* value** | **Willing n = 462 n (%)** | **Unwilling n = 652 n (%)** | ***P* value** | **Willing n = 473 n (%)** | **Unwilling n = 641 n (%)** | ***P* value** |
| Gender | | | | | | | | | |
| Male | 180 (36.07) | 213 (34.63) | .617 | 163 (35.28) | 230 (35.28) | .999 | 172 (36.36) | 221 (34.48) | .515 |
| Female | 319 (63.93) | 402 (65.37) | | 299 (64.72) | 422 (64.72) | | 301 (63.64) | 420 (65.52) | |
| Degree | | | | | | | | | |
| Undergraduate | 344 (68.94) | 258 (41.95) | <.001[a] | 280 (60.60) | 322 (49.39) | <.001[a] | 271 (57.29) | 331 (51.64) | .072 |
| Bachelor's degree | 110 (22.05) | 227 (36.91) | | 128 (27.71) | 209 (32.06) | | 140 (29.60) | 197 (30.73) | |
| Postgraduate | 45 (9.01) | 130 (21.14) | | 54 (11.69) | 121 (18.55) | | 62 (13.11) | 113 (17.63) | |
| Current Educational Status | | | | | | | | | |
| College students—Clinical medicine | 259 (51.91) | 132 (21.46) | <.001[a] | 207 (44.81) | 184 (28.22) | <.001[a] | 212 (44.82) | 179 (27.93) | <.001[a] |
| College students—Nursing | 85 (17.03) | 126 (20.49) | | 73 (15.80) | 138 (21.17) | | 59 (12.47) | 152 (23.71) | |
| Medical interns | 155 (31.06) | 357 (58.05) | | 182 (39.39) | 330 (50.61) | | 202 (42.71) | 310 (48.36) | |
| Region | | | | | | | | | |
| With severe epidemic or high risk | 357 (71.54) | 481 (78.21) | .010[a] | 335 (72.51) | 503 (77.15) | .077 | 336 (71.04) | 502 (78.32) | .005[a] |
| With stable epidemic | 142 (28.46) | 134 (21.79) | | 127 (27.49) | 149 (22.85) | | 137 (28.96) | 139 (21.68) | |
| GAD-7 Score | | | | | | | | | |
| CES-D Score | | | | | | | | | |

[a]*P* < .05, indicating based on the Chi-Square test that participants' degrees, current educational statuses and region made a significant difference in their willingness to work in an infection department, participants' degrees and current educational statuses made a significant difference in their willingness to work in a respiratory department, and their current educational statuses and regions made a significant difference in their willingness to work in a critical illness or emergency department

**Abbreviations:** CES-D, Center for Epidemiological Studies Depression Scale; GAD-7, Generalized Anxiety Disorder Scale-7.

**Table 5.** Medical Students' Willingness to Engage in Epidemic-related Subspecialty After Graduation, Using Logistic Regression Analysis (N = 1114)

| | Infection Department | | Respiratory Department | | Critical Illness/ Emergency Department | |
|---|---|---|---|---|---|---|
| **Variables** | **OR (95%CI)** | ***P* value** | **OR (95%CI)** | ***P* value** | **OR (95%CI)** | ***P* value** |
| Degree | | | | | | |
| Undergraduate | Reference group | | Reference group | | | |
| Bachelor's degree | 0.25 (0.181-0.343) | <.001[a] | 0.54 (0.40-0.72) | <.001[a] | | |
| Postgraduate | 0.18 (0.12-0.27) | <.001[a] | 0.40 (0.27-0.58) | <.001[a] | | |
| Current Educational Status | | | | | | |
| College students—Clinical medicine | Reference group | | Reference group | | Reference group | |
| College students—Nursing | 0.34 (0.24-0.48) | <.001[a] | 0.46 (0.32-0.65) | <.001[a] | 0.32 (0.22-0.46) | <.001[a] |
| Medical interns | 0.18 (0.12-0.27) | <.001[a] | 0.41 (0.28-0.60) | <.001[a] | 0.59 (0.45-0.78) | <.001[a] |
| Region | | | | | | |
| With severe epidemic or high risk | Reference group | | | | Reference group | |
| With stable epidemic | 1.05 (0.78-1.41) | .742 | | | 1.41 (1.06-1.89) | .019[a] |
| GAD-7 Score | 1.00 (0.95-1.05) | .943 | 1.02 (0.97-1.07) | .560 | 1.01 (0.96-1.06) | .816 |
| CES-D Score | 1.01 (0.99-1.03) | .554 | 1.00 (0.98-1.02) | .830 | 1.01 (0.99-1.03) | .483 |

[a]$P < .05$, indicating based on the logistic regression analysis that participants' degrees and current educational statuses made a significant difference in their willingness to work in an infection or a respiratory department, and their current educational statuses and regions made a significant difference in their willingness to work in a critical illness or emergency department.

**Abbreviations:** CES-D, Center for Epidemiological Studies Depression Scale; GAD-7, Generalized Anxiety Disorder Scale-7.

research or clinical work. Women were 0.63 times as likely to choose clinical work as men, with OR = 0.63, 95%CI: 0.41-0.98, and $P = .041$. Nursing students were 0.21 times as likely to choose clinical work than clinical-medicine students, with OR = 0.21, 95% CI: 0.13-0.35, and $P < .001$.

### Epidemic-related Specialties After Graduation

**Infection departments.** Table 4 shows that 55.21% of medical students, 213 males and 402 females, were reluctant to work in infection departments. Statistically significant differences existed among participants based on degree ($P < .001$), current educational status ($P < .001$), and region ($P = .010$), but none existed for gender ($P > .05$).

The multiple logistic regression analysis (Table 5) showed that degree and educational status were key factors influencing medical students' willingness to work in infectious diseases after graduation. Participants with a bachelor's diploma were 0.25 times as likely to be willing to work in infectious diseases, with OR = 0.25, 95% CI: 0.18-0.34, and $P < .001$, and postgraduate students were 0.18 times as likely, with OR = 0.18, 95% CI: 0.12-0.27, and $P < .001$, than undergraduate students. Nursing students were 0.34 times as likely to be willing to work in infectious diseases, with OR = 0.34, 95% CI: 0.24-0.48, and $P < .001$, and medical interns were 0.18 times as likely, with OR = 0.18, 95% CI: 0.12-0.27, and $P < .001$, than clinical-medicine students.

**Respiratory department.** Table 4 also shows that 58.53% of medical students, 230 males and 422 females, were reluctant to work in a respiratory department, but significant differences existed based on degree ($P < .001$) and current educational status ($P < .001$), but none existed for gender or region (both $P > .05$).

Compared with undergraduate students (Table 5), students with a bachelor's degree were 0.54 times as likely to be willing to work in a respiratory department, with OR = 0.54, 95% CI: 0.40-0.72, and $P < .001$, and postgraduate students were 0.40 times as likely, with OR = 0.40, 95% CI: 0.27-0.58, and $P < .001$. Compared with clinical-medicine students, nursing students were 0.46 times as likely to be willing to work in a respiratory department, with OR = 0.46, 95% CI: 0.32-0.65, and $P < .001$, and medical interns were 0.41 times as likely, with OR = 0.41, 95% CI: 0.28-0.60, $P < .001$.

**Critical illness or emergency department.** Table 4 also shows that 57.54% of medical students, 221 males and 420 females, were unwilling to specialize in a critical illness or emergency department. Significant differences existed based on current educational status ($P < .001$) and region ($P = .005$) but none existed for gender or degree (both $P > .05$). Students from regions with severe epidemics or high risks were less willing to work in critical illness or emergency departments than those from stable epidemic regions.

Table 5 also shows that current educational status and region were also significant factors in participants' willingness to work in a critical illness or emergency department. Compared with clinical-medicine students, nursing students were 0.32 times as likely to be willing to work in a critical illness or emergency department, with OR = 0.32, 95% CI: 0.22-0.46, and $P < .001$, and medical interns were 0.59 times a likely, with OR = 0.59, 95% CI: 0.45-0.78, and $P < .001$. Compared with students from regions with severe epidemics or high risks, those from regions with a stable epidemic were 1.41 times as likely to be willing to work in a critical illness or emergency department, with OR = 1.41, 95% CI: 1.06-1.89, and $P < .001$.

**Table 6.** Medical Students' Willingness to Participate in Epidemic-related Work, Using the Chi-square Test and Logistic Regression Analysis (N = 1114)

| | Work in Isolation Wards | | | | | Going to Wuhan as Volunteers | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Chi-square Test | | | Logistic Regression | | Chi-square Test | | | Logistic Regression | |
| Variables | Willing n = 895 n (%) | Unwilling n = 219 n (%) | *P* value | OR (95%CI) | *P* value | Willing n = 908 n (%) | Unwilling n = 206 n (%) | *P* value | OR (95%CI) | *P* value |
| Gender | | | | | | | | | | |
| Male | 311 (34.75) | 82 (37.44) | .455 | | | 314 (34.58) | 79 (38.35) | .307 | | |
| Female | 584 (65.25) | 137 (62.56) | | | | 594 (64.71) | 127 (61.65) | | | |
| Degree | | | | | | | | | | |
| Undergraduate | 483 (53.97) | 119 (54.34) | .011[a] | Reference group | | 495 (54.51) | 107 (51.94) | .011[a] | Reference group | |
| Bachelor's degree | 284 (31.73) | 53 (24.20) | | 0.65 (0.45-0.95) | 0.024[b] | 284 (31.28) | 53 (25.73) | | 0.75(0.52-1.09) | .134 |
| Postgraduate | 128 (14.30) | 47 (21.46) | | 1.34 (0.90-2.01) | 0.150 | 129 (14.21) | 46 (22.33) | | 1.50(1.00-2.26) | .052 |
| Current Educational Status | | | | | | | | | | |
| College students—Clinica medicine | 317 (35.42) | 74 (33.79) | .775 | | | 324 (35.68) | 87 (42.23) | .687 | | |
| College students—Nursing | 166 (18.55) | 45 (20.55) | | | | 171 (18.83) | 40 (19.42) | | | |
| Medical interns | 412 (46.03) | 100 (45.66) | | | | 413 (45.49) | 99 (48.06) | | | |
| Region | | | | | | | | | | |
| With severe epidemic or high risk | 657 (73.41) | 181 (82.65) | .005[a] | Reference group | | 666 (73.35) | 172 (83.50) | .002[a] | Reference group | |
| With stable epidemic | 238 (26.59) | 38 (17.35) | | 0.57 (0.38-0.84) | 0.005[b] | 242 (25.65) | 34 (16.50) | | 0.55 (0.37-0.83) | .004[b] |
| GAD-7 score | | | | 1.07 (1.01-1.13) | 0.032[b] | | | | 1.06 (1.00-1.12) | .055 |
| CES-D score | | | | 1.00 (0.97-1.02) | 0.787 | | | | 1.00(0.98-1.03) | .879 |

[a]$P < .05$, indicating based on the Chi-Square test that participants' degrees and regions made a significant difference in their willingness to work in isolation wards or to go to Wuhan as a volunteer.
[b]$P < .05$, indicating based on the logistic regression analysis that participants' degrees ,regions and GAD-7 score made a significant difference in their willingness to work in isolation wards and that participants' regions made a significant difference in their willingness to go to Wuhan as a volunteer

**Abbreviations:** CES-D, Center for Epidemiological Studies Depression Scale; GAD-7, Generalized Anxiety Disorder Scale-7.

### Work Related to the Epidemic

**Isolation wards.** Table 6 shows that 80.34% of medical students, 311 males and 584 females, were willing to work in isolation wards. Significant differences existed based on degree ($P = .011$) and region ($P = .005$), but no significant differences existed based on gender or current educational status (both $P > .05$).

Multiple logistic regression analysis revealed that degree, region, and GAD-7 score (OR = 1.07, 95% CI: 1.01-1.13, $P = .032$) were the critical factors determining willingness to work in isolation wards. Compared with undergraduate students, students with a bachelor's degree were 0.65 times as likely to be willing to work in isolation wards, with OR=0.65, 95% CI: 0.45-0.95, and $P = .024$. Students from stable-epidemic regions were 0.57 time as likely to be willing to work in isolation wards than those from regions with severe epidemics or high risks, with OR = 0.57, 95% CI: 0.38-0.84, and $P = .005$.

**Going to Wuhan as volunteers.** Table 6 shows that 81.51% of medical students, 314 males and 594 females, expressed their willingness to go to Wuhan as volunteers. Significant differences existed among the participants based on degree ($P = .011$) and region ($P = .002$), but no significant differences existed based on gender or current educational status (both $P > .05$). Compared with students from regions with severe epidemics or high risks, students from stable-epidemic regions were 0.55 times as likely to be willing to go to Wuhan as volunteers, with OR = 0.55, 95% CI: 0.37-0.83, and $P = .004$.

## DISCUSSION

The current study showed that the mental health status of medical students was good, without apparent anxiety or depression symptoms. However, mental health status did have some influence on participants' employment intentions. The current study was the first to analyze the relationship between mental state and job-search intention.

The current study found that the more anxious or depressed participants were, the more likely were they to think that the epidemic would affect their job-search intentions. At the same time, the more depressed the participants were, the more likely they were to choose medical work other than clinical work.

Similarly, mental anxiety could impact the willingness to participate in isolation wards, and the more anxious students were, the less likely they were to be willing to work in

isolation wards. Therefore, assisting medical students in improving their ability to cope with stress and reducing their risk of suffering from anxiety and depression during pandemics could play an important role in their job search after graduation.

Gender was one of the factors that affected participants' job search intentions during the epidemic. Compared with male medical students, more females were willing to choose basic research after graduation, and fewer were willing to choose clinical work. However, no significant differences existed between males and females in terms of whether the epidemic would affect their job-search intentions as well as their willingness to participate in an epidemic-related subspecialty after graduation or in epidemic-related work. This showed to a certain extent that in public-health emergencies, female medical students would also assume responsibility and wouldn't back down in the face of an epidemic.

The current survey also found that participants' degrees were another factor that affected their employment intention during the epidemic. Compared with clinical-medicine students, more nursing students and medical interns were willing to work in an infection department or respiratory department after graduation. Also, more participants with a bachelor's degree were ready to work in isolation wards during the pandemic.

Most medical students with a bachelor's degree have already entered clinical work, and their experience and knowledge during the epidemic could affect their intentions in seeking employment. In addition, clinical medicine has significant professional restrictions. Medical graduates may be affected by a traditional concept of employment, and the investment cost of medical education is high. Compared with undergraduates, medical students who have master's or doctorate degrees have spent more on their education. Thus, most medical graduates have higher expectations for their future work.

Yang et al's[17] findings that academic interests, competencies, and controllable lifestyles or flexible work schedules were the top three factors influencing job selection reflects the fact that medical graduates place more emphasis on the realization of self-value in unifying personal and social values. In the current study, the proportion of students with a bachelor's degree and postgraduate students who were willing to participate in an infection or respiratory department was significantly lower than that of undergraduate students. This embodies the higher expectations of the students with master's and doctoral degrees. Also, more students with a bachelor's degree were willing to work in isolation wards during the pandemic compared with undergraduate students. This shows that due to specific work experience, students with a bachelor's degree might have more extraordinary courage to challenge themselves and would be more interested in undertaking the work of isolation ward.

The current study also indicated that current educational status influenced medical students' employment intentions during the epidemic. Compared with clinical-medicine students, more nursing students thought that the epidemic would impact their job-search intentions. At the same time, fewer were willing to choose clinical work or participate in the infection, respiratory, or critical illness or emergency departments.

On the one hand, the nursing profession is complicated and challenging, and the time of direct contact with patients is longer. This can lead to a higher chance of dissatisfaction from patients compared to doctors. Similarly, compared with clinical-medicine students, more medical interns thought the epidemic would have an impact on their job-search intentions, and fewer medical interns were willing to participate in the infection, respiratory, or critical illness or emergency departments. This was because some medical interns worked on the front line of the fight against the virus, and they were immersed in or witnesses to the work in the isolation ward, and their feelings might have been more profound.

The participant's region was also one of the factors that affected medical students' employment intentions during the epidemic. Compared with students from severe epidemic or high-risk areas, those from stable epidemic regions were more willing to work in the critical illness or emergency department and more willing to work in isolation wards.

The current survey had some shortcomings. The research team selected only a few factors, including gender, degree, current educational status, and region, for analysis. The study didn't take into account the effects of economic conditions, family conditions, personalities, and other factors on the job-search intentions. The impact of an epidemic on the job search is multidimensional and may occur due to other individual and sociological factors.

The COVID-19 epidemic has affected the employment intention of Chinese medical students to some extent. Many factors, including mental status, gender, academic degree, current educational level, and geographical region, can impact employment intention. Therefore, medical students should be provided with practical strategies to improve their mental health. To help them cope with psychological stress, hospitals and medical institutions could provide psychological counseling for medical students.

Medical educators should attach importance to medical students' job-search intentions during an epidemic and prevent the loss of medical talent and should also alleviate the psychological pressure caused by the epidemic and the long-term impact on their job-search intentions. Moreover, improving the salary of physicians in related specialties and increasing employment opportunities would be beneficial in encouraging medical students to participate in specialties and work related to public-health events. Additionally, it is also necessary to insist on emphasizing the importance of professional ethics education.[23,24] In short, during public health emergencies, medical educators should pay attention to medical students' job-search intentions and conduct corresponding education and counseling based on factors such as mental status, gender, academic degree, current educational status, and geographical region.

## AUTHORS' DISCLOSURE STATEMENT

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## AUTHOR CONTRIBUTIONS

Xuan Long, Jie Zhang and Jia Chen contributed equally to this work.

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