

# Professional Identity of Chinese Medical Students During the COVID-19 Pandemic

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## Research article

**Keywords:** Professional identity, Career attitude, COVID-19, China, Medical students, Health emergency

**Posted Date:** January 14th, 2021

**DOI:** <https://doi.org/10.21203/rs.3.rs-144141/v1>

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# Abstract

**Background:** Although professional identity is a strong predictor of career choice, only a few studies report on career attitudes of medical students during a public health emergency. This study investigates the changes in medical students' professional identity and career attitude during the COVID-19 pandemic, evaluates their mental health and social support system under stress, and explores the relationship between their career attitude and other factors.

**Method:** An online survey of 6226 Chinese medical students was conducted to collect information on demographics, professional identity, and career attitudes. The collected data were assessed using the Patient Health Questionnaire, the Generalized Anxiety Disorder Scale, and the Social Support Rating Scale.

**Results:** The results revealed that most participants had their professional identity strengthened, did not change their career attitude, and preferred to participate in the frontline during the COVID-19 pandemic. Low social support, depressive symptoms, male gender, and senior year residency were factors that affected career attitude negatively.

**Conclusions:** After the outbreak of the pandemic, it was necessary to carry out diversified professional identity research to support medical students, especially those with low social support and depressive symptoms.

## Background

In December 2019, coronavirus pneumonia (COVID-19) broke out in Hubei province, China. On March 11, 2020, the World Health Organization (WHO) announced that COVID-19 was considered a global pandemic [1] that seriously threatened the health of people worldwide. In many countries, there was a serious shortage of medical workers because of numerous redundancies under this situation; consequently, retired doctors were recalled, and medical students were sent to fight against the pandemic. In China, more than 42,600 medical workers went to the most seriously affected areas to support medical work [2]. Many medical workers actively responded to the situation and became the core force that gained victory over the pandemic: they struggled at the forefront and were called heroes. In this sudden public health crisis, doctors highlighted the sense of value and honor of their professional spirit. As medical students constitute the reserve force of Chinese medicine, our investigation focused on assessing their professional attitudes, willingness to work as doctors, and their psychological conditions during the pandemic.

Under stressful situations, individuals have different emotional, cognitive, and behavioral responses. Stability of surrounding environment, personal susceptibility factors, psychological resilience, emotional regulation, coping style, and social support system affect individual's stress response. Additionally, an individual's cognitive evaluation of an event also affects their stress response [3]. The same holds true for stress response under the COVID-19 pandemic. The professional attitude of medical students is affected

by their cognitive evaluation of the situation, which, in turn, affects their emotional and behavioral response. Consequently, the stimulation of different emotions in medical students influences their career attitude and professional identity.

Professional identity is an individual's professional self-concept based on their beliefs, values, motives, attributes, and experiences [4]. It is derived from and perceived in terms of the role that individuals assume in their work. It is an important part of nurturing professionalism within medical students [5, 6] and is related to how strongly individuals identify with their chosen professions. Some scholars also pay attention to the formation and factors that influence medical students' professional identity [7–10]. For physicians-in-training, preliminary data suggest that good virtues in medical practice are associated with having a strong sense of professional identity [11]. Further, career attitude refers to the tendency of medical students to pursue the medical profession in the future; it is related to their professional identity.

Recently, studies in mainland China have gradually studied the professional identity of medical students. Previous studies have focused on the tense physician-patient relationship and violent injuries in China, which may have affected medical students' professional identity [12]. They have paid attention to the professional attitude of nursing staff [12]. Several intrinsic or extrinsic factors influence the professional identity of medical students, which either have a positive or a negative effect on it. Similarly, few previous studies have focused on the career attitude of medical students after public health emergencies. To the best of our knowledge, this study may be the largest survey on professional identity and career attitude of Chinese medical students after the outbreak of COVID-19. Therefore, this study has attempted to investigate the changes in medical students' professional identity and career attitude during the COVID-19 pandemic, evaluate their mental health and social support system under stress, and explore the relationship between their career attitude and other factors determining it.

## Methods

We used an online survey to conduct a cross-sectional study on the professional identity and mental health of medical students from February 11 to 19, 2020. The online survey was conducted through the Wenjuanxing platform (<https://www.wjx.cn/>). In total, 6318 participants took part in the survey. After excluding incomplete questionnaires and the ones that were completed in less than three minutes, 6226 participants from 31 provinces and autonomous regions were included in the analysis.

Approval for the study was obtained from the Ethics Committee of Beijing HuiLongGuan Hospital. All of the participants provided online informed consent to participate in the study.

The professional identity questionnaire was designed to evaluate acknowledged factors (professional cognition, professional emotion, professional commitment, professional behavior, professional achievement, and professional value) of professional identity after consulting the relevant literature [13], which were then combined with the characteristics of medical students. One item was selected from each of the six dimensions of medical students' professional identity scale [13], and a simple medical

students' professional identity scale (see Appendix A) was developed to evaluate professional identity. In this study, the Cronbach's  $\alpha$  was 0.857 and 0.890 before and after the pandemic, respectively.

Evaluation of career attitude was conducted by assessing medical students' attitude after the pandemic (the following question was asked: Did you change your career attitude after the pandemic? 1. unchanged; 2. enhanced; 3. weakened). According to the results, we divided medical students into three groups (unchanged group, enhanced group, and weakened group).

Depressive symptoms within 14 days were screened using the 9-item Patient Health Questionnaire (PHQ-9) [14], where each of the nine DSM-IV criteria were scored on a scale from 0 ("not at all") to 3 ("nearly every day"). Cronbach's  $\alpha$ , in this case, was 0.87.

Anxiety symptoms within 14 days were screened using the 7-item Generalized Anxiety Disorder Scale (GAD-7) [15], where items were rated from 0 ("not at all") to 3 ("nearly every day"). Cronbach's  $\alpha$ , in this case, was 0.92.

Social support was assessed using the Social Support Rating Scale (SSRS) [16]. A higher score indicated more social support. Final scores were categorized into three levels: "low," "medium," and "high."

The dataset was analyzed using SPSS version 24.0 (IBM SPSS, IBM Corp., Armonk, NY, USA). Chi-square test was used to compare the changes in career attitude of medical students under different demographic categories. Results obtained from GAD-7, PHQ-9, and SSRS for the three groups of Medical students were also compared. Rank sum test was used to analyze differences in dimensions of professional identity among the three groups of medical students before and after the pandemic. Further, multivariate disordered logic regression was used to analyze the factors influencing change in career attitude. The level of significance was set at 0.05 (two-sided).

## Results

A total of 6,226 full-time medical undergraduates aged between 18–27 completed the questionnaires. The median age of participants was 21 years, of which females accounted for 60.1%. The students came from all provincial regions of China except Macau, and 98.6% took the survey at home. A total of 79.0% of respondents revealed that they would like to participate in the frontline (Table 1).

Table 1  
Soci-demographic and clinical characteristics of the subjects (N = 6,226).

<b>Variables</b>	<b>n</b>	<b>%</b>
Gender		
Male	2,484	39.9
Female	3,742	60.1
Hometown		
Urban resident	2,213	35.5
Rural resident	4,013	64.5
Residential area		
Home	6,141	98.6
School	49	0.8
Forced isolation	12	0.2
Other	24	0.4
Grade		
1st year	1,875	30.1
2nd year	819	13.2
3rd year	784	12.6
4th year	1,331	21.4
5th year	1,417	22.8
2019-nCoV exposure		
No	5,727	92
Yes	499	0.8
Participate on the frontline		
Would like	4,917	79
Neutral	1,141	18.3
Would not like	168	2.7
	<b>Median</b>	<b>IQR</b>
Age	21	4

Variables	n	%
PHQ total scores	3	6
GAD total scores	1	4
SSRS total scores	36	9

As shown in Table 2, the number of participants who did not change their career attitude was 4989 (80.8%), while enhanced career attitudes accounted for 741 (11.9%) of the total respondents. Students whose career attitude was weakened totaled 496 (8.0%) in number. There were statistical differences among students from different academic years of medical school and hometowns.

Table 2  
The changes in career attitude among medical students with different soci-demographic characteristics (N = 6,226).

Variables	n (%)	Unchanged (n = 4,989)	Enhanced (n = 741)	Weakened (n = 496)	$\chi^2$	P
Gender					2.78	0.249
Male	2,484(39.9)	1,969	289	226		
Female	3,742(60.1)	3020	452	270		
Hometown					7.299	0.026
Urban resident	2,213(35.5)	1,763	248	202		
Rural resident	4,013(64.5)	3,226	493	494		
Grade					19.335	0.013
1st year	1,875(30.1)	1,494	243	138		
2nd year	819(13.2)	638	110	71		
3rd year	784(12.6)	605	104	75		
4th year	1,331(21.4)	1,083	150	98		
5th year	1,417(22.7)	1,169	134	114		
2019-nCoV exposure					0.564	0.754
No	5,727(92.0)	4,594	681	452		
Yes	499(0.8)	395	60	44		

Table 3 includes results that were obtained using the non-parametric Wilcoxon symbolic rank test. In the enhanced group, there was no significant difference in professional achievements before and after the pandemic ( $P = 0.494$ ), but for the rest of the groups, the difference was statistically significant. In the

weakened group, there were significant differences in professional cognition, commitment, achievement, and value.

Table 3  
The professional identity among medical students with different career attitudes before and after the pandemic (N = 6,226).

Variables	Career attitude			
		Unchanged	Enhanced	Weakened
Professional cognition	Z	-13.911	-8.026	-2.5
	P	0.000	0.000	0.012
Professional emotion	Z	-6.276	-6.633	-1.333
	P	0.000	0.000	0.182
Professional commitment	Z	-3.26	-7.994	-4.926
	P	0.000	0.000	0.000
Professional behavior	Z	-6.791	-7.852	-1.6
	P	0.000	0.000	0.110
Professional achievement	Z	-13.126	-0.685	-6.367
	P	0.000	0.494	0.000
Professional value	Z	-3.121	-6.598	-5.925
	P	0.002	0.000	0.000

Scores from GAD-7 and PHQ-9 tests were used to divide respondents into “anxiety group” and “depression group.” A Chi-square test showed that there were significant differences in anxiety, depression, and social support between the three groups of medical students with different career attitudes (summarized in Table 4).

Table 4

Depressive symptoms, anxiety symptoms and social support among medical students with different changes in career attitude (N = 6,226).

Changes of career attitude						
Variables	n	Unchanged	Enhanced	Weakened	$\chi^2$	<i>P</i>
Depressive symptoms					14.747	0.001
Yes	2,206	1,724	268	214		
No	4,020	3,264	473	282		
Anxiety symptoms					11.088	0.004
Yes	1,423	1,101	182	140		
No	4,803	3,888	559	356		
SSRS					31.063	0.000
Low	2,151	1,703	227	221		
Medium	2,146	1,731	257	158		
High	1,929	1,555	257	117		

We set the dependent variable of weakened, unchanged, and enhanced groups to 0, 1, and 2, respectively, and then performed ordered multivariate logic regression analysis. The parallel line hypothesis test showed that  $P < 0.05$ , which indicated that the data could not be analyzed using this method. Therefore, we conducted a disordered multivariate logic regression. The resultant chi-square value of the model was 139.49 ( $P < 0.001$ ), which indicated its statistical significance. The pseudo-R<sup>2</sup> of Nagelkerke was 0.031, which indicated that the model corresponded to a certain degree with the dependent variables. (refer to Table 5)

Table 5

Multivariate disordered logic regression of the factors associated with the changes in career attitude (N = 6,226).

Career attitude		B	SE	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
Enhanced	Intercept	-2.579	0.303	72.371	1	0			
	Gender								
	Male	-0.003	0.082	0.001	1	0.971	0.997	0.849	1.17
	Female	0b	.	.	0	.	.	.	.
	Grade								
	1st year	0.318	0.115	7.620	1	0.006	1.374	1.096	1.722
	2nd year	0.372	0.138	7.218	1	0.007	1.451	1.106	1.903
	3rd year	0.371	0.141	6.971	1	0.008	1.450	1.100	1.910
	4th year	0.189	0.127	2.227	1	0.136	1.208	0.943	1.548
	5th year	0b	.	.	0	.	.	.	.
	Depressive								
	No	-0.132	0.085	2.417	1	0.120	0.876	0.742	1.035
	Yes	0b	.	.	0	.	.	.	.
	SSRS								
	Low	-0.165	0.103	2.575	1	0.109	0.848	0.694	1.037
	Medium	-0.071	0.097	0.545	1	0.460	0.931	0.771	1.125
	High	0b	.	.	0	.	.	.	.
	Does your family support you to fight the epidemic								
	Strong support	1.014	0.298	11.573	1	0.001	2.755	1.537	4.941
	General support	0.656	0.289	5.136	1	0.023	1.927	1.093	3.399
	Neutrality	0.615	0.284	4.678	1	0.031	1.850	1.059	3.231
	Opposed	0.345	0.307	1.264	1	0.261	1.412	0.774	2.578

Career attitude	B	SE	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Strongly opposed	0b	.	.	0	.	.	.	.
Hometown								
Urban resident	-0.105	0.084	1.569	1	0.210	0.900	0.763	1.061
Rural resident	0b	.	.	0	.	.	.	.
Weakened	Intercept	-2.070	0.242	73.385	1	0		
Gender								
Male	0.225	0.096	5.456	1	0.020	1.252	1.037	1.513
Female	0b	.	.	0	.	.	.	.
Grade								
1st year	-0.002	0.134	0	1	0.986	0.998	0.767	1.298
2nd year	0.167	0.161	1.080	1	0.299	1.182	0.862	1.621
3rd year	0.269	0.159	2.875	1	0.090	1.309	0.959	1.786
4th year	-0.101	0.145	0.487	1	0.485	0.904	0.680	1.201
5th year	0b	.	.	0	.	.	.	.
Depressive								
No	-0.249	0.099	6.296	1	0.012	0.780	0.642	0.947
Yes	0b	.	.	0	.	.	.	.
SSRS								
Low	0.326	0.125	6.803	1	0.009	1.386	1.084	1.771
Medium	0.103	0.129	0.640	1	0.424	1.108	0.861	1.426
High	0b	.	.	0	.	.	.	.
Does your family support you to fight the epidemic								
Strong support	-1.116	0.277	16.173	1	0	0.328	0.190	0.564

Career attitude	B	SE	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
General support	-0.713	0.221	10.437	1	0.001	0.490	0.318	0.755
Neutrality	-0.440	0.204	4.665	1	0.031	0.644	0.432	0.960
Opposed	-0.008	0.220	0.001	1	0.970	0.992	0.644	1.527
Strongly opposed	0b	.	.	0	.	.	.	.
Hometown								
Urban resident	0.221	0.097	5.198	1	0.023	1.248	1.032	1.510
Rural resident	0b	.	.	0	.	.	.	.

Compared to subjects in the unchanged group, students in junior academic classes of medical school were more likely to enhance their career attitudes, wherein the attitude of freshmen were 1.374 times higher than that of fifth year students. Subjects whose family members strongly supported them in their fight against the pandemic were more likely to enhance their career attitude than those who were strongly opposed by their family members. The number of subjects who were strongly supported by their families was 2.755 times higher than those whose family members were strongly opposed.

Compared to subjects in the unchanged group, boys were more likely to weaken their career attitude than girls, and medical students with depression were more likely to weaken their attitude than those with high social support. Students who lived in cities were 1.248 times less likely to practice medicine than those living in rural areas. These results are summarized in Table 5.

## Discussion

Professional identity is an important factor for the development of medical education and practice, and the transformation of medical students' professional identity is at the core of medical education [17]. Those who possess strong professional identity are more likely to be connected to their line of work and find a greater sense of purpose in life through it [18]. In addition, medical students' career attitude is influenced by their cognition, attitude, and evaluation of their future career. This is a dynamic process of formation and evolution of professional identity, which continues to operate throughout the career of medical students.

This study found that most of the medical students were not only willing but also eager to continue practicing medicine. This result was similar to that of a previous study, which concluded that nursing

students' professional identity was enhanced after the outbreak of SARS in Hong Kong, China [19]. This proves that medical students' professional identity enhanced in varying degrees during this epidemic. The performance of medical students in the unchanged career attitude group was more prominent, which might be related to their motivation to study medicine. The professionalism of medical staff during the epidemic may also have been an inspiration. Some scholars [20, 21] found that the role of models and mentors had a significant impact on the professional identity of medical students. Passi [22] also indicated that positive role-modeling by doctors effectively enhanced the transformation of a student into a doctor. In this study, 79.0% students were likely to engage in the "battle" against the virus. This could be regarded as their "post-traumatic growth," which suggested that exposure to critical events could lead to opportunities for growth [23].

This study also found that medical students with depression were more likely to weaken their attitude toward medicine, which might be due to a sense of uncertainty about themselves. Previous studies [24, 25] showed that depression was one of the most common health problems among university students, especially among medical students who endured heavy financial burden and study-induced stress [26]. The mental health of these medical students could be a predisposing factor causing burnout during residency or postgraduate training [27]. It might also affect their choice of future careers.

Similarly, it was found that strong social support helped enhance medical students' career attitude. This study also established that the attitude of medical students' family members toward fighting the epidemic also affected the students' attitude toward medical practice. Generally speaking, people with high social support had better resources; they could get further support and help from the working environment and were more likely to solve problems and difficulties. As a resource available to individuals, social support played an intermediary role in the face of stress, and those with good social support could cope better with it [28]. The availability of social support reduced the odds of mental distress for those who perceived it [29]. The degree of social support was found to be negatively correlated with anxiety and depression of residents [26]. Students who lived alone or had bad relationships with their partners, classmates, or friends scored higher on the depression and anxiety scale. Thus, for medical students under stress due to a public health emergency, good social support was more conducive to better psychological state and encouraged them to continue to engage in the medical profession.

In addition, junior students were more likely to strengthen their attitude toward medicine than senior students. Furthermore, previous studies showed that the professional identity of medical students decreased over time [30, 31]. Iqbal [32] also indicated that senior students were more depressed with a poorer mental health status. The reasons might be that senior students dealt with higher levels of stress [33], were affected by heavy academic tasks, and encountered setbacks in clinical internship. On the other hand, junior medical students had just entered medical colleges and had not yet completely started the study of clinical medicine; thus, they expected much from themselves.

Boys and students from cities were more likely to weaken their attitude toward medicine. Some previous studies [30, 31, 34] concluded that girls were observed to report stronger identification than boys. This might be related to the fact that boys and students from cities bore more social responsibilities and economic pressure [35, 36] or that boys encountered more negative life events and received less social support. Conversely, some studies [36] showed that female physicians had lower rates of employment and lower value in terms of career success than male physicians after graduation [37].

## Conclusions

The COVID-19 pandemic not only effected a crisis but also reconstructed the professional identity of medical students. After such a crisis, some medical students' professional identity was enhanced, and they were prouder of the profession that they had chosen to pursue. However, as seen above, this was not the case for all medical students. It could be concluded that this is an appropriate time to nurture professional identity of medical students, that is, after the COVID-19 pandemic. The utilization of social support by medical students could be strengthened through group-coaching, which is an effective method of support [38].

The most important advantage of this study was that it conducted the largest survey of professional identity and career attitudes of medical students during the COVID-19 pandemic. Simultaneously, this study discussed the demographic factors of people with different career attitudes in depth and assessed the related factor of mental health status. Further research in the field should focus on ways to improve medical students' mental health and enhance their professional identity.

However, there were several restrictions to this study. First, cases were recruited using convenience sampling. We could not weigh this sample to increase representativeness because statistics on national medical students were not available. Second, medical students reported their professional identity before the outbreak, and retrospective study might cause recall biases. Finally, although the data collection process was anonymous, online surveys could not verify the identity of respondents, and self-reporting might have been accompanied by personal biases.

## Abbreviations

COVID-19: coronavirus pneumonia; WHO: the World Health Organization;

PHQ-9: Health Questionnaire; GAD-7: Anxiety Disorder Scale; SSRS: Social Support Rating Scale.

## Declarations

### Acknowledgements

The authors thank JH for his generous contributions to the project. We would like to thank Editage ([www.editage.cn](http://www.editage.cn)) for English language editing.

## Authors' Contributions

JC and XY conceived of the study. JC, XY and LG designed the methodology, interpreted the results; LZ<sup>2</sup> analyzed the data, SZ, LZ<sup>1</sup> and MQ have contributed to data collection. Each author has made substantial contributions to the conception and design of the work; or the acquisition, analysis, or interpretation of data; or revised it to have approved the submitted version. All authors have agreed to be personally accountable for the author's own contributions and to ensure that questions related to the accuracy or integrity of any part of the work are appropriately investigated, resolved, and the resolution documented in the literature.

## Funding

Data collection was supported by Capital Foundation of Medicine Research and Development (Grant number: 2018-3-2132) and the Special Foundation of Beijing Municipal Science & Technology Commission (Grant number: Z171100001017001). The funding body played no part in the design, conduct or reporting of the research.

## Availability of Data and Materials

Data may be available by request submitted to the corresponding author.

## Ethics Approval and Consent to Participate

Ethics Committee of Beijing HuiLongGuan Hospital approved the study (2020-05)

## Consent for Publication

Not applicable.

## Competing Interests

The authors declare that they have no competing interests.

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