Original Article
Good adaptability of freshmen in medical universities under the Coronavirus 2019 pandemic: a questionnaire-based single center study in China

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Abstract: Objective: To investigate the adaptability of freshmen in medical universities to the Coronavirus Disease 2019 (COVID-19) pandemic and to understand the relevant factors affecting their adaptation in medical university. Methods: Freshmen in a medical university in Guangdong Province were selected and surveyed using a self-administered general questionnaire and a college student adjustment scale prepared by Fang Xiaoyi et al. The results were analyzed statistically. Results: A total of 741 questionnaires were collected and 736 valid questionnaires were recovered. The adaptation level of freshmen in the medical university was moderately high. There were no differences in gender, age, family geographical location, or higher education level, but there were significant differences in major, type of household, only children (yes/no), and voluntary enrollment in medicine (yes/no). The survey showed that 30.3% of the students had discomfort at the beginning of the semester, 92.5% chose medical university voluntarily, and 83.4% expressed their enhanced motivation to study medicine after the COVID-19 outbreak, but 65.1% exhibited influence in study and life caused by COVID-19, which were statistically significant factors affecting the adaptation score. Conclusions: Freshmen in the medical university are generally well-adjusted with many influencing factors. Medical schools should strengthen adaptability management in order to timely identify the adaptation challenges of the students.

Keywords: Adaptation, college freshmen, medical university, COVID-19

Introduction

Studies have shown that college students are in their formative years and are more likely to develop mental health problems [1, 2]. Li investigated 1,676 college students and concluded that the prevalence of panic and health anxiety in them were 17.2% and 24.3%, respectively [3]. Previous research has categorized college students' adjustment challenges into nine variables, namely depression, anxiety, substance abuse, suicidal tendencies, family problems, self-esteem problems, interpersonal problems, academic problems, and career problems [4]. Rodgers classified the adjustment into the following six variables: academic adjustment, social adjustment, sleep adjustment, physical health adjustment, emotional adjustment, and behavioral adjustment [5]. According to Birch,

school adjustment can be divided into dimensions such as school avoidance, class participation, academic behaviors, school preferences, and self-direction, concluding that school adjustment is the ability to participate happily in various activities and to finish school with guidance [6]. Huebner measured career adjustment using developmental expectations, interpersonal competencies, and self-efficacy as indicators and demonstrated the importance of developing interpersonal adjustment skills in college freshmen [7].

Coronavirus 2019 (COVID-19) is considered one of the greatest challenges to humanity since World War II [8]. Experts have pointed out that in addition to the physical damage caused by the COVID-19 pandemic, mental health is also at risk [9, 10]. As COVID-19 continues to

spread globally, the incidence of psychological problems has been increasing, influencing not just patients and healthcare workers [11]. Son reported that 71% of college students reported increased stress and anxiety due to the outbreak of COVID-19. Of those, 91% were worried about the health of their own and their kinsfolk, 89% had difficulty concentrating, 86% experienced disrupted sleep patterns, 86% perceived reduced social interaction due to social distancing, and 82% became increasingly focused on academic performance [12].

Due to the strong infectivity and rapid propagation speed of COVID-19, many universities have to reduce the frequency of students going out to ensure their safety. During this period, students need to deal with various problems, and may experience conflict, exclusion, adaptation and integration to varying degrees. In this process, college students are more prone to psychological problems. It has been reported that the prevalence of depressive symptoms among Chinese college students was relatively high during the COVID-19 outbreak [8].

Medical students tended to have a heavier academic load than students from other majors, especially during the COVID-19 pandemic. Whether the pandemic causes differences in the learning, life and professional identity of medical students and how they adapt to the situation deserves attention. Linango-Naranjo reported that medical students experienced a decrease in their overall health and personal health dimensions, as well as an increase in anxiety and depression during and before the COVID-19 pandemic [13]. Lyons reported the poor mental health of medical students in Australia and found that 68% of students reported a deterioration in their mental health since the outbreak of COVID-19 [14]. Ifrah Naaz reported that freshmen in medical universities scored significantly higher than other students on measures of fear and anger [15].

In China, the adaptation of medical students during the COVID-19 pandemic is not clear. In view of this, the freshmen in a medical university in Guangdong province enrolled in 2021 were selected as research participants, and a questionnaire survey was employed to analyze their adaptability and the influencing factors, so as to timely discover the psychological adaptation problems of medical university freshmen.

Methods

Research participants

This research adopted the method of cluster random sampling, and carried out a questionnaire survey among the freshmen enrolled in a medical university in Guangdong Province in 2021 under unified guidance. The survey subjects included students majoring in clinical medicine, pediatrics, imaging medicine, anesthesiology, nursing, and midwifery. Inclusion criterion: Freshmen who were able to understand the questionnaire and willing to cooperate. Exclusion criterion: Those with unwillingness to cooperate. The study was approved by the ethics committee of The First Clinical Medical College, Guangdong Medical University.

Research tools

This study was conducted using an online questionnaire survey tool. A Medical College Life Adaptability Questionnaire in the context of COVID-19 in 2021 was generated based on the Chinese College Student Adjustment Scale (CCSAS) developed by Fang [16]. The survey contents covered general information of participants and the CCSAS. The CCSAS consists of 60 items in 7 dimensions (interpersonal adaptation, study adaptation, campus life adaptation, career choice adaptation, emotional adaptation, self-adaptation, and satisfaction). The items are listed on a 5-point scale ranging from "absolutely disagree" to "absolutely agree". A higher score indicates better adaptation status. The correlation coefficient between each dimension of the questionnaire and the total score was 0.77-0.89, suggesting a high correlation. The overall Cronbach alpha coefficient of the questionnaire was 0.954 (>0.9), and the structural validity analysis yielded a Kaiser-Meyer-Olkin (KMO) value of 0.961 (>0.8), while the Bartlett sphericity test showed a P<0.001, indicating high reliability and validity of the questionnaire. See **Figure 1** for details.

Research process

The questionnaire was given on a class-based manner one month after their enrollment in college. Before the distribution, students were given unified instructions and were asked to complete the surveys independently.
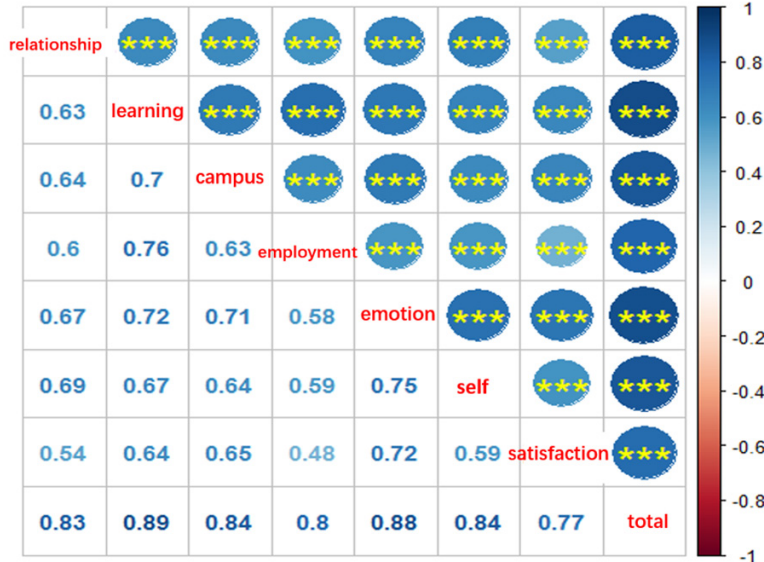
Figure 1. The correlation matrix between adaptability of each dimension and the total score of the questionnaire.

Data processing

The exported data were double-checked to remove invalid information. Statistical analysis was carried out by R software. For general situation and scale evaluation, the descriptive analysis method was used for statistics; quantitative data in a normal distribution were described by X ± SD, or median, upper, and lower quartiles were used otherwise; qualitative data were described as percentage and constituent ratio. For the analysis of differences in adaptability with different demographic characteristics, the single-sample t test was performed for binary data. Homogeneity test of variance was performed for multiple groups of ordered and multi-classification data (study majors, study in different middle schools, etc.). Analysis of variance was used for data that met the conditions of variance analysis. Logarithmic transformation was used for data with uneven variances, and Kruskal-Wallis H nonparametric test was used for data with uneven variances after transformation. Factors influencing freshmen's adaptability were analyzed by multiple linear stepwise regression. P<0.05 (two-tailed) indicated a significant difference.

Results

General data

Of the 741 questionnaires collected, 736 valid ones were included for analysis after eliminat-

ing those with incomplete data or incorrect information, with an effective rate of 99.3%. The age ranged from 17 to 21 years, with an average of 18.67 ± 0.71 years. There were 362 male students (49.2%) and 374 female students (50.8%) returned the questionnaire. The general demographic characteristics of the respondents are shown in **Table 1**.

Overall adaptability of students

In terms of the overall adaptability score, the highest score was 5.0 and the lowest was 1.93, with a mean of 3.50 ± 0.53. The upper and lower quad figures were 3.12 and 3.83, respectively, with a median of 3.48. See **Table 2** for details.

Analysis of adjustment scores of medical freshmen with different demographic characteristics

There was no statistically significant difference between freshmen at different ages in terms of overall adjustment and dimensions. Male students scored higher than female students in terms of satisfaction, but there was no significant difference in overall adjustment and other dimensions. There was no significant difference in independent living history before college (yes/no) and living on campus (yes/no). However, only children scored higher than non-only children in all dimensions. Urban students scored higher than rural students in general adjustment and dimensions. See **Table 3** for details.

Analysis of differences in adaptability among medical students of different majors

There were statistical differences in the scores of overall adaptability, learning adaptation, and self-adaptation among freshmen in different majors. In terms of overall adaptability, students majoring in midwifery scored the lowest, followed by nursing, and students majoring in clinical medicine had the highest score, followed by anesthesia. However, pairwise com-

Table 1. General demographic characteristics of the respondents (N = 736)

General condition	Population (n)	Proportion (%)	General condition	Population (n)	Proportion (%)
Gender			Whether the only child in family		
Male	362	49.2	Yes	163	22.1
Female	374	50.8	No	573	77.9
Age (years of age)			The area where the family is located		
≤18	337	45.8	Within Guangdong province	622	84.5
>18	399	54.2	Outside Guangdong province	114	15.5
			Type of registered permanent residence		
Major			Countryside	323	43.9
Clinic medicine	372	50.5	cities and towns	413	56.1
pediatrics	136	18.5	Type of middle school		
Imaging Medicine	105	14.3	Key or Model High School (Public)	315	42.8
anesthesiology	69	9.4	Regular High School (public)	364	49.5
Nursing	23	3.1	Private High School	57	7.7
midwifery	31	4.2	Mode of learning in middle school		
Whether it is the own will to apply for medical schools			living on campus	617	83.8
Yes	681	92.5	Without living on campus	119	16.2
No	55	7.5	Whether working as a student cadre in the middle school		
Whether COVID-19 increased the motivation to study medicine			Yes	452	61.4
Yes	614	83.4	No	284	38.6
No	122	16.6	Whether lived independently before enrolling university		
Whether the control of the COVID-19 outbreak has brought trouble			Yes	406	55.2
Yes	479	65.1	No	330	44.8
No	257	34.9	The aspects that have not been adapted to so far		
Whether there was discomfort at the beginning of the term			None	225	30.6
Yes	223	30.3	School mode and state	323	43.9
No	513	69.7	Diet	115	15.6
			Other	73	9.9

Note: COVID-19, Coronavirus 2019.

Table 2. Overall adaptability score of college students

Dimension	N	Min	Max	Mean	SD
Interpersonal adaptability	736	1.20	5.00	3.39	0.65
Learning adaptability	736	2.00	5.00	3.61	0.61
Campus adaptability	736	1.50	5.00	3.58	0.63
Career adaptability	736	1.89	5.00	3.60	0.57
Emotional adaptation	736	1.44	5.00	3.53	0.63
Self adaptation	736	1.63	5.00	3.38	0.66
Degree of satisfaction	736	1.20	5.00	3.34	0.75
Overall adaptability	736	1.93	5.00	3.50	0.53

Table 3. Whether being an only child and types of household registration affect the adaptability score of medical freshmen

Dimension	Only child		P value	Type of household registration		P value
	Yes	No		Cities and towns	Countryside	
Interpersonal adaptability	3.70 ± 0.56	3.58 ± 0.62	0.013	3.69 ± 0.61	3.53 ± 0.60	<0.001
Learning adaptability	3.68 ± 0.59	3.55 ± 0.63	0.028	3.69 ± 0.62	3.49 ± 0.62	<0.001
Campus adaptability	3.71 ± 0.56	3.57 ± 0.57	0.023	3.69 ± 0.60	3.53 ± 0.54	<0.001
Career adaptability	3.56 ± 0.59	3.51 ± 0.64	0.007	3.59 ± 0.63	3.47 ± 0.62	0.015
Emotional adaptation	3.43 ± 0.63	3.37 ± 0.67	0.377	3.45 ± 0.68	3.33± 0.65	0.025
Self adaptation	3.42 ± 0.74	3.31 ± 0.75	0.345	3.44 ± 0.72	3.26 ± 0.75	0.001
Degree of satisfaction	3.58 ± 0.49	3.48 ± 0.54	0.111	3.59 ± 0.54	3.43 ± 0.52	<0.001
Overall adaptability	3.50 ± 0.65	3.36 ± 0.65	0.024	3.50 ± 0.66	3.30 ± 0.62	<0.001

Table 4. Adaptability score of medical students of different majors

Dimension	Clinic medicine	Pediatrics	Imaging Medicine	Anaesthesiology	Nursing	Midwifery	P value
Interpersonal adaptability	3.45 ± 0.66	3.31 ± 0.64	3.31 ± 0.61	3.43 ± 0.69	3.32 ± 0.65	3.29 ± 0.55	0.192
Learning adaptability	3.68 ± 0.63	3.48 ± 0.58	3.64 ± 0.56	3.63 ± 0.59	3.34 ± 0.64	3.35 ± 0.51	0.001
Campus adaptability	3.58 ± 0.65	3.56 ± 0.61	3.63 ± 0.58	3.68 ± 0.59	3.47± 0.61	3.36 ± 0.63	0.222
Career adaptability	3.64 ± 0.59	3.52 ± 0.54	3.61 ± 0.55	3.69 ± 0.57	3.53 ± 0.52	3.39 ± 0.50	0.058
Emotional adaptation	3.57 ± 0.63	3.43 ± 0.62	3.55 ± 0.63	3.53 ± 0.62	3.52 ± 0.66	3.31 ± 0.62	0.124
Self adaptation	3.46 ± 0.67	3.29 ± 0.60	3.33 ± 0.69	3.45 ± 0.63	3.23 ± 0.63	2.98 ± 0.64	0.001
Degree of satisfaction	3.40 ± 0.77	3.25 ± 0.72	3.31 ± 0.65	3.30 ± 0.75	3.47 ± 0.78	3.34 ± 0.75	0.118
Overall adaptability	3.55 ± 0.55	3.42 ± 0.50	3.50 ± 0.50	3.54 ± 0.52	3.41 ± 0.49	3.27 ± 0.46	0.017

parison showed that there was no significance in overall adaptability across majors. In learning adaptation, there was no significant difference between nursing and midwifery freshmen, nor among anesthesiology, clinical medicine, pediatrics or imaging medicine students. Nursing and midwifery students scored significantly lower than students in the other four majors, but there was no difference between other groups. See **Table 4** for details.

Analysis of adaptability scores of class cadre and non-class cadre medical freshmen

The results showed that except for the satisfaction dimension, students who were class cad-

res in secondary school had significant higher scores in all dimensions and overall adaptability than those who had not been class cadres. See **Table 5** for details.

Analysis of differences in adjustment scores among medical students who entered college with or without discomfort and whether they enrolled in medical school voluntarily

It was found that 223 (30.3%) freshmen included in this study had discomfort at the beginning of the school year and 55 (7.5%) were not voluntarily enrolled in medical school. Students with discomfort at the beginning of the school year scored lower in overall adjustment and all

Table 5. Analysis of adaptability scores of medical freshmen with or without an experience as of a class cadre

Dimension	Yes	No	P value
Interpersonal adaptability	3.46 ± 0.64	3.27 ± 0.65	<0.001
Learning adaptability	3.66 ± 0.59	3.52 ± 0.64	0.002
Campus adaptability	3.62 ± 0.62	3.50 ± 0.62	0.017
Career adaptability	3.66 ± 0.57	3.52 ± 0.55	0.001
Emotional adaptation	3.57 ± 0.60	3.45 ± 0.67	0.016
Self adaptation	3.43 ± 0.66	3.31 ± 0.67	0.011
Degree of satisfaction	3.38 ± 0.73	3.28 ± 0.77	0.082
Overall adaptability	3.55 ± 0.52	3.41 ± 0.55	0.001

dimensions than those without discomfort. Students who were willing to be enrolled in medical school scored significantly higher in terms of overall adjustment and each dimension than those with unwillingness to enroll. See **Table 6** for details.

Analysis of adaptability score differences among medical students who reported that COVID-19 had enhanced their motivation to study medicine and whether it had caused problems

In this research, 614 (83.4%) students reported that COVID-19 had enhanced their motivation to study medicine, and 479 (65.1%) reported troubles caused by the control measures of COVID-19. Students who believed that COVID-19 had motivated them to engage in medicine scored higher in overall adaptation and all dimensions than those who denied it (P<0.001). In addition to the interpersonal relationship score, students who felt that the control measures had brought troubles to them had lower scores in the overall adaptation and other dimensions, with significant differences. See **Table 7** for details.

Analysis of adaptability scores among medical students with or without discomfort after a period of university life

225 (30.6%) students reported no discomfort after a period of university life, 323 (43.9%) thought that they were not adapted to the learning mode and state, 115 (15.6%) were not adapted to their diet, and 73 students (9.9%) had discomfort in climate, interpersonal relationship, or cultural customs. The results showed that after a period of university life, the overall adaptation and scores of all dimensions

of students without discomfort were higher than those with discomfort in learning and diet, with significant differences (P<0.001). See **Table 8** for details.

Analysis on influencing factors of overall adaptability in medical college students

Variables with statistical significance (P<0.05) were included in the stepwise multiple linear regression analysis. The type of household registration, student cadres in secondary school (yes/no), willingness to enroll in medical school (yes/no), increased motivation to study medicine since COVID-19 (yes/no), discomfort so far, and the geographical region of the family were factors significantly affecting the interpersonal adaptation ability of medical students under COVID-19 (P<0.05). The type of household registration, student cadres in secondary school (yes/no), willingness to enroll in medical school (yes/no), increased motivation to study medicine since COVID-19 (yes/no), influence caused by the COVID-19 control measures (yes/no), discomfort so far, major, and geographical region of the family were factors significantly influencing the learning adaptability of medical students under COVID-19 (P<0.05). Type of household registration, discomfort at the beginning of the semester, willingness to enroll in medical school (yes/no), increased motivation to study medicine since COVID-19 (yes/no), influence caused by the COVID-19 control measures (yes/no), and discomfort so far were significant factors affecting the campus adaptability of medical students under COVID-19 (P<0.05). Type of household registration, increased motivation to study medicine since COVID-19 (yes/no), and discomfort as far were significant factors affecting the occupational adaptability of medical students under COVID-19 (P<0.05). Increased motivation to study medicine since COVID-19 (yes/no), influence caused by the COVID-19 control measures (yes/no), and major were factors that significantly affected the emotional adaptation of medical students under COVID-19 (P<0.05). The significant factors affecting the adaptation of medical students under COVID-19 were determined to be student cadres of secondary school (yes/no), willingness to enroll in medical school (yes/no),

Table 6. Adaptability score difference analysis of medical students who have discomforts at the beginning of the semester and whether they applied for medical school of their own free will

Dimension	Whether there are discomfort symptoms at the beginning of the semester		P value	Whether it is their choice to apply for medical school		P value
	Yes	No		Yes	No	
Interpersonal adaptability	3.34 ± 0.62	3.41 ± 0.66	0.204	3.42 ± 0.65	3.05 ± 0.51	<0.001
Learning adaptability	3.50 ± 0.60	3.65 ± 0.61	0.003	3.64 ± 0.60	3.16 ± 0.58	<0.001
Campus adaptability	3.44 ± 0.61	3.64 ± 0.62	<0.001	3.61 ± 0.62	3.17 ± 0.62	<0.001
Career adaptability	3.56 ± 0.55	3.62 ± 0.58	0.194	3.62 ± 0.57	3.36 ± 0.47	0.001
Emotional adaptation	3.35 ± 0.61	3.60 ± 0.62	<0.001	3.55 ± 0.62	3.17 ± 0.61	<0.001
Self adaptation	3.25 ± 0.67	3.44 ± 0.66	<0.001	3.40 ± 0.67	3.16 ± 0.61	0.008
Degree of satisfaction	3.11 ± 0.76	3.44 ± 0.72	<0.001	3.38 ± 0.74	2.85 ± 0.71	<0.001
Overall adaptability	3.39 ± 0.50	3.55 ± 0.54	<0.001	3.53 ± 0.53	3.15 ± 0.45	<0.001

Table 7. The adaptability scores of medical students with or without increased motivation to study medicine and those with or without pandemic-induced problems

Dimension	COVID-19 has increased the motivation to study medicine		P value	Negative impact from control measures during the COVID-19 pandemic		P value
	Yes	No		Yes	No	
Interpersonal adaptability	3.41 ± 0.65	3.09 ± 0.59	<0.001	3.35 ± 0.65	3.37 ± 0.66	0.597
Learning adaptability	3.61 ± 0.61	3.15 ± 0.59	<0.001	3.48 ± 0.62	3.61 ± 0.64	0.002
Campus adaptability	3.51 ± 0.63	3.15 ± 0.64	<0.001	3.39 ± 0.65	3.57 ± 0.63	<0.001
Career adaptability	3.56 ± 0.58	3.23 ± 0.52	<0.001	3.47 ± 0.57	3.57 ± 0.61	0.009
Emotional adaptation	3.52 ± 0.62	3.13 ± 0.62	<0.001	3.41 ± 0.63	3.54 ± 0.65	0.002
Self adaptation	3.39 ± 0.66	3.06 ± 0.60	<0.001	3.29 ± 0.65	3.40 ± 0.69	0.013
Degree of satisfaction	3.33 ± 0.73	2.84 ± 0.81	<0.001	3.16 ± 0.76	3.42 ± 0.75	<0.001
Overall adaptability	3.49 ± 0.53	3.11 ± 0.48	<0.001	3.39 ± 0.53	3.51 ± 0.55	0.001

Note: COVID-19, Corona Virus Disease 2019.

Table 8. Scores of whether there were changllenges in adaptation of medical students after a period of university life

Dimension	No discomfort	Learning style and state	Diet	Other	P value
Interpersonal adaptability	3.63 ± 0.62	3.24 ± 0.58	3.43 ± 0.67	3.23 ± 0.76	<0.001
Learning adaptability	3.88 ± 0.59	3.41 ± 0.55	3.61 ± 0.62	3.62 ± 0.61	<0.001
Campus adaptability	3.86 ± 0.61	3.42 ± 0.58	3.52 ± 0.63	3.46 ± 0.56	<0.001
Career adaptability	3.81 ± 0.57	3.46 ± 0.52	3.64 ± 0.56	3.56 ± 0.59	<0.001
Emotional adaptation	3.86 ± 0.56	3.34 ± 0.56	3.48 ± 0.67	3.36 ± 0.63	<0.001
Self adaptation	3.66 ± 0.59	3.22 ± 0.63	3.36 ± 0.71	3.28 ± 0.71	<0.001
Degree of satisfaction	3.78 ± 0.61	3.14 ± 0.70	3.19 ± 0.76	3.10 ± 0.77	<0.001
Overall adaptability	3.78 ± 0.50	3.33 ± 0.47	3.49 ± 0.54	3.40 ± 0.52	<0.001

influence caused by the COVID-19 control measures (yes/no), major, and gender (P<0.05). Type of household registration, discomfort at the beginning of the semester (yes/no), willingness to enroll in medical school (yes/no), increased motivation to study medicine since COVID-19 (yes/no), influence caused by COVID-19 control measures (yes/no), and discomfort so far were significant factors affecting the satisfaction of medical students under COVID-19 (P<0.05). Type of household registration, student cadres of secondary schools (yes/no), discomfort at the beginning of the semester (yes/no), willingness to enroll in medical school (yes/

Table 9. Argument items and assignment

Independent variables	Assignment
Only child in family	Yes = 1, No = 2
Type of household registration	Cities and towns = 1, Countryside = 2
Working as a student cadre in the middle school	Yes = 1, No = 2
Discomforts at the beginning of the term	Yes = 1, No = 2
Applied for medical schools voluntarily	Yes = 1, No = 2
COVID-19 increased the motivation to study medicine	Yes = 1, No = 2
Negative impacts from COVID-19 control measures	Yes = 1, No = 2
The aspects that have not been adapted to so far	None = 1, School mode and state = 2, Diet = 3, other = 4
Major	Clinic medicine = 1, Pediatrics = 2, Imaging Medicine = 3, Anaesthesiology = 4, Nursing = 5, Midwifery = 6
Area where the family is located	Within Guangdong Province = 1, Outside Guangdong Province = 2
Gender	Male = 1, Female = 2

According to collinearity diagnosis, the tolerance of each variable is greater than 0.2, and VIF (variance inflation factor) is less than 2, so it can be considered that there is no multicollinearity among independent variables in the model. COVID-19, Coronavirus 2019.

Table 10. Multiple linear regression analysis of freshmen adaptability

Dimension	A	B	C	D	E	F	G	H	I	J	K
Interpersonal adaptability	--	-0.174**	-0.149**	--	-0.218*	-0.23**	--	-0.13**	--	0.232**	--
Learning adaptability	--	-0.141**	-0.108*	0.082	-0.304**	-0.366**	0.129*	-0.072**	-0.046**	-0.046**	--
Campus adaptability	--	-0.182**	-0.108	0.114*	-0.31**	-0.261**	0.161**	-0.107**	--	--	--
Career adaptability	--	-0.148**	-0.065	--	-0.118	-0.300**	--	-0.071**	--	--	--
Emotional adaptation	--	-0.09	-0.085*	0.172	-0.227**	-0.285*	-0.284**	-0.14	-0.026**	--	--
Self adaptation	--	--	-0.099**	-0.128**	0.106*	--	-0.264**	0.086	-0.103**	-0.048	-0.121*
Degree of satisfaction	--	-0.177**	--	0.214**	0.351**	-0.352**	-0.213**	-0.196**	--	--	--
Overall adaptability	-0.032-	-0.136**	-0.107**	0.093**	0.225**	-0.290**	-0.102*	-0.107**	-0.033*	----	--

A = only child, B = type of household registration, C = student cadre in secondary school, D = discomfort at the beginning of the school year, E = willingness to enroll in medical school, F = increased motivation to study medicine since the Corona Virus Disease 2019 (COVID-19), G = whether the control of the COVID-19 has caused distress, H = discomfort so far, I = professional, J = geographic area of family, K = gender. **indicates $P<0.01$, *indicates $P<0.05$.

no), increased motivation to study medicine since COVID-19 (yes/no), distress caused by the COVID-19 control measures (yes/no), discomfort so far, and major were found to significantly affect the overall adaptability of medical students under COVID-19 ($P<0.05$). See **Tables 9**, **10** for details.

Discussion

The survey data of this study showed that the mean score of the adjustment status of freshmen in a medical university in Guangdong Province was 3.50 ± 0.53, which was in the middle to upper level, indicating good overall adjustment status at this medical university. This is consistent with the finding of Xie, who reported a generally high level of adjustment among university freshmen through a survey [17]. In terms of scores of various dimensions,

the study adaptation status was the best, which is inconsistent with the 71.2% proportion of freshmen with adaptation problems noted in a previous study [18]. The satisfaction dimension scored the lowest. Satisfaction is a comprehensive indicator of all aspects of their current life and studies. Schools can improve the adjustment of freshmen to campus life and address psychological aspects that affect their satisfaction.

The present research suggests that gender and age are not the key factors affecting the adaptation of freshmen in medical university, which is in contrast to the findings reported by Mulyadi, who observed poorer mental health among female students during the pandemic [19]. Some studies have shown that giving university students enough care and encouragement can help them overcome negative emo-

tions and reduce the occurrence of psychological problems [20]. The results of this survey showed that only children generally had better school adaptability. Besides, urban students had significant advantages in overall adaptability and adaptability in all dimensions over rural students. Compared to students who had not served as class cadres, students who had served as class cadres in middle school had significantly higher scores in other dimensions and comprehensive quality except satisfaction. This suggests that the individual's adaptive ability is closely related to the family environment and education status, and that previous experience as a class cadre has a certain effect on cultivating students' independence and adaptability. Also, student cadres tend to have more opportunities to have contact with teachers, increasing their access to career development information and opportunities to receive career guidance [21].

Byrnes conducted a survey of 1,668 medical students and reported that about one-fifth of the students believed that the COVID-19 pandemic, especially the number of COVID-19 cases and deaths, affected their choice of major [22], and 72.4% said they could not explore the major they were interested in. Mulyadi analyzed 17 studies with 13,247 students majoring in nursing and found four common health problems and sleep disorders among nursing students during COVID-19 [19]. This study showed that majors affected freshmen's comprehensive adaptability, learning adaptability, and self-adaptability. Among them, clinical medicine and anesthesia majors showed significant advantages in academic adaptability and self-adaptability, while midwifery and nursing majors had the least advantages. In addition, students who were enrolled in medical school of their own free will showed a significant advantage in overall and various dimensions of adaptability compared to those with unwillingness. This suggests that respecting students' autonomy has a significant impact on their adaptability. Students who had increased motivation to study medicine due to COVID-19 scored higher than deniers. In contrast, students who felt that the control measures of COVID-19 caused them distress on all dimensions scored significantly lower. Alghamdi reported that it was of great importance for science educators to teach about COVID-19

and related pandemics to improve students' scientific literacy [23]. Therefore, universities should strengthen the management of medical freshmen's adaptability in universities.

Michaud reported a decline in medical students' well-being since the COVID-19 outbreak [24]. Oh studied 36 universities in the USA and reported that COVID-19-related anxiety, financial stress, and infection were associated with psychiatric experiences [25]. Yu reported a 56.8% prevalence of depressive symptoms among university students during COVID-19 [8]. Stepwise multiple linear regression analysis in this study found that type of household registration, student cadres of secondary school (yes/no), willingness to enroll in medical school (yes/no), enhanced motivation to study medicine since COVID-19 (yes/no), distress caused by the COVID-19 control measures (yes/no), and major were important indicators influencing adaptability of university freshmen. Student cadres, urban household registration, satisfaction with the major and interest in the major were all positive influencing factors for learning adaptability. This suggests that the government, schools, and families should pay attention to the distribution of teaching resources across geographical regions, respect students' interests and preferences, and cater to their desire for the significance in their chosen major. All these factors can have a significant impact on the lifelong development of university students. University is managed in an open manner, requiring students to have the ability to study and live independently [26]. In terms of learning in university, students' autonomy and independence in learning are challenged by various and complicated learning contents, profound professional knowledge, and reduced guidance and supervision from teachers [27]. In interpersonal communication, students should think and choose according to their own knowledge and experience. In the surrounding environment, there are differences in climate, language, eating habits, lifestyles, etc., requiring individuals to make timely self-adjustment according to the campus environment, so as to successfully complete their studies. This paper revealed factors affecting the social adaptability of medical students, including the place of origin, only child (yes/no), and experience of student cadres (yes/no), while are all previously established and difficult to change, but this

does not mean that medical students cannot get enlightenment from this study. The influence of these factors on medical students is reflected in their personality, behaviors, social interaction, and coping style. In the study of Niu [18], it was also noted that students with low family socioeconomic status were more likely to develop adaptation problems in school, which offers another important perspective that may affect the adaptability of medical students on campus under COVID-19.

Tempski surveyed 10,433 students from 257 medical schools in Brazil and showed that medical students who were willing to take risks to engage in practice in the context of the COVID-19 pandemic would become better health professionals. Medical students were motivated by a sense of purpose or responsibility, altruism, perceptions of good performance and values of professionalism in addition to their interest [28]. Buckland reported that many international medical students volunteered to help in hospitals during the COVID-19 pandemic [29]. In the UK, medical students helped nurses to provide care to patients, and supported the healthcare system while gaining hands-on experience in interprofessional collaboration.

In conclusion, college students have the obligation to find their future life goals, shape their personality, and understand their responsibilities, ranging from academic, economic, and interpersonal, to post-graduation concerns [30].

This study obtained comprehensive results of the adaptability of medical university freshmen and the relevant influencing factors affecting adaptability under COVID-19, and examined the mental health and public health of medical university students to some extent, providing a theoretical basis for the university to formulate corresponding policies and career planning counselling programs to improve the level of adaptability of university freshmen. The study of the demographic characteristics of medical students as well as the relationship among cognition, behavior, and adaptation related to COVID-19 can help provide a career planning counselling program that effectively increases the adaptability level of such students. This can provide not only a scientific basis for medical educators and administrators, but also a reference for empirical research on the adjustment of medical freshmen, which enables a comprehensive and in-depth exploration of medical student adaptability, thereby improving the learning ability and adaptability of medical students. However, the sample size of this study is small, and future research should be extended to other provinces and nations and included a comparison to non-medical university freshmen for comparative analysis.

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Disclosure of conflict of interest

None.

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