Professional Commitment of 8-Year Medical Doctoral Degree Program Students in China: The Mediating Role of Self-Efficacy, Learning Engagement, and Academic Performance

Yao Lu[1,2]* ⬤, Kuang Tong[1]*, Mingang Wen[3], Yanyan Gong[1], Dan Zhuang[4] and Hanyi Zhu[1]

[1]Office of Academic Affairs, Southern Medical University, Guangzhou, Guangdong, People's Republic of China. [2]School of Public Health, Southern Medical University, Guangzhou, Guangdong, People's Republic of China. [3]Center for Teaching and Learning Development, Southern Medical University, Guangzhou, Guangdong, People's Republic of China. [4]Office of Students' Affairs, Nanfang Hospital, Southern Medical University, Guangzhou, Guangdong, People's Republic of China.

ABSTRACT

BACKGROUND: Studying the professional commitment of a student in an 8-year medical training program of China, especially its association with academic performance, can enhance the understanding of professional loyalty in future doctors. This study aimed to investigate the self-efficacy, academic performance, professional commitment, and learning engagement of 8-year program medical students, and explore the mediating roles of professional commitment and learning engagement on the associations between self-efficacy and academic performance.

METHODS: We conducted a cross-sectional study in a Chinese medical university and collected the General Self-Efficacy Scale, Professional Commitment of Undergraduates Scales, and the Utrecht Work Engagement Scale-Student from self-reported students. Academic performance was ascertained using course examination scores in the most recent year. We conducted a structural equation model (SEM) analysis to examine the mediating roles of professional commitment and learning engagement on the relationship between self-efficacy and academic performance.

RESULTS: A total number of 402 medical students were included in this study. Students in the clinical practice stage had significantly lower professional commitment and learning engagement than students in the pre-medical and medical course stages. The professional commitment of students from low-income families was significantly lower than that of students from high-income families. Professional commitment and learning engagement were mediators in the relationship between self-efficacy and academic performance.

CONCLUSIONS: This study is the first to investigate professional commitment among students in the China 8-year medical program. Professional commitment plays an intermediary role between self-efficacy and academic performance.

KEYWORDS: 8-year program medical student, self-efficacy, academic performance, professional commitment, learning engagement, structural equation model

Background

The scale of medical education in China has experienced a rapid expansion. When the People's Republic of China was established in 1949, only 22 medical colleges existed, with 3800 students enrolled per year. By September 2020, this number had increased to more than 200 medical colleges, with approximately 800,000 students enrolled per year.[1] The rapid growth of enrollment challenged the quality of medical education. China has made many changes to improve its medical education system. In the 1960s, most higher medical schools had a 5-year program, a few higher medical schools had a 6-year program, and junior colleges had a 3-year program.[2] With the continuous advancement of the reform, the 7- and 8-year clinical medical programs were added in a few universities, forming a compatible situation of a variety of medical programs. Now China has gradually established a clinical medical education system with Chinese characteristics, which includes three stages of medical school, graduate medical education and continuing education, with the "5 + 3" model as the main body, an 8-year program as the exploration and the "3 + 2" model as the supplement.[3] The 8-year program has been in implementation since 2004. The Ministry of Education of China has approved 14 top universities to offer the 8-year program for medical doctor (M.D.) training. The 8-year program aims to cultivate

highly skilled medical professionals by broadening their expertise in medical knowledge, clinical skills, and research capabilities. According to the report of the China Medical Education Development Center, the 8-year program enrolls approximately 1500 students a year and has graduated over 10 000 students. The 8-year program at Southern Medical University adopts the "2 + 3 + 3" training mode, including 2 years of pre-medical education, 3 years of medical course education, and 3 years of clinical practice education (including 1 year of first-level clinical training and 2 years of second-level clinical training). An organ system-centered curriculum is being implemented, and each student has a tutor during the training process. The 8-year program is widely desired by students, and only the best high school graduates have a chance to enter an 8-year program.

Due to the high social reputation and relatively considerable income of doctors, many people believe that the professional commitment of medical students is not an issue to worry about, and the professional commitment of medical students has not been given enough attention. Considering the shortage of doctors in China, it is an issue of concern that these medical students who invest significant time and resources in their medical education do not pursue a career as doctors. Professional commitment determines peoples' work behaviors.[4] Nurses who have higher professional commitment tend to exhibit less turnover intention and higher job satisfaction.[5] Also, professional commitment could enhance patient safety and patient-perceived quality of care that is widely recognized as an assessment index of care outcomes.[6] Some studies have found that professional commitment is an ongoing, dynamic process, which is originally shaped during the training of medical students in college.[7] Therefore, if students have a higher professional commitment in college, they will continue to have a higher professional commitment after they graduate and become registered doctors in a hospital setting. Thus, it is important to understand the level of professional commitment of medical students. However, few studies have investigated the professional commitment of medical students in the clinical training stage.

Despite significant research efforts, identifying factors that predict student success remains an ongoing challenge, and this is especially true for academic programs such as those in health professions disciplines, including medicine. In addition, research predicting the academic success of students in health professions disciplines has been conducted using mostly cognitive measures, such as GPAs and standardized admissions tests. Although these cognitive measures cannot explain the majority of observed variations in student performance[8] they are still very important and decisive indicators, especially in college admission and employment. On the other hand, there is a growing belief that cognitive measures should be supplemented with measures of noncognitive factors, defined as skills associated with motivation, attitude, and temperament.[9] Medical educators are increasingly interested in how medical students' self-efficacy is related to

learning and development during medical school. Bandura's social cognitive theory suggests that self-efficacy, defined as the confidence to carry out the activities necessary to accomplish desired goals,[10] plays an important role in influencing achievement outcomes through its dynamic interplay with environmental and behavioral determinants.[11] Learning engagement refers to a continuous, positive emotional state that individuals hold during the completion of their studies.[12] In recent years, learning engagement has received increasing attention from researchers due to the rise of positive psychology. As an important predictor of student academic performance and dropout rates, learning engagement can visually demonstrate students' learning effort and effectively predict students' academic performance or further education.[13]

Therefore, this study aimed to determine the predictive role of professional commitment and explore the relationship between professional commitment, self-efficacy, learning engagement, and academic performance.

Methods

Participants and procedure

Students in the 8-year clinical medicine program from a University in south China were investigated in 2023. Eighth-year students were not included in this study due to the lack of a unified curriculum and assessment in the teaching plan. Students could voluntarily decide whether to participate in this survey or not. The questionnaire survey was anonymous. All participants were informed of the aim of the study and were informed that their data would be used only for the purpose of academic research. No incentives were provided. The reporting of this study conforms to the STROBE checklist[14] for cross-sectional studies (Annexure 1 in the online supplemental materials).

Sampling technique and sample size calculation

Participants completed the information collection by filling out an online questionnaire. We referred to previous studies that the professional commitment score of student nurses was 3.52 ± 0.69.[15] The sample size was calculated using the formula $n = \left(\frac{z_{\alpha/2} \text{CV}}{\varepsilon}\right)^2$, a Z-value of 1.96 to reflect a 95% confidence level for a two-tailed test, a margin of error of 0.02, balancing precision with feasibility. To accommodate potential dropouts, we increased the initial calculation from 369 to 402 participants, approximately a 4% adjustment, informed by attrition rates in similar healthcare research.

Questionnaires

General self-efficacy scale (GSES). We used the GSES designed by Luszczynska A et al.[16] and translated by Wang Caikang et al.[17] It is a four-point Likert-like scale graded from "totally incorrect" to "totally correct." Higher scores indicate higher general self-efficacy. We found that the internal consistency

and reliability measure of the scale had a Cronbach's alpha coefficient of 0.930, which was acceptable. The results from Bartlett's test of sphericity were significant (KMO = 0.927, *P* < .001), which allowed us to identify the factor model by using the exploratory factor analysis approach (Table 1).

Professional commitment of undergraduates scales (PCUS). We used the professional commitment of undergraduates scale designed by Lian Rong et al.[18] It is a five-point Likert-like scale graded from "totally agree" to "totally disagree." A higher score indicates a higher level of professional commitment. The internal consistency and reliability measure of the scale had a Cronbach's alpha coefficient of .901. The results from Bartlett's test of sphericity were significant (KMO = 0.915, *P* < .001) (Table 1).

Utrecht work engagement scale-student (UWES-S). We used the Utrecht Work Engagement Scale-Student designed by Schaufeli et al.[19] and translated by Lee Xiying et al.[20] It is a five-point Likert-like scale graded from "totally agree" to "totally disagree." A higher score indicates a higher level of working engagement. The internal consistency and reliability measure

of the scale had a Cronbach's alpha coefficient of .877. The results from Bartlett's test of sphericity were significant (KMO = 0.878, *P* < .001) (Table 1).

Academic performance

Academic performance was represented by examination scores of the three highest credit courses in the last year. To increase the comparability of scores in different courses, we adopted the standard deviation method[21] to convert the original course score (X) into standardized grades (X'). The conversion formula is as follows:

$$X' = 75 + 10 \times \frac{X - mean}{SD}$$

Statistical analysis

Statistical description and correlation analysis were performed using SPSS 26.0 statistical software. Categorical data were summarized using frequency and percentage, and continuous data using mean and standard deviation. Unpaired *t*-test was used to make comparisons between two groups, one-way ANOVA was used to make comparisons between three groups, and the

Table 1. Exploratory factor analysis.

SCALES	ITEMS	COMPONENT	KMO
Self-efficacy	For me, it is easy to stick to ideals and achieve goals.	0.865	0.927
	I am confident that I can deal with anything unexpected effectively.	0.899	
	With my intelligence, I can certainly cope with unexpected situations.	0.911	
	If I make the necessary effort, I can certainly solve most of the difficult problems.	0.760	
	Faced with a difficult problem, I can usually find several solutions.	0.853	
	Whatever happens to me, I can handle it freely.	0.868	
Professional commitment	I am very passionate about my major.	0.819	0.915
	Under any circumstances, I will not change my major.	0.678	
	My major is conducive to my further study.	0.805	
	My major is conducive to realizing my ideal.	0.847	
	There will be many further study opportunities for professional-related work in the future.	0.769	
	My major provides me with enough space for self-development, and I can attain my self-value.	0.877	
	The major has an important role in social development, and for the future of the country, I should learn it well.	0.786	
Learning engagement	As soon as I get up in the morning, I am happy to study.	0.807	0.878
	When studying, I feel full of energy.	0.861	
	Even if encounter setbacks, I will not be discouraged but will persist on learning.	0.850	
	I am very passionate about learning.	0.866	
	When I studied, I felt that the time had passed very quickly.	0.726	

Note. Principal component factor extraction for the self-efficacy scale, professional commitment scale, and learning engagement scale. The total variances of the three scales were 74.1%, 63.9%, and 67.9%, respectively. KMO = result of Kaiser–Meyer–Olkin analysis.

LSD method was used for further pairwise comparisons. We used Pearson correlation to explore the relationships between the outcome variables. Goodness-of-fitting test, path analysis, and mediation effect analysis were performed using AMOS 26.0 software. The mediation effect analysis was performed using the Bootstrap method.[22] A 95% confidence interval of the indirect effect that does not include 0 suggests that the mediation effect is present, and a 95% confidence interval of the direct effect that includes 0 indicates the presence of a full mediating effect. The test standard was set at a two-sided *P*-value of .05.

Results

Characteristics of respondents

Of the 408 questionnaires distributed 402 valid questionnaires were returned, indicating a response rate of 98.5%. Incomplete questionnaires were discarded. The demographic characteristics of the participants are shown in Table 2. Overall, 55% of the respondents were female. Also, 96.8% were Han Chinese, and 73.4% of them lived in urban areas in China before entering the university. They all chose the 8-year clinical medicine program as their first choice major in the college entrance examination. According to the student teaching plan, grades 1–7 are divided into three stages, namely pre-medical education (Stage I), medical course education (Stage II), and clinical practice education (Stage III).

Comparison of the observed variables between students with different characteristics

We compared the psychological indicators of the participants with different characteristics (Table 3). The average score of self-efficacy among the 8-year program students was 2.63 ± 0.68. The self-efficacy score of males was 2.76 ± 0.68, which was significantly higher than 2.53 ± 0.67 of the females ($t = 11.770$, $P = .001$).

The average score of the students' professional commitment scale was 4.09 ± 0.60. Senior students had lower scores for professional commitment ($F = 15.406$, $P < .001$). Further pairwise comparisons showed that students in the clinical practice stages had significantly lower professional commitment than students in the pre-medical and medical course stages ($P < .001$). Students from different income families had different scores of professional commitment ($F = 4.063$, $P = .018$). Further pairwise comparisons showed that the professional commitment of students from low-income families (<¥3000 per month) was significantly lower than that of students from high-income families (>¥5000 per month) ($P = .005$).

The average score of the students' learning engagement scale was 3.66 ± 0.70. The learning engagement score of males was 3.76 ± 0.73 which was significantly higher than that of female 3.58 ± 0.66 ($t = 6.686$, $P = .010$). Students at different stages have significantly different levels of learning engagement ($F = 12.235$, $P < .001$). Further pairwise comparisons showed that the learning engagement of students in the clinical course stage

Table 2. Characteristics of the individual respondents.

VARIABLES	N (% OF 402)
Age (years, mean $\pm$ SD)	21.69 ± 1.97
Gender	
Male	181 (45.0)
Female	221 (55.0)
Race	
Han	389 (96.8)
Not Han	13 (3.2)
Home location	
Urban areas	295 (73.4)
Rural areas	107 (26.6)
Method of admission	
Medicine as the first choice	402 (100.0)
Family total income per month	
<¥3000	93 (23.1)
¥3000–¥5000	149 (37.1)
>¥5000	160 (39.8)
Grade	
Stage I	
Grade 1	78 (19.4)
Grade 2	64 (15.9)
Stage II	
Grade 3	72 (17.9)
Grade 4	58 (14.4)
Grade 5	62 (15.4)
Stage III	
Grade 6	48 (11.9)
Grade 7	20 (5.0)

was significantly lower than that of students in the pre-medical and medical course stages ($P < .001$). Since scores were standardized, we compared the scores of students in different grades. The standardized examination score of male students was significantly lower than that of female students ($t = 4.983$, $P = .026$).

Correlation analysis of the observed variables

The Pearson correlation coefficients between self-efficacy, professional commitment, learning engagement, and academic performance are shown in Table 4. Self-efficacy was significantly and positively correlated with professional commitment ($r = 0.437$, $P < .001$), learning engagement ($r = 0.557$,

Table 3. Comparison of students' variables with different characteristics (mean ± SD).

Variables	Male (n = 181)	Female (n = 221)	t	P
Self-efficacy	2.76 ± 0.68	2.53 ± 0.67	11.770	.001
Professional Commitment	4.09 ± 0.65	4.08 ± 0.56	0.012	.912
Learning Engagement	3.76 ± 0.73	3.58 ± 0.66	6.686	.010
Academic Performance	73.97 ± 8.40	75.80 ± 8.03	4.983	.026

Variables	Urban areas (n = 295)	Rural areas (n = 107)	t	P
Self-efficacy	2.66 ± 0.69	2.55 ± 0.64	2.045	.154
Professional Commitment	4.11 ± 0.63	4.03 ± 0.54	1.527	.217
Learning Engagement	3.67 ± 0.71	3.63 ± 0.66	0.195	.659
Academic Performance	74.67 ± 8.55	75.82 ± 7.29	1.545	.215

Variables	Stage I (n = 142)	Stage II (n = 192)	Stage III (n = 68)	F	P
Self-efficacy	2.61 ± 0.67	2.68 ± 0.73	2.54 ± 0.53	1.196	.303
Professional Commitment	4.22 ± 0.51	4.10 ± 0.64	3.75 ± 0.57	15.406	<.001
Learning Engagement	3.75 ± 0.64	3.73 ± 0.72	3.29 ± 0.64	12.235	<.001
Academic Performance	75.00 ± 8.01	75.00 ± 8.34	75.00 ± 8.42	0	1

Variables	<¥3000 (n = 93)	¥3000–¥5000 (n = 149)	>¥5000 (n = 160)	F	P
Self-efficacy	2.53 ± 0.66	2.59 ± 0.67	2.73 ± 0.69	2.806	.062
Professional Commitment	3.94 ± 0.56	4.10 ± 0.63	4.16 ± 0.59	4.063	.018
Learning Engagement	3.52 ± 0.72	3.66 ± 0.66	3.74 ± 0.71	2.992	.051
Academic Performance	76.00 ± 7.55	74.23 ± 8.51	75.07 ± 8.34	1.360	.258

Table 4. Pearson correlation between the variables (*r*).

	SELF-EFFICACY	PROFESSIONAL COMMITMENT	LEARNING ENGAGEMENT
Professional Commitment	0.437***	–	–
Learning Engagement	0.557***	0.639***	–
Academic Performance	0.105*	0.048	0.160**

*$P < .05$; **$P < .01$; ***$P < .001$.

$P < .001$), and academic performance ($r = 0.105$, $P = .034$). Professional commitment was significantly positively correlated with learning engagement ($r = 0.639$, $P < .001$). Learning engagement was significantly positively correlated with academic performance ($r = 0.160$, $P = .001$). These correlations form the basis for the further analysis conducted.

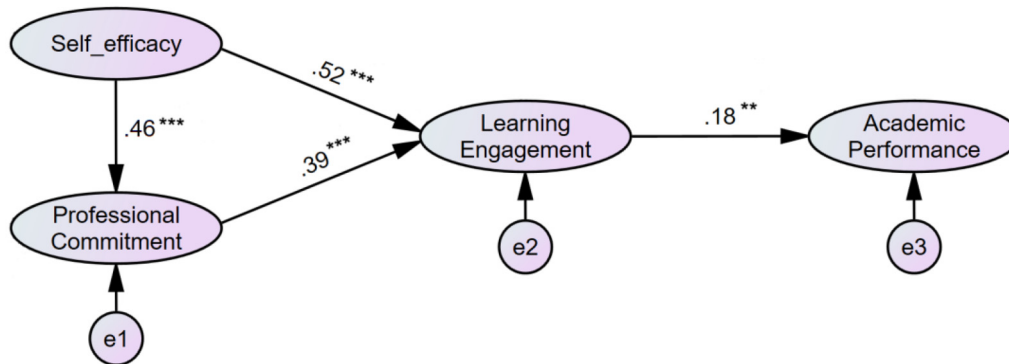## Structural equation model of the observed variables

After continuous optimization, we constructed a structural equation model of self-efficacy, professional commitment, learning engagement, and academic performance. The value of χ^2/df value of this model was 1.699, and NFI, GFI, AGFI, CFI, and TLI were >0.9, and RMSEA was 0.042. All the fitting indexes met the requirements (Table 5).

The path diagram and path coefficients of the model are shown in Figure 1 and Table 6. The standardized path coefficient of self-efficacy on learning engagement was 0.52 ($P < .001$). The standardized path coefficient of self-efficacy on professional commitment was 0.46 ($P < .001$). The standardized path coefficient of professional commitment on learning engagement was 0.39 ($P < .001$). The standardized path coefficient of learning engagement on academic performance was 0.18 ($P = .002$). The standardized path coefficient of self-efficacy on academic performance was −0.16 ($P = .059$).

Table 5. Goodness-of-fit measures for structural equation modeling.

	χ^2	χ^2/df	NFI	GFI	AGFI	CFI	TLI	RMSEA
Standard	—	>1, <3	>0.90	>0.90	>0.90	>0.90	>0.90	<0.05
Result	314.239	1.699	0.943	0.933	0.917	0.975	0.972	0.042

Note. Df, indicates degrees of freedom; NFI, normal fit index; GFI, goodness of fit index; AGFI, Adjusted goodness of fit index; CFI, comparative fit index; TLI, Tucker–Lewis index; RMSEA, root-mean-square error of approximation.

Chi-square=314.239 DF=185 Chi/DF=1.699 GFI=.933 AGFI=.917 RMSEA=.042

Figure 1. Structural equation model depicting the relationship between self-efficacy, professional commitment, learning engagement and academic performance. **$p < .01$. ***$p < .001$.

Table 6. Results of structural equation model analyses.

EFFECTS	STANDARDIZED ESTIMATES	SE	P
Self-efficacy on professional commitment	0.463	0.043	<.001
Self-efficacy on learning engagement	0.516	0.053	<.001
Professional commitment on learning engagement	0.387	0.064	<.001
Learning engagement on academic performance	0.184	0.060	.002

Table 7. Effect of the mediation model (standardization).

EFFECT	PATH	EFFECT VALUE	BOOTSTRAP'S 95% CONFIDENCE INTERVAL	P
Total effect	Self-efficacy→ Academic performance	0.130	0.040–0.206	.004
Indirect effect 1	Self-efficacy→ Learning engagement→ Academic performance	0.097	0.035–0.170	.002
Indirect effect 2	Self-efficacy→ Professional commitment→ Learning engagement→Academic performance	0.034	0.009–0.069	.004

The intermediary effect of professional commitment and learning engagement

We further analyzed the mediation effect of the model (Table 7). The mediation effect of professional commitment and learning investment was a full mediation effect that includes two pathways. The first path involved self-efficacy influencing academic performance through learning engagement. The indirect effect value was 0.097, and Bootstrap's 95% confidence interval was 0.035–0.170. Another path was that self-efficacy influenced academic performance through professional commitment and learning engagement. The indirect effect value was 0.034, and Bootstrap's 95% confidence interval was 0.009–0.069.

Discussion

The issue of the professional commitment of clinical medicine students has long been ignored. Many studies have explored nursing students' sense of professionalism due to concerns about the loss of nurses.[23,24] However, studies on doctors' sense of professionalism are scarce, despite the significant shortage of doctors in China. For example, the shortage of anesthesiologists has become a concern for surgeons and is now considered as a social problem. The number of anesthesiologists per 100,000 people in China is only 6.7, compared to 13.8 in the United States and 17 in the European Union. Similarly, according to the Child Welfare Stocktaking Report 2016, there is a serious shortage of pediatricians in China, with only five pediatricians for every 10,000 children. A survey that investigated 54,214 hospitals from all 31 provinces in mainland China showed that the dropout rate of pediatricians has increased to 12.6%.[25] Our previous survey found that about 20% of students majoring in clinical medicine changed careers. Medical students, teachers, schools, and the government all incur huge costs during the long medical study period. However, these "dropout" students did not continue to pursue a career as doctors. Some students engaged in scientific research work, some chose to work in enterprises, some went to government departments, and some chose to be teachers. The following questions remain to be answered: (a) What has led to a change in these students' initial career plans? and (b) Can educators identify this change early and intervene effectively?

Professional commitment can provide insights that help to answer the above questions. The professional commitment in college can reflect the students' recognition of their major. On the other hand, professional commitment can affect permanence, rotation, and/or abandonment at work.[26] We investigated students in the 8-year clinical medicine program for two main reasons. First, the duration of the 8-year program is quite long, and some studies have shown that anxiety and depression of students are more prominent among these students.[27] Second, these students have very high scores in the college entrance examination and strong professional intentions on the time of admission. This study aimed to explore whether students receiving the highest standard of medical training continue to pursue their intended medical careers, leading to the following five key findings.

First, professional commitment, self-efficacy, and learning engagement were positively correlated with each other. The finding is consistent with those by Kung[28] who found a positive relationship between professional commitment and self-efficacy in clinical students. Walter, Juliette et.al.[29] reviewed the factors influencing nurses' engagement and found that professional motivation and organizational commitment are critical factors influencing engagement. Professional commitment, self-efficacy, and learning engagement evaluated the students' cognition from different observational perspectives. The results showed that students with high professional commitment also had a high sense of self-efficacy and were more enthusiastic about learning.

Second, professional commitment exerts a mediating effect between self-efficacy and learning engagement. Professional commitment, an indicator of students' subjective feelings about their major, has been shown to have a mediating effect among multiple psychological characteristics. Ying revealed that professional commitment plays a mediating role between the clinical learning environment and learning engagement in nursing students.[30] Yu Hsingyi found that nursing professional commitment mediated on the relationship between social support, resilience, and intention to stay among newly graduated male nurses.[31]

Third, our results found that both professional commitment and self-efficacy could influence academic performance through learning engagement. The impact of professional commitment and self-efficacy was indirect, not direct. Similar to the results of our study, Edlira Muca's study among veterinary students also found that learning engagement has a positive and direct effect on academic performance, while self-efficacy and academic fit have an indirect effect on academic performance.[32] Academic performance is more directly and closely related to learning engagement, and a change in learning engagement can be directly reflected in academic performance. Learning engagement is a direct predictor of academic performance. Despite the positive indirect effect on academic achievement, there was minimal variation in self-efficacy among students of different regional origin, learning stages, and family income. Self-efficacy changed little during the students' school years and differed among the students only between genders. This suggests self-efficacy is a relatively stable psychological trait. Liu's study found that about 88.9% of the students' self-efficacy was moderate and stable during their college years.[33] There was also an indirect effect on academic performance, and unlike self-efficacy, professional commitment was significantly different among students at different stages of learning. Professional commitment is more sensitive to changes in the learning phase. While considering the predictive role in students' future career success,[34] professional commitment is a good mediating variable for predicting academic performance and career success.

Fourth, students in the clinical practice stage had significantly lower professional commitment and learning engagement ($P < .001$). Freshmen have a basic understanding of their major.[35] The professional commitment of the first-grade students can be used as a baseline to compare with students in later grades. The clinical practice stage is significantly different from the pre-medical or medical course education stages in China. The methods of acquiring knowledge have changed from books to practice. Some studies have shown that when entering the clinical practice stage, students feel that there is a

huge gap between medical theory and practical work, making it difficult for students to control their emotions. On the other hand, the pressure exerted on students is increasing. After entry into the clinical practice stage, students faced many challenges, such as the medical practitioner examination, increased clinical work-load, and scientific research required for graduation. In recent years, the job market has become increasingly demanding of students' scientific research output, and students' concerns about their future careers have become more prominent. All these changes may contribute to the decline in the professional commitment of students in the clinical practice stage of the 8-year medical program. Similar results were obtained in another study of 8-year program students from the Fudan University of China.[36] They reported that 8-year program students in clinical training (sixth/seventh year) had lower empathy than students in premedical study (first/second year), basic medicine (third/fourth year), and clinical medicine (fifth year). Eight-year program students in China lack effective career guidance and psychological counseling when entering the clinical practice stage, and the connection needs to be strengthened during this important period. Therefore, we suggest that after entering the clinical practice stage, reasonable and systematic career planning courses should be carried out based on the Clinical Doctor Competency Framework of China.[37] Through the introduction of interpersonal and communication skills, core values, and professionalism, these courses will help students to improve their understanding of career planning and relieve their confusion about career development.

Finally, the professional commitment of students decreased along with the decrease in household income ($F = 4.063$, $P = .018$). Furthermore, a pairwise comparison found that the professional commitment of students from low-income families (<¥3000 per month) was significantly lower than that of students from high-income families (>¥5000 per month) ($P = .005$). This study was conducted in Guangzhou, where the minimum living allowance for one resident is 1125 yuan per month. For a family of three people, the economic status of low-income families in this study is equivalent to the income status of low-income families in China. According to the 2021 China Statistical Bulletin on Civil Affairs Development, China currently has 42,123 million people living on subsistence allowances. Although students from low-income families did not show significant differences in academic performance from other students, attention needs to be given to the decrease in professional commitment. This suggests that family income is negatively associated with the professional commitment of a student. Additionally, due to the long training time of doctors and low income in the early stage of career development, students generate very little income for their families. Low-income families usually have an insufficient understanding of doctors' career development, which makes it difficult for students to gain professional identity in the family. For students from low-income families, we need to give more attention and support to them by seeking more scholarship support and alleviating their psychological pressure from their families.

Limitations

A number of limitations need to be considered when interpreting the findings of this study. Our sample was not representative of professional commitment levels among medical students in the 8-year program countrywide. We also employed a self-reported scale of self-efficacy, professional commitment, and learning engagement and, although these scales have been reported to be reliable and valid, there may be discrepancies between self-report and actual behavior, and the self-reports might have been subject to bias. Furthermore, our findings were based on a cross-sectional design, and the possibility of cohort effects could not be dismissed in our study. Thus, a longitudinal study is recommended to verify the findings. Finally, since the medical students came from across the country, their family backgrounds may have differed significantly, such as living with a joint family or nuclear family, and parents' education levels, which may have influenced their self-efficacy, professional commitment, learning engagement, and academic performance.

Conclusions

This is one of the few studies that focus on professional commitment among clinical medicine students and the first study to examine the associations between professional commitment, self-efficacy, learning engagement, and academic performance in clinical medicine students. We found that professional commitment and learning engagement play a full mediating role between self-efficacy and academic performance. Professional commitment was lower for students in the clinical practice stages and from low-income families. Professional commitment could serve as a predictor of students' academic performance.

Abbreviations

M.D.	medical doctor
GSES	General Self-Efficacy Scale
PCUS	Professional Commitment of Undergraduates Scales
UWES-S	Utrecht Work Engagement Scale-Student
KMO	Kaiser-Meyer-Olkin
Df	indicates degrees of freedom
NFI	normal fit index
GFI	goodness of fit index
AGFI	adjusted goodness of fit index
CFI	comparative fit index
TLI	Tucker–Lewis index
RMSEA	root mean square error of approximation.

Authors' Contributions

LY analyzed the data and drafted the manuscript. TK revised the manuscript critically for important intellectual content. ZHY revised the manuscript. GYY and ZD prepared surveys and collected data. ZHY conceived and designed the study. All authors read and approved the final version of the manuscript.

Availability of Data and Materials

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

Ethics Approval and Consent to Participate

All subjects provided written informed consents and the study procedures were approved by the Committee on Human Experimentation of Southern Medical University ([2023]No.77). An introduction about the survey was provided on the first page of the questionnaire, including aims, the main contents of this survey and promise to keep the data anonymous and confidential. The sampled students had the right to withdraw at any time.

ORCID iD

Yao Lu https://orcid.org/0009-0000-3918-5397

Supplemental Material

Supplemental material for this article is available online.

REFERENCES

1. Guo JR, Wang WM. Analysis on the reform of China higher medical education in new development stage. *J Natl Coll Educ Adm*. 2022;1(07):19–26 + 47.
2. Zhu C, Zhang WF. *History of medical education in New China*. Beijing Medical University and China Union Medical University Union Press; 1990.
3. Wang W. Medical education in China: progress in the past 70 years and a vision for the future. *BMC Med Educ*. 2021;21(1):453.
4. Kaufmann LM, Wheeler MA, Sojo VE. Employment precarity strengthens the relationships between the dark triad and professional commitment. *Front Psychol*. 2021;12(1):673226.
5. Lu H, Zhao Y, While A. Job satisfaction among hospital nurses: a literature review. *Int J Nurs Stud*. 2019;94(1):21–31.
6. Huang TL, Lee IC, Wong MK, et al. How do three components of professional commitment influence nurse-reported patient-centred care and care quality? *J Clin Nurs*. 2023;32(1–2):126–136.
7. Naghavi AS, Pourabbasi A. Earthquake in the city: using real life gamification model for teaching professional commitment in high school students. *J Med Ethics Hist Me*. 2018;11(1):12.
8. Busche K, Elks ML, Hanson JT, et al. The validity of scores from the new MCAT exam in predicting student performance: results from a multisite study. *Acad Med*. 2020;95(3):387–395.
9. Stoffel JM, Cain J. Review of grit and resilience literature within health professions education. *Am J Pharm Educ*. 2018;82(2):6150.
10. Di Corrado D, Coco M, Guarnera M, Maldonato NM, Quartiroli A, Magnano P. The influence of self-efficacy and locus of control on body image: a path-analysis in aspiring fashion models, athletes and students. *Int J Env Res Pub He*. 2021;18(11):6128.
11. Bandura A, Locke EA. Negative self-efficacy and goal effects revisited. *J Appl Psychol*. 2003;88(1):87–99.
12. Olson N, Oberhoffer-Fritz R, Reiner B, Schulz T. Study related factors associated with study engagement and student burnout among German university students. *Front Public Health*. 2023;11(1):1168264.
13. Wu H, Li S, Zheng J, Guo J. Medical students' motivation and academic performance: the mediating roles of self-efficacy and learning engagement. *Med Educ Online*. 2020;25(1):1742964.
14. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. Strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *Br Med J*. 2007;335(7624):806–808.
15. Shi C, Cleofas JV. Professional commitment and willingness to care for people living with HIV among undergraduate nursing students: the mediating role of empathy. *Nurse Educ Today*. 2022;119(1):105610.
16. Luszczynska A, Scholz U, Schwarzer R. The general self-efficacy scale: multicultural validation studies. *J Psychol*. 2005;139(5):439–457.
17. Caikang W, Yong L. Correlation among general self-efficacy trait anxiety, state anxiety and test anxiety. *Chin J Clin Psychol*. 2000;1(04):229–230.
18. Rong L, Lixian Y, Lanhua W. Relationship between professional commitment and learning burnout of undergraduates and scales developing. *J Psychol*. 2005;1(05): 632–636.
19. Demerouti E, Bakker AB, de Jonge J, Janssen PP, Schaufeli WB. Burnout and engagement at work as a function of demands and control. *Scand J Work Env Hea*. 2001;27(4):279–286.
20. Xiying L, Rong H. A revise of the UWES-S of Chinese college sample. *Psychol Res*. 2010;3(01):84–88.
21. Yonglin G, Dexin L. Discussion on standardized treatment of examination results. *J Fujian Med Univ*. 2001;1(01):29–31.
22. Williams J, Mackinnon DP. Resampling and distribution of the product methods for testing indirect effects in complex models. *Struct Equ Modeling*. 2008;15(1): 23–51.
23. Cleary M, Lees D, Sayers J. Loyalty in the workplace: some considerations for mental health nurses. *Issues Ment Health N*. 2018;39(4):366–368.
24. Church CD, He Z, Yarbrough S. Factors influencing organizational commitment and turnover in nurse residents. *J Contin Educ Nurs*. 2018;49(10):482–488.
25. Zhang Y, Huang L, Zhou X, et al. Characteristics and workload of pediatricians in China. *Pediatrics*. 2019;144(1):e20183532.
26. Orgambidez A, Borrego Y, Vazquez-Aguado O. Self-efficacy and organizational commitment among Spanish nurses: the role of work engagement. *Int Nurs Rev*. 2019;66(3):381–388.
27. Li NN, Li H, Shi XC, Jiang YN, Zhao J. Investigation and analysis of multi-grades psychological status of eight-year undergraduates in clinical medicine. *Basic Clin Med*. 2020;40(01):141–144.
28. Kung PC, Huang HL, Che HL, Chou YF, Chi SF, Tseng SM. Effectiveness of clinical mentorship program for students of long-term aged care: a mixed-methods study. *Nurs Educ Today*. 2023;125(1):105781.
29. Walter JK, Terry LM. Factors influencing nurses' engagement with CPD activities: a systematic review. *Br J Nurs*. 2021;30(1):60–68.
30. Ying W, Mingxuan L, Qian Z, Shuxian Z, Yufang G, Kefang W. The mediating role of professional commitment between the clinical learning environment and learning engagement of nursing students in clinical practice: a cross-sectional study. *Nurs Educ Today*. 2023;121(1):105677.
31. Yu H, Huang C, Chin Y, et al. The mediating effects of nursing professional commitment on the relationship between social support, resilience, and intention to stay among newly graduated male nurses: a cross-sectional questionnaire survey. *Int J Env Res Pub He*. 2021;18(14):7546.
32. Muca E, Molino M, Ghislieri C, et al. Relationships between psychological characteristics, academic fit and engagement with academic performance in veterinary medical students. *Bmc Vet Res*. 2023;19(1):132.
33. Liu X, Ji X, Zhang Y. Trajectories of college students' general self-efficacy, the related predictors, and depression: a piecewise growth mixture modeling approach. *Heliyon*. 2023;9(5):e15750.
34. Ingarianti TM, Suhariadi F, Fajrianthi F, Kristiana IF. The effect of antecedents of teachers' subjective career success. *Int J Env Res Pub He*. 2022;19(17):11121.
35. Chang HY, Tsai WY, Huang YL. Dialogues with human books to promote professional commitment and learning among first-year nursing students: a mixed-methods study. *Nurse Educ Today*. 2024;132(1):106010.
36. Li D, Xu H, Kang M, Ma S. Empathy in Chinese eight-year medical program students: differences by school year, educational stage, and future career preference. *BMC Med Educ*. 2018;18(1):241.
37. Sun BZ, Li JG, Wang QM. *Construction and Application of Clinical Competency Model in China*. The People's Health Publishing House; 2015.