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## High- and low-achieving international medical students' perceptions of the factors influencing their academic performance at Chinese universities

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### ABSTRACT

China has become an attractive destination for international medical students, particularly those from developing countries in Asia and Africa. These students are known to face difficulties in adapting to Chinese medical universities and they tend to score poorly on subsequent examinations to enter the medical profession in their home or in a third country. To date, limited research concerning the factors that affect the academic performance of this group of students in China has been conducted. In particular, there have been very few comparisons between high and low achievers to identify the factors that high- and low-achieving international medical students in all years of study perceive as affecting their academic performance. A qualitative research approach was implemented at two medical universities. Semi-structured interviews were conducted with 18 high achievers and 22 low achievers in their second, third, fourth, fifth, sixth, and post-graduation years. Interviews were audio-recorded, transcribed, and coded using a thematic analysis approach. A few key overlapping factors were identified: social support, learning motivation and interest, exam preparation and strategies, time management, and coping. The high achievers manipulated these strategies successfully while the low achievers did not. The high achievers demonstrated efficient learning methods (efficient use of class time, good note-taking habits, preview and review strategies, expanded learning, self-study and group learning, deep learning, choosing an appropriate study location, and focusing on basics and concepts). They also achieved a good balance between studying and leisure. The low achievers mentioned learning challenges, health issues, English language barriers, and problems with online classes. This study allowed us to identify important factors that international medical students at Chinese institutions perceive to influence their performance. The findings contribute to the literature on the topic and provide a solid basis for practice and policy development.

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International medical education; undergraduate; high achievers; low achievers; academic performance; Chinese universities; higher education

## Background

Undergraduate medical education for international students in China was originally offered in the early 2000s and has been growing rapidly ever since [1]. Many international students, especially those from developing countries in Asia and Africa, set their sights on China to study medicine because of its reputation for high-quality education and promising career prospects [2,3]. These students come to Chinese medical universities to undertake a Bachelor of Medicine and Bachelor of Surgery (MBBS) degree, which is granted after students have completed the required coursework and internship. In China, the MBBS programme uses English as the medium of instruction and is taught separately to local and international students. The curriculum typically consists of 5 years of pre-clinical (natural science, basic medical science, and Chinese language) and clinical subjects, with a further year of internship before the final degree is

conferred [4]. Rotational internships can be completed either in designated Chinese hospitals or in students' home countries, depending on the students' preferences and their governments' requirements. Each medical university typically designates one member of the academic staff to oversee MBBS student affairs and teaching, and Chinese teachers who are perceived by the university to speak adequate English are responsible for teaching the course. International students and their Chinese counterparts usually have separate classes and accommodations.

The MBBS programme is under the direct supervision of the Ministry of Education in China (MOE). Forty-five universities and colleges are officially authorised by the Chinese MOE to recruit international medical students [5]. The universities have quota limits, so the total annual intake for all the eligible universities tends to be less than 4,000 [5]. These universities and colleges are recognised by the

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Medical Council of China and the World Health Organisation (WHO) in the World Directory of Medical Schools, and the medical degree granted by these authorised medical universities and colleges is valid throughout the world. Students who have completed this degree are eligible to sit a range of local examinations, such as the United Medical Licensing Examination (USMLE) in the U.S., the Professional and Linguistic Assessments Board (PLAB) test in the U.K., the Medical Council of India (MCI) Screening test in India, the Pakistan Medical and Dental Council (PMDC) Screening test in Pakistan, and the Nepal Medical Council (NMC) Screening test in Nepal. An overwhelming majority of MBBS students are from low- and lower-middle-income countries in Asia and Africa, and these students usually set the career goal of returning to their home country after graduation to serve the local healthcare system. A small number of students choose to migrate to higher-income countries to work or continue their studies [4,6]. After graduation, these students make valuable contributions to the global health workforce and to the local and national healthcare systems of either their home country or another country.

One serious reported issue is that only a minority of international medical graduates from China pass license exams in their home countries [7,8]. According to data from the Indian National Board of Examinations, between 2015 and 2018, only 11.8% of Indian MBBS graduates from China who attempted the Foreign Medical Graduate Screening Exam passed. This is concerning because a considerable proportion of the international medical students in China are Indian. These low pass rates are also observed in other countries: for example, between 2016 and 2018, the average pass rate of MBBS graduates from China in the licensing exams of the NMC was only 32%. This low success rate in the exam that determines whether a student obtains a licence to become a medical doctor has given rise to concerns about the quality of international MBBS education in China [9]. In this context, understanding the factors that contribute to the academic success of these students is essential. Academic performance is critical for students, parents, medical institutions, societies, and governments [10]; therefore, it is imperative that educators in Chinese medical institutions identify the causes of students' success and failure. Such information is important for ensuring that medical education is of high quality, helping students to succeed in their studies and achieve their career goals in the future [11].

The progress of international medical students who are completing their studies in an unfamiliar country can be affected by many factors. Studies have suggested a range of factors influencing the academic achievement of international students.

These factors include students' prior academic performance [12], their English language proficiency [13], their financial situation [14], their level of acculturation [15], the amount of social support they can rely on [16], their self-efficacy [17], influences from teachers [18], the availability of support services and a good learning environment [19], and their use of coping strategies such as help-seeking behaviour [18] or suppressive coping (i.e., avoidance of coping activities or denial of problems [20]).

While common factors have been identified across all of the countries studied, country-specific factors have also emerged, perhaps reflecting variance due to culture or regional geo-political influences. Studies conducted in the U.S., Saudi Arabia, Germany, Malaysia, and Jordan [e.g [11,21–23], have revealed that the factors affecting medical students' academic performance include age, gender, marital status, English language proficiency, ability to socialise, social support, and coping strategies. Important factors identified in other studies include individual resilience [24], time spent socialising [10], class attendance [25], participation in extracurricular activities [11], stress management [22], and the length of the commute to college [11]. In Chinese medical schools, factors related to students' metacognitive strategies, emotional engagement, and extracurricular learning input seem to play a role in students' learning outcomes [26]. Other factors include entrance college examination grades and family environment (including whether the student is an only child, the level of parental care and support, and parents' level of involvement in their children's study [27]).

In terms of actual study processes and achievement, the influential factors include students' learning motivation [e.g [24,28], and their study methods [21,25]. Successful study methods include time devoted to study, studying alone, deep learning, group learning, self-quizzing, time management, the use of test-taking strategies, the effective use of learning resources, and awareness of one's own performance [e.g [23,25,28]. Based on a survey in India, Das et al. [29] reported that concentration, comprehension, exam anxiety, organisation, research aptitude, computer skills, and note-taking skills all influenced medical undergraduate students' learning. In Jordan, having a part-time job, smoking, and daytime sleepiness were found to be negative influences [23]. In a U.S. medical school, Artino et al. [30] found that compared with high-achieving medical students, low achievers reported lower task value and self-efficacy beliefs while also reporting more anxiety, frustration, and boredom in self-regulated learning.

Some of the studies above compared high achievers and low achievers, thereby providing valuable insights into the effective study strategies of high performers as well as the problematic academic

attitudes and behaviours of struggling students [21]. However, there were limitations in these studies: Todres et al. [28], for example, only interviewed intermediate and final-year medical students, while Foong et al. [24] studied only first- and second-year students. The survey study by Artino et al. [30] was limited to second-year students. More complete coverage of students across all stages of study is needed to reveal the full set of factors that differentiate high-performing from low-performing students.

Navigating the specific professional and disciplinary nature of the medical field as an international student can create additional burdens. Mann et al. [31] reported that international MBBS students underperformed compared with local Australian students due to their limited English proficiency, and that within the group of international students they surveyed, students speaking Sino-Tibetan languages were at a particular disadvantage. Treloar et al. [32] found that in an Australian medical course that used the problem-based learning approach, the performance of international students was hindered by financial pressures, perceived racism, lack of faculty support, and a sense of instability. Tavakol and Dennick [33] noted that Asian international medical students who are studying in North American, European, and Oceanic universities may struggle to follow some pedagogical approaches (e.g., problem-based learning), and their preferred learning method of memorisation – socialised through their education in their countries of origin – may be misperceived as rote learning by their teachers.

In Chinese universities, international medical students are likely to encounter challenges that are not commonly reported in studies conducted in other countries that attract international medical students (usually located in Europe, North America, and Oceania). For instance, international students in China are often confronted with language barriers when trying to communicate with Chinese patients who do not speak English during their hospital clerkships and rotational internships [34–36]. This barrier can be detrimental to their practical learning and to the improvement of their communication skills [34,35]. The lack of standard medical textbooks is another significant challenge facing both teachers and students, making education inconsistent across institutions [37–39]. Other challenges that have been raised in specialised Chinese journals include an undersupply of qualified lecturers and clinical teachers, a lack of English language proficiency among both teachers and students, and overly didactic teaching methods [36–38]. However, much of the Chinese research to date consists of reports without empirical evidence, and more studies targeting the academic success of international students are needed.

Given the continuing trend for medical training in China to attract international students, the progress of these students requires further study. The exploratory study reported here aimed to identify the factors associated with academic performance in a sample of international students studying medicine in China. Such information is of value for the delivery of courses in the future, as well as for policy development more broadly.

## Method

### Participants

The participants in this study were selected from two medical universities (i.e., Xuzhou Medical University and Nanjing Medical University) offering a 6-year MBBS programme in Jiangsu province. English was the medium of instruction in these programmes, but the instructors were native Chinese speakers. During the first year, international students in both programmes took liberal arts subjects, chemistry, mathematics, physics, cell biology, immunology, embryology, and Chinese language. In the second to fifth years, they learn basic medical science, took clinical subjects, and attended clinical classes conducted in hospitals. In their sixth year, students completed an internship in China or their home country. International students have a specific curriculum, take classes separately, experience different linguistic means of instruction, and use different textbooks than the ones used by Chinese students. This places the international students in a separate educational strand that differs significantly from that the Chinese students take, thus making any comparison between the challenges, difficulties and academic performance of international and national students very difficult to accomplish.

A combination of purposive sampling and extreme sampling was used in this study. The university administration and academic staff at both universities were asked to help us identify and recruit high-performing and low-performing international students. The university staff categorised these two groups of students based on students' cumulative academic scores in each cohort (i.e., academic year). Three students each from the extreme ends of these scores (three highest scorers and three lowest scorers) were invited to be interviewed. For example, a participant who was interviewed in their fourth year would have their scores from all three previous years assessed and compared to rest of the students from the same academic year and if they were among the three highest or lowest scorers, they would be eligible to be interviewed. Purposive sampling was used to target international medical

students, and the selection of extreme cases (high and low achievers) allowed us to gather 'illuminative cases' that helped us to contextualise success and lack of success [40].

These combined sampling approaches are appropriate for studies concerned with how things could or should be [41]. They also facilitate evaluation of the implementation of learning programmes in specific contexts through an examination of both successful and unsuccessful outcomes [42]. For example, to study the challenges related to teaching citizenship education in social sciences courses in Turkey, Ersoy [43] selected students and teachers according to the economic background of the educational institution (high and low socioeconomic status).

In our study, 18 high-performing and 22 low-performing students were recruited and attended our interviews. Three low achievers who had already graduated declined our interview invitation. The recruitment of interviewees was guided by data information saturation [44], meaning that recruitment stopped when data information saturation was achieved. The data reached a saturation point after 37 interviews, but 3 more interviews were conducted to confirm the saturation state (one in the high performing group, and two in the low performing group). These 3 additional interviews confirmed the saturation state of the interviews but also validated further the saturation, since no new elements or dimensions resulted from doing them [44]. Information about the participants can be found in Table 1. These students were in their second, third, fourth, fifth, sixth, and post-graduation years. They were also reasonably well balanced in terms of gender, and most of them were from Africa (essentially sub-Saharan countries) and Asia (South Asian and Southeast Asian countries). Ethics approval was obtained from the Research Ethics Committee of Xuzhou Medical University (ethical consent agreement number from Xuzhou Medical University is

XZMU20190028; ethical consent agreement number from Nanjing Medical University is NJMUIRB774).

### Data collection

Semi-structured individual interviews were conducted between September 2020 and January 2021. They included predetermined questions that acted as prompts to engage the interviewees in a directed conversation without placing constraints on the interviewee's exposition of their ideas or insights, thus allowing for flexibility and openness in the interview process (as recommended in the methodological literature, see [45]; the interview script can be found in the Appendix). The interviews were conducted in English language, which all the interviewees have knowledge of. Due to the COVID-19 pandemic, both face-to-face and online interviews were conducted depending on the student's location. Nine students were interviewed in person in a quiet, comfortable meeting room on campus. These participants signed a written consent form in front of the interviewer. The other 31 students were interviewed online using platforms such as WeChat and Skype. In these cases, the interviewer sent a written consent form to these students via email, and the students printed it out, signed it, and sent an electronic version back to the interviewer.

The Interviewer was a trained doctoral student. She was acquainted with some of the students, so she was able to create a relaxing atmosphere that encouraged them to speak freely while also striving to maintain the neutrality recommended for interviewing practices [46]. A reflective journal entry was kept during interviews and data analysis to minimise any potential interviewer bias. The interviewees were asked to think carefully about their learning experiences in the Chinese university and to identify factors that had helped them to succeed or had been a hindrance.

Participation was voluntary and informed written consent was obtained before the interviews. Each interview lasted between 40 and 80 minutes and was audio-recorded. The data were kept confidential and used for research purposes only. Consent to publish details of the interviewees has been obtained from all the participants.

### Data analysis

The interview audio files were transcribed verbatim into text and the transcripts were coded manually by the first author. Following the thematic analysis approach proposed by Braun and Clarke [47], the first author began by immersing herself in the data and noting key words and phrases. Initial codes were generated based on these words and phrases. The

**Table 1.** Participant profile.

	University A	University B	Total
<b>Participants</b>	27	13	40
<b>Gender</b>			
Male	11	7	18
Female	16	6	22
<b>Continent of origin</b>			
Africa	10	2	12
Asia	17	10	27
Other continents	0	1	1
<b>High achievers</b>	12	6	18
<b>Low achievers</b>	15	7	22
<b>Cohort</b>			
2019	2	2	4
2018	2	2	4
2017	2	2	4
2016	5	3	8
2015	6	2	8
2014	5	2	7
2013	4	0	4
2012	1	0	1

initial codes were then summarised into potential themes and refined by consensus within the research team (i.e., the other authors) via discussions about and adjustments to the emerging and established themes. Member checking, peer auditing, and reflective journaling were conducted to increase trustworthiness [48].

## Results

Factors that high achievers perceived as influencing their success

### ***Theme 1: efficient learning methods***

The transcripts revealed eight learning methods that the students perceived to be helpful. The most common prerequisite for learning was identified as attending class regularly and punctually and maintaining full concentration. If a class was considered not to be very interesting, the students often opted to study on their own by reading textbooks or watching medical videos.

I normally pay at least 90% to 95% of full attention to my class, which makes the half of my study, so the rest of half is recalling and reviewing the content. That makes it easy, I guess.

Study self-management was also evident, with many high achievers mentioning that they reviewed the syllabus both before and shortly after class. They also stressed the 'good habit' of taking notes during class and creating one's own notebook, which included copies of the teachers' slides and extra readings taken from online materials and other sources. The high-achieving students also expanded their learning by reading other textbooks, watching online videos and lectures, and asking more senior students for help.

As one high achiever stated:

I never limited myself to slides and the textbooks recommended by the school ... It is important for me to have at least two to three international-based textbooks on one subject ... incorporating videos, case files...

The high achievers also took advantage of group study sessions with friends or roommates to discuss topics and teach each other. They chose a suitable location for this: the library, a classroom, their dorm, or a quiet place on campus. They also engaged in 'deep learning' strategies (e.g., mind mapping) to remain fully focused and active while reading. This ensured that they fully understood and retained the subject matter rather than having to cram immediately before exams. These students focused on learning concepts and basics rather than cramming.

### ***Theme 2: adequate social support***

All 18 of the high achievers stated that they received adequate social support from many sources, including family, friends, roommates, classmates, senior students, locals, teachers, administrators, and romantic partners. They benefited significantly from having families that provided emotional and material support, being surrounded by friends who were cooperative and healthily competitive, receiving guidance from senior students, having cooperative and understanding roommates, and receiving guidance and support from teachers.

My family is like a pillar ... encouragement from the family raises my morale to study extra hard ... [this is] one of the huge driving forces for my success.

### ***Theme 3: high learning motivation and interest***

The high-achieving students demonstrated strong learning motivation and interest in medicine. They maintained positive attitudes towards their studies and clear career goals. These students aimed to be consistent and focused on their studies, and they consciously strove to stay on their path. University scholarships and good grades were also important external motivators.

I only have one focus: to become a doctor.

If you want to do well in medicine, you need to study hard and concentrate ... Academics is your career, sports is not ... [do] not deviate your focus to something else like going after girls or concentrating on sports.

### ***Theme 4: adequate exam preparation and completion strategies***

Eleven of the high achievers (61%) mentioned that it was important to allocate a sufficient number of hours to early exam preparation. They used practice papers provided by teachers and carefully reviewed their notes and slides. They also took short breaks while studying for exams. During exams, some of the high achievers would try to sit in the first row of the exam hall to avoid distractions from classmates. One student had noticed that, possibly because of the language barrier, the teachers would understand and accept answers only if the students used the exact words found on the slides or learning materials in their answers on the exam paper. In the exam, she would write these words down first before continuing in her own words to demonstrate her understanding. This strategy helped her receive high grades.

When we had exams in December, I would start preparing for them in September. That was the main study phase for me. Prepare early and I can be cool in the exam.

### **Theme 5: maximising time for study**

Ten of the high achievers (56%) viewed studying as the most important task in their lives and reserved a large amount of time for study. They curtailed their social lives to have more time to study.

I always think about study because I don't party, I don't go out, I don't waste time. We have to study at least 15 or 16 hours a day.

Another student shared how she used her free time to study:

Besides my bath time and work, even when I am taking my breakfast, lunch, and dinner, I used to watch educational videos or go through my notes.

### **Theme 6: keeping a balance between study and leisure**

Eight of the high achievers (44%) mentioned that they took small breaks from studying and participated in extracurricular activities to keep their minds fresh and avoid becoming stressed. One student described her experience as follows:

My first and main point was not stressing myself but calming myself, so everything is clear in your mind. I participated in some extra-curricular activities like singing or volunteering, and I didn't stress up in the book always.

### **Theme 7: use of active coping mechanisms**

The high achievers adopted more active coping strategies when facing academic difficulties that were due, for example, to teachers' poor command of English, learning difficulties, or stress. They showed resilience, maintained a positive attitude, and actively thought about how to address these problems. These students approached their teachers, peers, and friends for help; adjusted their learning strategies; searched for information online; and consciously motivated themselves. As one student explained:

We can send teacher emails ... They have time to collect thoughts and reply to us in a way that we can understand. After class, we talk to teachers to get their WeChat. Sometimes, we go and meet them in their office ... They will try their best to reply to our questions.

Factors that low achievers perceived as influencing their poor performance

### **Theme 1: poor time management**

A vast majority (91%) of the low achievers indicated that they often spent time on non-academic activities, such as using social media, watching movies, playing video games, engaging in sports, sleeping, grocery shopping, roaming around the city, chatting with friends, cooking, doing chores, participating in extracurricular activities, or investing in unsuccessful romantic relationships. Procrastination and prioritising laboratory-based research over academic study severely affected their progress.

I didn't manage time well enough. Laziness is the biggest problem ... In the past five years, in my free time I slept, I used social media like Twitter and other things but not reading.

### **Theme 2: difficulties with the programme content**

Sixteen of the low achievers (73%) reported that they had encountered difficulties with the Chinese language, mathematics, chemistry, physics, and medical subjects. Some of the students had weak prior knowledge in the natural sciences. They regarded basic medical subjects and clinical subjects as too complex and broad, overly challenging, and requiring a great deal of memory work and difficult medical terminology. The low-achieving students were unable to understand some of the topics clearly and did not know where to focus.<sup>1</sup> 41% of these students said that they could not understand the lectures because the teachers spoke poor English and read the lecture slides verbatim without explanation. They attributed their exam failure to these issues.

I failed neurology. Neurology is complicated, very difficult for me ... I don't understand what teachers are talking about because of their poor English and explanation. I had to teach myself, but I still could not understand some material. That is the main reason I failed.

### **Theme 3: low learning motivation and negative attitudes**

Low motivation to study was reported by 73% of the low achievers. They described this as laziness, lack of willpower to study, being immature, preferring to enjoy life, and not being serious about studying. They tended not to be interested in learning Chinese, mathematics, chemistry, and physics in the first year, and to prioritise selected courses that they perceived as more important than others.

In the first year, I was not serious because I was more focused on enjoying my life. I didn't read much ... I was not really hardworking.

### Theme 4: insufficient exam preparation and test-taking strategies

Issues with examination preparation were mentioned by 68% of the low-achieving students: having to cram for exams, devoting inadequate time to exam preparation, focusing their study on lecture slides rather than textbooks, cramming before exams, and not getting enough sleep. For these reasons, several students perceived exams to be too difficult.

Two days before exams, I started my preparation. For mathematics, I studied for only one night from 12 am to 8 am ... For Chinese, I did not study anything ... Now I think it was a great mistake that I didn't give my best to exams.

Leaving blank spaces in answers to exam questions was perceived to be an unwise strategy that led to a higher chance of failing.

While writing in exams, I used to leave blanks. I only wrote what I knew. The teacher told me not to leave blank, otherwise there was a high chance of failing you. I think this is one of the reasons why I failed in some exams.

### Theme 5: health issues

Over half of the low achievers reported health issues that affected their performance. Due to the cold weather in winter, some of the students fell ill and could not wake up early in the morning, leading to poor class attendance. Falling sick during exams, in particular, negatively affected their performance. 33% of the low achievers reported having experienced depression caused by loss of family members, study stress, exam anxiety, fear of failing, homesickness, loneliness, or culture shock. This depression was another perceived cause of their academic failure.

In my second year, I failed four subjects. I was worried I would not be able to become a doctor. I felt so stressed that I could not focus on study and got delusions. I had to go back home to receive treatment before I resumed my study.

### Theme 6: inadequate social support

Lack of social support was mentioned by 37% of the low achievers. In particular, the participants perceived that not receiving family support, feeling pressure from their families' high expectations, a lack of friends, negative interactions with roommates, and being too introverted to ask for help had contributed to their academic failure.

My family gave support, but not so much. Most of them are trying to be better with what they are doing. I am a little bit independent. So sometimes, I don't talk to them about my problems, because

I feel they also have their problems to deal with ... I try to live alone, trying to take care of my issues.

### Theme 7: English language barriers

Seven of the low achievers did not have English as their first language. These participants explained that their insufficient English language proficiency was detrimental to their learning. They had trouble reading English medical books, understanding teachers (whose own English language was often poor), and communicating with them in English.

I didn't understand so much English because in India, we learned in Hindi language. Therefore, it was hard for me to change into English medium. Sometimes I understood, but still it was hard for me. I failed in exams just because of my English.

### Theme 8: online classes

Due to pandemic-related policies, some of the international students enrolled at Chinese universities attended classes online. The participants in this study reported a range of problems with online classes, including network instability, lack of teacher – student interaction, increased workload, difficulties concentrating, and emotional fatigue. These problems were perceived to make learning more difficult and less productive.

Online classes are more difficult ... The teacher can teach the whole topic in one video while offline we can take a week. Offline, teachers are slower in presenting and you can understand more. But online, they just recorded a video, they can't interact, they can't see if you understand or not.

### Theme 9: maladaptive coping mechanisms

The low achievers tended to become more passive and less resilient when confronted with the difficulties described above. Rather than proactively trying to cope with their problems, these students tended to resort to complaining or retreating.

I encountered many challenges and felt a lot of pressure ... I had a lot of courses and exams in the third year. At that time, I felt like just stopping medicine, to change the course.

## Discussion

As governments often evaluate the quality of medical education according to student performance, it is important that Chinese medical schools identify the factors that contribute to international students' success and failure. The interviews conducted for this study provided opportunities for international students to reflect upon their learning [28] and discuss

**Table 2.** Perceived factors affecting the academic performance of high and low achievers.

Factors contributing to high achievers' success	Factors hindering the performance of low achievers
1. Efficient learning methods	1. Poor time management
2. Adequate social support	2. Learning challenges
3. High learning motivation and interest	3. Inadequate exam preparation and strategies
4. Strong exam preparation and test-taking strategies	4. Low learning motivation and interest
5. Maximisation of time to study	5. Health issues (physical and mental)
6. Balance between study and leisure	6. Inadequate social support
7. Use of active coping mechanisms	7. Language barriers
	8. Ineffective online classes
	9. Use of passive coping mechanisms

the key factors that they perceived to have influenced their success or failure in the MBBS programme. Most of the findings in this study are consistent with those of previous studies, but new themes have also emerged (Table 2).

The findings in this study are in keeping with data from other settings [e.g. 24,25]. The success of high achievers was related to strong learning motivation and interest, efficient learning methods, good time management, strong exam preparation and test-taking strategies, the use of active coping strategies, and social support. The poor performance of low achievers was associated with a lack of these advantages. The new findings of this study are as follows: (i) the positive role that a balance between study and leisure plays for high achievers, (ii) the high achievers' effective use of class time; (iii) the importance of expanded learning, and (iv) the importance of learning concepts and basics. Students with different genders and continents of origin were almost evenly distributed among high and low performing students and reported similar factors affecting their performance to those reported by other groups. No differences were found by year of study of the students, suggesting that the factors relative to high and low performance found in this study apply broadly to all students.

The low achievers in this study struggled because of learning challenges, health issues, English language barriers, and problems with online learning. Learning challenges for medical students are rarely reported in the literature, probably because most of the students admitted to such courses have achieved good results throughout their school years. However, the finding that low achievers' poor academic knowledge of basic natural sciences led to learning struggles and exam failures is consistent with McKenzie and Schiweitzer's [12] finding that students' college entry score predicted their college GPA. This suggests that during recruitment, attention should be paid to applicants' prior academic achievement in subjects relevant to the natural sciences.

An important finding with clear implications for the improvement of medical courses in China is that lecturers' often weak English language abilities and their teacher-centred, monotonous teaching styles

may impede student learning. There is an urgent need to improve the English language skills and pedagogical knowledge of teaching staff at these Chinese universities.

Language difficulties also affect students. The results of this study affirm the finding of Salih et al. [11] that English proficiency is a vital factor in medical students' academic performance. Students with poor English struggle a great deal. This suggests that there should be a stricter assessment of English language proficiency before admission, and that English language support systems should be developed to help low achievers improve their English after entry.

The finding that online learning was a problem for some of the international students concurs with several studies that have reported the same difficulties [2,49]. Although much of the turn to online learning occurred because of the COVID-19 pandemic, and it is hoped that medical training courses will return to face-to-face learning when the pandemic is over, it is also likely that online teaching and learning will become a more permanent component of learning in the post-pandemic world. Online education therefore demands considerable research attention [50]. In this particular context, lecturers had to work to adapt to online learning [51], and this effort should not be dismissed. However, in view of the challenges reported by the students in this study, it is important that universities take measures to improve the online teaching and learning experience for students by soliciting timely feedback from teachers (e.g., responses to students' questions and grading of online assignments), making the online learning experience more interactive, and being more attentive to student feedback regarding the challenges they face when dealing with online learning.

The low achievers in this study also attributed their weak performance to physical and mental health issues. This is consistent with the finding of Thomson et al. [52] that medical students' coping ability and social support are related to their physical and mental resilience. Suffering from mild illnesses, such as the common cold in winter, may be related to a lack of self-care or preparedness. For this reason, universities should promote self-care behaviour and provide students with access to psychological counselling and social support.

## Implications for policy and practice

The findings of this study have important implications for policy and practice. First, students with good academic records in science subjects, such as mathematics, physics, chemistry, and biology, should be given priority during recruitment. Students who have demonstrated good English language proficiency should also be primary recruitment targets. Admitting students with a strong academic background in key disciplines can to some extent reduce the likelihood of academic failures. Second, workshops, seminars, and mentoring programmes can be implemented so that high achievers can share their successful learning experiences and provide guidance and recommendations to their peers. Mentoring programmes that pair high achievers with lower-achieving students can also create bonds based on mutual support, friendship, and joint study that will eventually benefit both students. They may also prevent lower-achieving students from entering into cycles of social isolation, stress, and mental strain. Universities should aim to identify the academic struggles and needs of low-performing students at an early stage and to support their education through the implementation of targeted remediation and counselling services. Staff should try to remember that students' success is universities' success. Targeted interventions can motivate this group of students, help them to improve their language and time management skills, and assist them in developing learning and coping strategies. The low achievers in this study tended not to seek help, so universities should be alert to this possibility and proactively provide low achievers with pastoral care and social support. It is also necessary that academics create a conducive learning culture in which students feel that it is normal to encounter learning difficulties and in which they feel safe seeking help.

## Limitations

The main limitation of this study is that the data were only collected from two medical universities located within a single province. The English proficiency of lecturers and the availability of support services may be better in other Chinese universities. It would be useful to investigate this issue more widely, involving a greater number of universities from several provinces in China. Another limitation of this study is that it relied solely on students' own accounts. It is possible that these students may not have an objective appreciation of their own actions and abilities. However, at the same time, it is also unlikely that students are unaware of the actions and behaviours

that led them to obtain a particular academic result. In future studies, this limitation could be addressed by taking a longitudinal qualitative perspective and following students' educational journeys while objectively assessing their actions, behaviours, strategies, and grades on a continual basis.

## Note

1. It is relevant to note that both high and low achievers said that some disciplines were harder to understand than others. However, neither group perceived the sheer volume of study material as overwhelming. It seems as though the amount of study material was taken as a given by the students, perhaps seen as a natural outcome of the development of health sciences and the medical profession.

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## Consent for publication

Consent to publish details of the interviewees has been obtained from all the participants.

## Contributions

Qinxu Jiang collected the data, analysed and interpreted the data, drafted the paper, revised it critically for intellectual content, and gave final approval of the version to be published. Hugo Horta analysed and interpreted the data, drafted the paper, revised it critically for intellectual content, and gave final approval of the version to be published. Mantak Yuen drafted the paper, revised it critically for intellectual content, and gave final approval of the version to be published. All authors agree to be accountable for all aspects of the work.

## Data availability statement

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data is not available. Requests for data can be considered and if considered reasonable are available from the corresponding author Hugo Horta ([horta@hku.hk](mailto:horta@hku.hk)) or Qinxu Jiang (e-mail: [jiangviolet86@hotmail.com](mailto:jiangviolet86@hotmail.com)).

## Ethics approval and consent to participate

Ethical approval was obtained from the Ethics Committee of Xuzhou Medical University and the Academic Ethics and Ethics Committee of Nanjing Medical University. All participants gave written informed consent to participate before interviews began. The entirety of the research, including data collection and methods was carried out in accordance with relevant guidelines and regulations.

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## Appendix

### Interview Script

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#### Questions

1. What motivated you to study medicine?
2. What were the reasons to choose China as your destination to study in the MBBS program?
3. What do you consider is necessary for one to be successful in the MBBS program?
4. Have you encountered challenges or difficulties in your academic learning in China? If yes, what were they? How did you cope with them? If not, why do you think you have not encountered any challenges or difficulties (for both possible answers; any examples?)
5. Have you encountered challenges or difficulties in your social life in China? If yes, what were they? How did you cope with them? If not, why do you think you have not encountered any challenges or difficulties (for both possible answers; any examples?)
6. Have you encountered challenges or difficulties in your wellbeing in China? If yes, what were they? How did you cope with them? If not, why do you think you have not encountered any challenges or difficulties (for both possible answers; any examples?)
7. Have you encountered other challenges that you think are significant to you? If yes, how did you cope with them? If not, why do you think you have not encountered any challenges or difficulties (for both possible answers; any examples?)
8. What do you think were the reasons that made you one of the top students in your whole batch? (for high achievers) (any examples?)
9. What do you think were the reasons that led you to failing in exams/staying down/having low exam scores? (for low achievers) (any examples?)

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