


Influence of Tutors' Overseas Experience on Doctoral Medical Students' Skill Development: A Comparative Study in China

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Background: Overseas study is believed to enhance health professionals' research capacity. This positive impact has been passed down through generations of medical students via their tutors. This study aims to quantify and compare the benefits of tutors' overseas study experience for basic and clinical medical students.

Methods: A structured questionnaire was administered to medical students in Harbin Medical University (HMU) and its affiliated hospitals, whose tutors have overseas study experience. The study included 263 basic students from HMU basic medicine (Group A) and 263 age-matched clinical students from the affiliated hospitals (Group B). Data were analyzed using SPSS software.

Results: Most students believed that their tutors' overseas study experience greatly enhanced their abilities. The total IF (Impact Factor) of articles published during their PhD study by Group A and Group B was, respectively, 4.639 and 3.791 ($P < 0.05$). The number of SCI papers during their PhD study and foreign language skills improvement scores by Group A and Group B was, respectively, 1.14 and 1.06 ($P > 0.05$). Significant differences were found between Group A and B in the mean scores for improvement in learning ability, idea renewal, research ability and international academic communication skills ($P < 0.05$).

Conclusion: Our study revealed significant associations between tutors' overseas experience and medical students' outcomes. Basic students with overseas-experienced tutors demonstrated higher research achievements, while clinical students reported greater perceived improvements in overall abilities. Our findings suggest that study abroad policies for medical tutors may warrant consideration, given the observed associations with student outcomes.

Keywords: ability improvements, Chinese medical students, tutors' overseas experience, medical education policies, studying abroad

Background

International education enables students to expand their knowledge, experience foreign cultures, and broaden their horizons.^{1,2} According to China's Ministry of Education (2022),³ over 80% of Chinese students studying abroad return to China after completing their education. A significant number of students studying abroad will have a direct impact on the growth of many parts of the industry once they return home. Most health professionals work in medical universities or affiliated hospitals after returning to China.

Studying abroad provides teachers with opportunities to develop a deeper appreciation for diverse cultures, adapt to social changes, and gain insights into varied health practices and disease profiles. Research has highlighted that physicians who studied abroad often reported enhanced motivation, broadened perspectives, increased confidence, refined clinical skills, and a more informed approach to choosing their medical specialties.⁴

The 2022 work plan of the China's Ministry of Education emphasizes that teachers are crucial for educational development and efforts should be made to build a highly qualified and innovative teaching faculty.⁵ Faculty development is closely tied to international exchange and global engagement. Programs such as overseas visiting scholar initiatives and international study opportunities expose educators to innovative teaching methods and advanced

pedagogical practices. Initiatives like visiting scholar programs enhance educators' pedagogical expertise and prepare them for interconnected academic environments.⁶ Our focus is to examine whether tutors' study abroad experiences influence their students' research achievements and perceived scientific skill development. Government-sponsored overseas education is a high-return investment and a strategic initiative essential for the country's long-term development. Optimal allocation of resources and an efficient study abroad program layout are crucial for achieving the best results. Recent studies in China's medical education system demonstrate that faculty members' international training experiences significantly enhance both their professional competencies and student development outcomes.^{7,8} Therefore, it is essential for medical colleges to promote the internationalization of medical education and enhance the quality and efficiency of study abroad selection.

China's medical education system employs a dual-track approach encompassing both basic medical sciences and clinical medicine, training professionals through integrated undergraduate-to-doctoral programs. Basic medical sciences focus on training researchers in fundamental medical studies, while clinical medicine develops clinician-scientists who integrate patient care with research. At the doctoral level, strict disciplinary boundaries are maintained, with faculty tutors guiding candidates exclusively within their fields. These tutors play a crucial role in doctoral training by overseeing research, providing academic guidance, and collaborating on projects. Nevertheless, the differential impact of tutors' international exposure on these two distinct training tracks remains underexplored. To investigate this gap, we implemented a cross-sectional study assessing: (1) student academic achievements across basic/clinical medicine programs, and (2) self-reported competency improvements associated with tutors' overseas experience. We specifically hypothesized that basic medicine students would demonstrate greater enhancement in high-impact publications (as measured by IF), attributable to their exclusive research focus, whereas clinical students' gains might be moderated by their dual clinical-academic commitments.

Methods

Harbin Medical University (HMU), which has nine affiliated hospitals, is a higher medical education research base established by the People's Government of Heilongjiang Province. It also implements the national high-level university public graduate program. As of May 2024, HMU has established academic partnerships with over 200 universities and research institutions across more than 20 countries, including Russia, the United States, Australia, Japan, and Canada. These collaborations create greater opportunities for faculty to engage in international study. Consequently, the number of tutors pursuing overseas education continues to rise each year.

The study was conducted from January 2015 to December 2023 and focused on doctoral graduates (PhD and MD degrees, which are unified as PhD in China) from the 2012 to 2019 cohorts whose tutors had overseas experience. In China, student cohorts are classified by their year of enrollment, with doctoral programs typically lasting 3–4 years. By 2023, students from the 2019 cohort had recently graduated, and to ensure a sufficient sample size, the study included cohorts dating back to 2012. Previous research indicates that tutors generally require 3–4 months to adapt to a new academic environment abroad.^{7,8} Consequently, study abroad periods of less than 6 months are insufficient to fully prepare an independent researcher. To maintain consistency, all tutors in this study had a minimum of 6 months of overseas study experience. To exclude the influence of students' ages on this study, we rigorously matched 263 students from HMU basic medicine (Group A), who specialize in basic research, with 263 students from the affiliated hospitals (Group B), who specialize in clinical medicine, based on their graduation ages. In order to exclude the influence of students' abroad experience on this study, all students had no overseas study experience.

The Science Citation Index (SCI) is widely recognized as the most authoritative tool for retrieving scientific publications and evaluating scientific research. Its IF serves as a key metric for assessing the significance of SCI-indexed papers. For instance, prior studies have noted that the Journal Impact Factor is frequently used in academic evaluations, including reviews, promotions, and tenure decisions, particularly at research-intensive institutions.⁹ While recognizing IF's limitations in assessing teaching quality,¹⁰ we employed it as a validated proxy for research mentorship effectiveness in academic evaluation. High-IF journals typically demand rigorous methodology and novelty—qualities that tutors must impart to their trainees. The number of SCI papers and their impact factors serve as quantitative indicators of an author's research capability and academic standing. Because authors' contributions to research vary,

there is no international system that can eliminate these discrepancies; therefore, we ranked authors using the “HMU Promotion System (2013)” to reflect this distinction. The paper’s first and corresponding author receives 100% of the IF, the second author receives 50% of the IF, and the third or subsequent author receives 25% of the IF.¹¹

To collect information effectively, we constructed a questionnaire presented in [Additional Material 1](#). The questionnaire is divided into two phases: (a) Basic information and close-ended questions, including age of graduation, number of published SCI papers and total impact factor during their PhD study, which has been used in our previous research;^{7,8} (b) Five open-ended questions about the experience and benefits of overseas study, covering the degree of improvement in foreign language skills, learning ability, idea renewal, research ability, and international academic communication skills. Students’ perceived attainment of the program outcomes was assessed using a 5-point Likert-type scale (1 = To a Minimal Extent; 5 = To a Very Large Extent). The questionnaire was filled out when the students graduated. Ethical approval was obtained from the Harbin Medical University Research Centre ethics committee (Approval Number: 2024376).

The questionnaires were self-administered, completely anonymized, and collected immediately after completion. All students received written and verbal information about the research project before signing a consent form to participate. Response rates were 100%. All data were anonymized to protect the respondents’ privacy. Data analysis for the quantitative measures was performed using SPSS for Windows, version 24 (SPSS Inc., Chicago, IL, USA). Continuous variables with normal distribution were presented as mean±standard deviation (SD) and compared by *t*-test. Non-normally distributed variables were reported as median (interquartile range) and analyzed using the rank sum test. Statistical significance was determined using $P < 0.05$.

Results

In this study, students of the two groups have the same age distribution, which ranged from 26 to 39 years (mean = 31.403 years). In both group A (specialized in basic research, $n=263$) and group B (specialized in clinical medicine, $n=263$), most students believed that their tutors’ overseas study experience had a very large extent impact on their foreign language skills (Group A: 104/263, 39.5%; Group B: 114/263, 43.3%), learning ability (Group A: 91/263, 34.6%; Group B: 115/263, 43.7%), idea renewal (Group A: 67/263, 25.5%; Group B: 91/263, 34.6%) and research ability (Group A: 92/263, 35.0%; Group B: 114/263, 43.3%). A majority of students thought that the influence of their tutors’ overseas study experience on their international academic communication skills had been achieved a considerable extent (Group A: 75/263, 28.5%; Group B: 83/263, 31.6%) (Table 1). Among the various effects of tutors’ overseas study experiences on students, the significant impact on foreign language skills was the most commonly identified by participants in both groups (Group A: 104/263, 39.5%; Group B: 114/263, 43.3%).

Table 1 Extent to Which the Number of Students Believed That Their Tutors’ Overseas Study Experience Delivered a Range of Desirable Outcomes

	Group	To a Minimal Extent	To a Lesser Extent	To a Moderate Extent	To a Considerable Extent	To a Very Large Extent
Foreign language skills	A	21(8.0%)	25(9.5%)	57(21.7%)	56(21.3%)	104(39.5%)
	B	19(7.2%)	20(7.6%)	29(11.0%)	81(30.8%)	114(43.3%)
Learning ability	A	22(8.4%)	31(11.8%)	60(22.8%)	59(22.4%)	91(34.6%)
	B	19(7.2%)	24(9.1%)	34(12.9%)	71(27.0%)	115(43.7%)
Idea renewal	A	31(11.8%)	38(14.4%)	65(24.7%)	62(23.6%)	67(25.5%)
	B	26(9.9%)	32(12.2%)	44(16.7%)	70(26.6%)	91(34.6%)
Research ability	A	21(8.0%)	27(10.3%)	53(20.2%)	70(26.6%)	92(35.0%)
	B	17(6.5%)	22(8.4%)	31(11.8%)	79(30.0%)	114(43.3%)
International academic communication skills	A	42(16.0%)	44(16.7%)	65(24.7%)	75(28.5%)	37(14.1%)
	B	29(11.0%)	39(14.8%)	49(18.6%)	83(31.6%)	63(24.0%)

Notes: Group A: Students from HMU basic medicine who are scientific researchers ($n = 263$); Group B: Students from the affiliated hospitals, specialized in clinical medicine ($n = 263$).

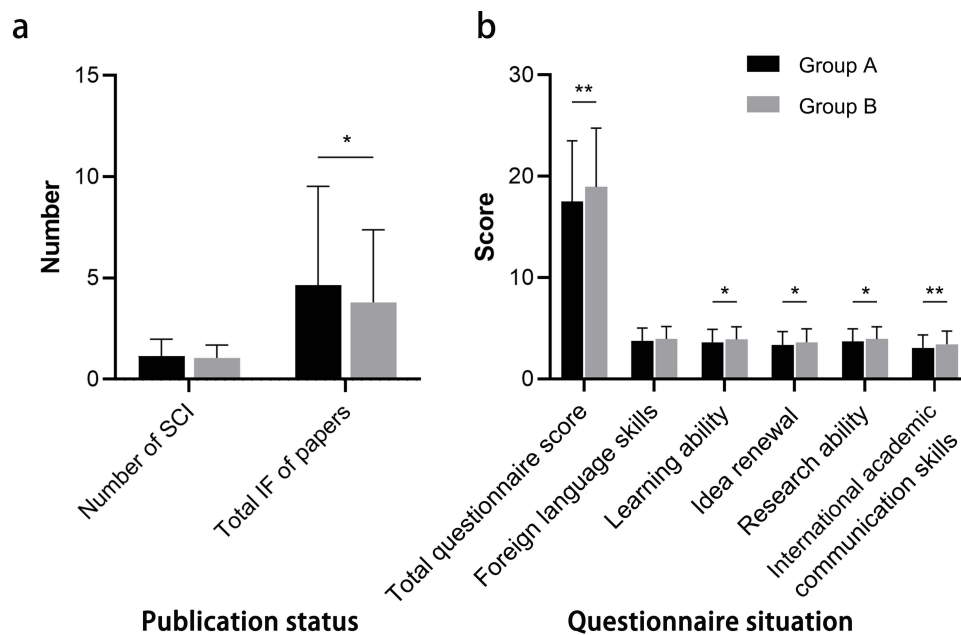


Figure 1 Comparison of research output (SCI publications and impact factors) and students' perceived competency improvements between group A and group B during their PhD study. (a) The number of SCI papers and total IF of papers between the two groups during their PhD study. (b) The total score of the questionnaire and each item score between the two groups. Group A: Students from HMU basic medicine, specialized in basic research; Group B: Students from the affiliated hospitals, specialized in clinical medicine; * $P < 0.05$. ** $P < 0.01$.

The number of SCI papers published by individual students from HMU basic medicine during their PhD study (Table 2, Group A) ranged from 0 to 10 (mean = 1.140), with a total IF during their PhD study ranging from 0.00 to 58.23 (mean = 4.639). In contrast, the number of SCI papers published by students from the affiliated hospitals during their PhD study (Table 2, Group B) ranged from 0 to 3 (mean = 1.060), and the total IF for papers published during their PhD study ranged from 0.00 to 34.23 (mean = 3.791). We found statistically significant differences between Group A and Group B for total IF during their PhD study ($P = 0.024$, Cohen's $d=0.07$), but the difference between the two groups for number of SCI papers during their PhD study (Group A mean=1.140; Group B mean=1.060; $P = 0.220$) was not statistically significant (Figure 1a).

The influence of tutors' study abroad experience on students is often multifaceted, and is not limited to the improvement of students' unilateral ability. Therefore, we use the total score of the questionnaire to reflect the level of influence on students in all aspects. The total questionnaire scores for Group A (Table 2) ranged from 5 to 25 (mean = 17.52), while the total questionnaire scores for Group B (Table 2) ranged from 5 to 25 (mean = 18.97). While statistically significant differences were observed in total questionnaire scores between Group A (basic medicine, $M=17.52$) and Group B (clinical medicine, $M=18.97$), $P = 0.005$, the effect size was modest (Cohen's $d=0.25$). This suggests that although tutors' overseas experience was consistently associated with positive outcomes across groups, the absolute differences in perceived benefits were relatively small. A 5-point scale was used to assess and quantify the students' subjective evaluation of their tutors. The single score of each item in the questionnaire ranged from 1 (lowest) to 5 (highest). We performed a Cronbach's alpha analysis on the 5-point Likert scale items (526 responses in total). The results indicated high internal consistency ($\alpha=0.959$ for the overall scale), exceeding the threshold of 0.7 and meeting acceptable reliability standards. There were significant differences between Group A and Group B in mean scores for the degree of improvement in learning ability (Group A mean=3.630; Group B mean=3.910; $P = 0.013$, Cohen's $d=0.81$), idea renewal (Group A mean=3.370; Group B mean=3.640; $P = 0.018$, Cohen's $d=0.75$), research ability (Group A mean=3.700; Group B mean=3.950; $P = 0.021$, Cohen's $d=0.83$) and international academic communication skills (Group A mean=3.080; Group B mean=3.430; $P = 0.002$, Cohen's $d=0.69$). The difference in foreign language skills improvement scores between the two groups was not statistically significant (Group A mean=3.750; Group B mean=3.950; $P = 0.061$) (Figure 1b).

Table 2 Comparison of Research Output (SCI Publications and Impact Factors) and Students' Perceived Competency Improvements Between Group A and Group B During Their PhD Study

	Group	N	Mean	SD	t	P
Number of SCI papers	A	263	1.140	0.845	1.228	0.220
	B	263	1.060	0.630		
Total IF of papers	A	263	4.639	4.896	2.266	0.024*
	B	263	3.791	3.594		
Total questionnaire score	A	263	17.520	5.999	-2.813	0.005**
	B	263	18.970	5.782		
Foreign language skills	A	263	3.750	1.286	-1.874	0.061
	B	263	3.950	1.225		
Learning ability	A	263	3.630	1.292	-2.498	0.013*
	B	263	3.910	1.257		
Idea renewal	A	263	3.370	1.321	-2.370	0.018*
	B	263	3.640	1.329		
Research ability	A	263	3.700	1.264	-2.323	0.021*
	B	263	3.950	1.213		
International academic communication skills	A	263	3.080	1.286	-3.069	0.002**
	B	263	3.430	1.299		

Notes: N – Number; SD – Standard Deviation; Group A: Students from HMU basic medicine, specialized in basic research; Group B: Students from the affiliated hospitals, specialized in clinical medicine; T-test: *P < 0.05. **P < 0.01.

Discussion

Studying abroad is an essential component of medical training at many institutions and universities, and it is highly valued by medical students. When choosing study abroad destinations, students are often motivated by a desire to enhance their clinical or research ability and by the opportunity to travel, experience diverse cultures, and learn about various healthcare environments.^{12,13} The overall ability of medical students in postgraduate or doctoral studies depends on many factors. Among the most important are the educational background and qualifications of their tutors, and the tutors' ability to convey knowledge and scientific research skills. The questionnaire results showed that the tutors' overseas study experience had a significant positive impact on most basic and clinical medical students across all five measured dimensions. These findings support the beneficial role of international exposure in medical education.

Our prior research has demonstrated that professionals' overseas study experiences not only enhance their own competencies,⁷ but also positively influence the ability development of their students – particularly in medical education.⁸ However, it remains unclear which type of students – those majoring in basic medicine or clinical medicine – benefit more from their tutors' international experience. To address this gap, our current study further investigates the differential impacts of tutors' overseas study experiences on these two student groups, evaluating outcomes across five key measurement dimensions. After returning to China, tutors from basic medical schools can continue to engage in foundational research, which should maintain the positive influence of their overseas study experience. However, tutors from clinical medicine need to balance clinical works and scientific research. Will the positive impact of a clinical tutor's overseas study experience be diminished by the heavy clinical workload after returning to China? Will students majoring in basic medicine benefit more from their tutors' overseas study experience? Should we encourage and provide fundings for more tutors in basic medicine to study abroad? Should the study abroad funding policy be biased towards foundation tutors or clinical tutors? This study aims to answer the above questions by comparing the influence of tutors' overseas study experience on their students in clinical medicine versus those in basic medicine.

In this study, there is no difference in the number of SCI papers between the two groups during their PhD study. However, there is a significant difference in the total IF of the papers during their PhD study. This indicates that the IF of individual articles published by students from HMU basic medicine who are scientific researchers is higher. This result suggests basic researchers prioritize quality publications in high-IF journals, reflecting fundamental science's emphasis

on novelty and methodological rigor.¹⁴ By contrast, clinical medicine's focus on translational competencies and patient-centered skills – while equally vital for professional development – is less captured by traditional impact metrics. Besides, students of HMU basic medicine are primarily engaged in scientific research, whereas students at affiliated hospitals spend the majority of their time in clinical work, with limited time for scientific research. We suggest that this result may be also related to factors such as the longer time that students from HMU basic medicine devote to scientific research.

Our comparative analysis reveals that clinical students from affiliated hospitals perceived significantly greater improvement in learning ability, idea renewal, research ability and international academic communication skills than their basic science counterparts at HMU. This divergence stems from distinctive features of clinical training: (1) its applied nature demands rapid knowledge translation into patient care, with overseas-trained tutors introducing practical techniques, updated protocols, and multidisciplinary approaches that immediately enhance clinical competencies; (2) exposure to patient-centered pedagogies (eg, Anglo-American bedside teaching models) fosters more interactive, feedback-intensive supervision styles among clinical tutors; and (3) international experience cultivates cross-cultural communication skills and global health awareness¹⁵ - competencies particularly salient during clinical rotations with diverse patient populations. These discipline-specific mechanisms elucidate why clinical students reported stronger perceived benefits despite lower SCI impact factors (Table 2). Consequently, policy formulations for international exchange programs should judiciously weigh both bibliometric indicators and learner-reported outcomes.

We contend that IF, as publication metrics, inadequately reflect mentoring quality. Clinical mentors often incorporate internationally acquired case-based pedagogies that develop practical competencies, independent of IF improvements. Basic science mentors typically emphasize high-impact research, enhancing technical skills but offering less immediate improvement in broader competencies. Consequently, while basic medicine's higher IF indicates scholarly standing, it remains compatible with clinical students' greater perceived gains. Basic science students' higher IF publications indicate potential research quality improvements from tutors' international exposure. Yet given clinical students' stronger perceived benefits, educational impact assessments should combine IF with learner-reported outcomes.

There was no significant difference in students' perceptions of how their tutors' overseas study experience had enhanced their foreign language skills between the two groups. English proficiency is a key criterion for admission to medical school, both groups of students have gone through the same training process. And their reading amount and frequency are basically similar. Additionally, tutors with overseas study experience typically possess high-level English skills and can provide a consistent, high-quality English learning environment upon their return. Consequently, both groups benefit equally in this aspect.

Early interventions promoting international study programs (through information campaigns and language preparation) could improve participation, particularly when faculty exemplify the benefits through their own experiences.¹⁶ We propose that governments and educational institutions could increase funding opportunities for medical tutors to study abroad, ensuring that more tutors can gain international education and research experience. Our findings regarding the distinct requirements of basic versus clinical medicine can guide the development of differentiated funding strategies. For instance, basic medical tutors can be offered more research training opportunities, while clinical medical tutors can receive increased opportunities for clinical skills developments and academic exchanges. Subsequent research should investigate customized funding mechanisms tailored to the differing internationalization requirements between basic and clinical medicine. Meanwhile, the government may encourage and support medical schools to establish long-term cooperative relationships with internationally renowned universities and research institutions, regularly sending tutors and students for exchange and study to form stable international cooperation mechanisms.

Limitation

It is important to acknowledge several limitations in this study that should be considered when interpreting the findings. First, our research focused on students from HMU and its affiliated hospitals, which may not fully represent the experiences of all Chinese medical students. This limits the ability to generalize the findings to other institutions or international contexts. Future studies should include data from a wider range of medical schools across China and beyond to improve the applicability of the results. Second, we relied on the “HMU Promotion System (2013)” to evaluate

contributions, a system that may not be relevant to all SCI paper publications worldwide. This may restrict the comparison of our findings to broader international research standards. Additionally, data collection was based on self-reported questionnaires, which depend on students' self-assessment and may introduce bias or affect response accuracy.¹¹ Future research could incorporate more objective methods, such as interviews or focus group discussions, to gather deeper insights. A further limitation involves our measurement scope – while age-matching controlled for core demographic factors, we did not systematically assess other potential confounders like institutional resources, pre-existing student abilities, or curriculum delivery variations. Although participants shared standardized institutional frameworks, residual confounding may persist. For example, clinical students' equipment access likely differs from basic researchers' laboratory resources; Not consider tutors' personal characteristics, such as teaching skills, research expertise, and individual charisma. Dot account for the specifics of tutors' overseas experiences, such as the country of study, research projects, or cultural adaptation processes. These unmeasured variables may contribute to intergroup outcome differences, indicating our findings reflect combined effects of tutors' international experience and institutional contexts rather than isolated causation. These factors can have varying effects on both tutors and students. Future research should analyze these details to offer a more nuanced perspective on the influence of overseas study experiences.

Conclusions

This study, based on HMU, found that tutors' overseas study experience significantly benefits the majority of medical students in both groups, highlighting the positive influence of studying abroad on medical professionals. Although promising, these single-institution findings necessitate validation across diverse settings. Both basic and clinical students should value overseas study experience when choosing a tutor. A disciplinary divergence was observed: basic science students with internationally trained mentors achieved greater research productivity, whereas clinical students reported more comprehensive perceived gains. Our institutional findings advocate for balanced international study policies serving both basic and clinical medicine, pending validation across multiple institutions.

Data Sharing Statement

The datasets used and analyzed for the current study are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

Ethical approval was obtained from the Harbin Medical University Research Centre ethics committee (Approval Number: 2024376). This work was carried out in accordance with the Declaration of Helsinki, including but not limited to the anonymity of participants being guaranteed and the informed consent of participants being obtained. All participants received written and verbal information about the research project before providing written consent to participate.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests in this work.

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