



Acceptance of peer physical examination in medical students in Wuhan, China: A cross-sectional study

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Abstract

Background: Peer physical examination (PPE) is an essential part of the education of medical students. This study aimed to assess the acceptance level of PPE in Chinese society as well as other related factors. While there have been numerous studies on PPE acceptance in Western societies, there have been relatively few studies on this topic in China.

Methods: A questionnaire was distributed via social media to clinical-year medical students in China. With 1890 students participating overall, the response rate was 86.9%. The questionnaire collected demographic information and previous experience with PPE, and utilized a 5-point Likert scale to assess acceptance of PPE and factors influencing it.

Results: One thousand six hundred and forty-four percent of Chinese medical students accepted PPE, with 13% rejecting it and 19% neutral. Males were more accepting of PPE than females, and females were less accepting of being examined by someone of the opposite gender. The groin/thigh and breast areas were the most rejected for examination. There were no significant differences in acceptance rates between universities or academic performance groups. However, society had a significant impact on the acceptance of PPE.

Conclusions: With a 67% acceptance rate of PPE among Chinese medical students, it could be considered a viable alternative to absent life models in Chinese universities. However, implementing PPE may come with its own set of difficulties, so it is recommended that a supervisor is present and that single-gender groups are formed, with friends paired together if possible.

KEYWORDS

China, peer physical examination, Wuhan

Younes A. Khadour is the first author of this manuscript.

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1 | INTRODUCTION

The inclusion of clinical training is essential to the curriculum of medical school. The cultivation of clinical skills is a fundamental aim for every medical student. Acquiring an adequate set of clinical skills is critical for delivering optimal clinical care. The acquisition and development of clinical skills can be accomplished by utilizing various methods, one of which is peer physical examination (PPE).

PPE is an educational practice where students serve as models for one another in acquiring physical examination skills and basic noninvasive procedures; this method has also been employed for teaching and learning anatomy.¹

PPE is a valuable educational approach, as it allows medical students to develop their clinical and communication skills before engaging with actual patients.² Furthermore, adopting this approach enables medical students to develop their skills in a safe and controlled environment, allowing them to practice extensively while minimizing potential patient harm.³

Thus, PPE provides students with a learning environment that permits them to make mistakes and glean knowledge from experience.⁴ It allows students to establish a baseline for "normal" by conducting physical examinations on healthy students before examining patients displaying abnormal clinical signs. The routine implementation of PPE is impeded by accepting students with diverse backgrounds and religions, as PPE can cause discomfort or inappropriate behavior among some students.²

Several studies conducted in the West have reported a high acceptance of PPE, with acceptance rates ranging from 60% to 98%.^{2,4-6} However, there is a lack of research on the acceptance of PPE among Chinese medical students and its associated factors.

This study aims to investigate medical students' attitudes from different universities in Wuhan City toward PPE as a component of learning clinical skills while also exploring the potential relationships between students' demographic characteristics and attitudes toward PPE.

2 | METHODS

2.1 | Participants and setting

This cross-sectional study was carried out in 2023 among all medical students in their first to fifth year at different universities in Wuhan (10 major medical universities and colleges) and graduated students. Our study primarily addressed third-year students who had recently met clinical subjects and clinical-year students (fourth and fifth year) who had always needed more practical skills. All participants who were medical students were included, as well as responses with missing data were excluded. The data was collected between March 13 and May 13, 2023. A brief introduction outlined the purpose of the research, the procedures, and how the data set would be utilized before participants filled out the questionnaire.

2.2 | Questionnaire

We modified our questionnaire based on those used in related previous studies^{2,7,8} (Supporting Information S1: 1). The questionnaire is separated into several domains, beginning with demographic information (age, gender, university, academic year, academic performance, financial condition, and speculation about the surrounding environment).

Previous examinations by a supervisor were also documented. Next, questions aim to examine students' attitudes toward PPE and the factors that influence it. Students could express their acceptance of using PPE, being examined by the same and opposite gender and examining the same and opposite gender using the 5-point Likert scale (from 1: *strongly disagree* to 5: *strongly agree*).

It was written in English at first, then translated into Chinese by language specialists, and then retranslated into English to ensure consistency in the meaning of terms and concepts (before collecting the study sample). A pilot study was done on 40 students, and the questionnaire was revised in accordance with the principal statistical study. The tool's reliability in assessing acceptance was evaluated using Cronbach's α , which showed an acceptable score of (0.87).

2.3 | Data analysis

Baseline characteristics were reported as absolute (n) and percentages (%) for categorical data. One-way ANOVA was performed to assess the significance of differences in PPE acceptance across universities, financial levels, academic performance, and society. Additionally, an independent samples t -test was used to determine gender-based differences in PPE acceptance between males and females. Statistical significance was defined as a two-sided p -value of 0.05. IBM SPSS Statistics 25 was utilized for all statistical analyses.

3 | RESULTS

A total number of 1890 online surveys were collected. After excluding all participants who did not meet the inclusion criteria and missing data, the final participants' number was 1644. Two hundred and seventy-seven (16.84%) participants were from Tongji Medical College and 196 (11.92%) from Wuchang Medical College of Fujian Medical University. Also, 905 (55.05%) participants were females, and 739 (44.95%) were males; other sample details and characteristics are shown in Table 1.

More than half of the students accepted the PPE (67.09%); however, only 218 (13.26%) did not accept the PPE, and 323 (19.64%) were neutral Table 2. The groin area was the most rejected area for examination 311 (% 18.91), followed by the breast 416 (28.04%), then the chest (lung and ribs) 611 (37.16%), while the hand 1601 (97.38%) was the most acceptable area, followed by the head and neck 1543 (93.58%) (Table 3).

TABLE 1 Characteristic of participants.

| Variables | Frequency | Percent |
|--|-----------|---------|
| Gender | | |
| Male | 739 | 44.95 |
| Female | 905 | 55.05 |
| Academic year by 2022–2023 | | |
| First year | 131 | 7.96 |
| Second year | 149 | 9.06 |
| Third year | 405 | 24.63 |
| Fourth year | 442 | 26.88 |
| Fifth year | 453 | 27.55 |
| Graduated | 64 | 3.89 |
| Collage | | |
| Wuhan University Medical School | 166 | 10.09 |
| Tongji Medical College | 277 | 16.84 |
| Wuchang Medical College of Fujian Medical University | 196 | 11.92 |
| Hubei College of Traditional Chinese Medicine | 114 | 6.93 |
| Hubei University of Medicine | 134 | 8.15 |
| Hubei University of Traditional Chinese Medicine | 129 | 7.84 |
| Wuhan University of Science and Technology Medical College | 182 | 11.07 |
| Central China University of Science and Technology Medical College | 139 | 8.45 |
| Hubei Institute of Physical Education | 183 | 11.13 |
| Hubei University for Nationalities School of Medicine | 124 | 7.54 |
| Financial statue | | |
| Very good | 573 | 34.85 |
| Good | 778 | 47.32 |
| Bad | 293 | 17.82 |
| Academic performance | | |
| Excellent | 282 | 17.15 |
| Very good | 650 | 39.53 |
| Good | 597 | 36.31 |
| Average | 73 | 4.44 |
| Acceptable | 42 | 2.55 |

Only 13.34% of females accepted the breast region to be examined. In comparison, 41.73% of males accepted it, also 11.98% of females accepted the groin region to be examined, while 42.23% of males accepted it. There is also a big difference in the back region, as only 65.87% of females accepted it. In comparison, 86.33% of

TABLE 2 Acceptance rates of PPE among participants.

| Acceptance rates of PPE | Frequency | Percent |
|-------------------------|-----------|---------|
| Accept | 1103 | 67.09 |
| Neutral | 323 | 19.64 |
| Don't accept | 218 | 13.26 |

Abbreviation: PPE, peer physical examination.

TABLE 3 Acceptance rates for the areas of the body among participants.

| Areas of the body | Frequency | Percent |
|-----------------------|-----------|---------|
| Hands | 1601 | 97.38 |
| Head and neck | 1543 | 93.85 |
| Shoulder and arm | 1490 | 90.63 |
| Knee | 1321 | 80.35 |
| Leg and foot | 1412 | 85.88 |
| Back | 1104 | 67.15 |
| Abdomen | 805 | 48.96 |
| Chest (lung and ribs) | 611 | 37.16 |
| Breast | 461 | 28.04 |
| Groin | 311 | 18.91 |

TABLE 4 Reported willingness to be examined on different body regions according to gender.

| Areas of the body | Gender | |
|-----------------------|--------|--------|
| | Male | Female |
| Hands | 97.31 | 96.47 |
| Head and neck | 93.52 | 92.54 |
| Shoulder and arm | 92.41 | 87.72 |
| Knee | 98.22 | 92.54 |
| Leg and foot | 95.22 | 88.32 |
| Back | 86.33 | 65.87 |
| Abdomen | 89.65 | 62.21 |
| Chest (lung and ribs) | 73.55 | 46.65 |
| Breast | 41.73 | 13.43 |
| Groin | 42.23 | 11.98 |

males accepted it; more detailed information on the acceptance rates and gender differences for other anatomical regions is shown in Table 4.

This study demonstrated that male participants had a significantly higher acceptance rate for PPE ($p < 0.003$) than their female counterparts. Additionally, participants who underwent a prior examination with a supervisor exhibited significantly higher acceptance rates for PPE than those who did not receive such an

TABLE 5 Willingness to be examined depending on gender of the examiner.

| | Strongly agree | Agree | Neutral | Disagree | Strongly disagree |
|---|----------------|-------|---------|----------|-------------------|
| Females' examination preference | | | | | |
| Doesn't mind examine the other gender | 438 | 521 | 595 | 79 | 11 |
| Doesn't mind being examined by the other gender | 260 | 457 | 743 | 175 | 9 |
| Males' examination preference | | | | | |
| Doesn't mind examine the other gender | 249 | 521 | 632 | 134 | 108 |
| Doesn't mind being examined by the other gender | 338 | 553 | 612 | 134 | 7 |

TABLE 6 Relation between lack of learning means and poor clinical examination skills.

| Relation between lack of learning means and poor clinical examination skills poor PPE | Frequency | Percent |
|---|-----------|---------|
| Lack of learning means contributed to poor clinical examination skills | 1157 | 70.37 |
| Lack of learning means didn't contribute to poor clinical examination skills | 224 | 13.62 |
| Neutral | 263 | 15.99 |

Abbreviation: PPE, peer physical examination.

examination ($p < 0.006$). Notably, the results showed that females were less accepting of being examined by a member of the opposite gender than males. Specifically, 58.33% of females didn't mind examining the other gender, while only 43.61% didn't mind being examined by the other gender (Table 5).

A one-way ANOVA was conducted to determine the impact of financial status, university, and academic performance on the acceptance of PPE. The results indicated no statistically significant difference between individuals with very good, good, or bad financial status ($p = 0.457$). Furthermore, no significant difference in PPE acceptance was observed between university groups ($p = 0.378$) or academic performance groups ($p = 0.085$).

About 70% of students saw that the lack of learning means because the conflict contributed to poor clinical examination skills; however, only 13.6% did not see that, and 15.9% were neutral (Table 6). Also, there was no statistically significant difference between different university groups with a p -value of 0.728.

4 | DISCUSSION

Incorporating PPE into medical school curricula is increasingly imperative since it allows students to gain practical experience in clinical examination techniques before engaging with actual patients. This research aims to shed light on how various demographic factors impact the inclination of Chinese students to engage in PPE. Our findings revealed that 67% of the medical students surveyed agreed

with the statement above and acknowledged its role in their inadequate clinical examination skills. In contrast to a comparable study conducted in the Germany, where 43% of medical students expressed not wanting to undergo a PPE as a means of learning clinical skills,⁹ our survey revealed that 86.4% of students regarded PPE as a suitable approach for enhancing their skills. However, this does not necessarily imply that the implementation of PPE in Chinese medical education will be seamless due to the complex and multifaceted nature of the Chinese community. Although the students in our study acknowledged the significance of PPE, their actual willingness to participate was influenced by personal factors such as gender, ethnicity, and the social environment in which they lived and studied, the results of our research indicated a significant divergence between the willingness of male and female students to participate in PPE, with male students exhibiting a greater inclination to engage in PPE compared to their female counterparts. This finding is noteworthy and suggests the existence of several underlying factors that may account for this gender disparity. These findings align with previous research on the relationship between gender and religion,^{10,11} which suggests that female students may be more comfortable engaging in PPE with peers of the same gender than with those of the opposite gender. This is consistent with the results of other studies.⁷ Our study also found that a similar trend applies to male students, albeit with a lower refusal rate. This finding is consistent with the literature,^{5,12} suggesting that single-gender pairing students for PPE are more acceptable than pairing students of different genders.

Interestingly, among students who were comfortable with mixed-gender groups, our survey results revealed that female students were more inclined to assume the role of the examiner rather than the examinee. In contrast, male students showed a higher willingness toward the examinee role. This gender discrepancy may disadvantage male students regarding opportunities to examine female peers, as reported in other studies.¹³

Moreover, it is important to consider that females may experience higher levels of body shame and body surveillance, leading to their increased unease with participating in PPE compared to males. This difference in comfort levels between male and female students may contribute to the varying willingness to engage in PPE. In addition, female students may also feel less comfortable with

mixed-gender PPE due to their perception of males as potential perpetrators of critical and teasing comments, as well as the perceived risk of sexual objectification by males during the examination process.¹

One of the most critical factors that can impact the effectiveness of PPE is determining which body areas are acceptable to be examined by peers. As anticipated, our results demonstrated that students were less comfortable examining intimate body areas, which was particularly evident in the groin area, deemed the most unacceptable area to be examined by both male and female students, followed by the breast. This finding is consistent with previous research.^{5,8} In contrast, our study showed that male and female students highly accepted non-intimate body areas for examination. This is consistent with similar studies conducted in Western societies.^{2,6} As well as our findings indicated a significant disparity in the level of acceptance for examining certain body parts between male and female students. Specifically, female students were less comfortable examining the abdominal and back regions, which are considered sensitive areas.

Surprisingly, this study found that no significant difference between students who believed that societal perceptions hindered the practice of PPE and those who held the opposite view regarding their willingness to accept PPE. This may be attributed to Chinese medical students' relatively homogenous demographic characteristics, such as age and origin. In contrast, studies conducted in universities with a more diverse student body, such as in Australia, have reported that being older and coming from a different cultural background may affect students' attitudes toward PPE.¹⁴

While there is significant diversity in the financial status, academic performance, and diligence among Chinese medical students, our findings revealed that students were willing to assume the role of the examinee exhibited no discernible interest in the financial status, intelligence, or diligence of their peer examiner.

We thought smarter students would entice more students to choose them as their examiners, but we were proven wrong. This could be explained by the fact that all Chinese students lack practical experience and clinical training, making it possible for any student, regardless of academic standing, to examine identical conditions and with identical hygiene standards across all PPE groups.

Additionally, the most influential factor in students' selection of an examiner was whether or not the examiner was a friend or a stranger. Most students preferred to have a friendly face as their examiner, likely because they perceived a friend as more trustworthy than a stranger, felt less embarrassed about body exposure, and believed that a friend would be less likely to perform a painful examination. Creating small groups of friends to practice PPE together may be a solution for individuals who feel shy or embarrassed. This is because most students find the role of the examinee uncomfortable and may refuse to participate in PPE again. Practicing with friends may increase comfort and confidence, improving the PPE experience. The discomfort and embarrassment experienced by students during PPE may also be attributed to the lack of a safe and professional environment during the session.

Interestingly, our results found that students examined by their tutor before were more motivated to participate in PPE again. This could be because the presence of tutors can create a safe and professional environment that promotes a positive and comfortable PPE experience. Eighty-nine percent of students preferred having tutors present during PPE sessions. When asked about the importance of tutors' presence, students acknowledged the significant role of tutors in identifying mistakes in their clinical examination and correcting them. Additionally, tutors were important for setting boundaries and preventing harassment during the examination. A previous study¹⁵ found that increasing the number of tutors in a class can lead to higher student participation rates.

This study has some limitations. The limited sample size may affect the generalizability of our findings. It is essential to conduct further studies to verify the accuracy and consistency of the assessment tool and establish a standardized evaluation system. Moreover, a multivariate analysis could provide more comprehensive information and compelling evidence regarding the performance of PPE skills in medical students.

5 | CONCLUSION

With a 67% acceptance rate, PPE can be a viable substitute for the absence of life models in Chinese universities. However, as societies become more complex, learning becomes increasingly challenging. This research has identified several sensitive issues, such as gender, sensitive body areas, tutors' presence, and safe environments that hinder Chinese students from practicing PPE comfortably, building confidence, and improving their clinical skills. Although definitive solutions have not yet been reached, certain key concepts, such as the freedom to choose one's own PPE group, can bring about significant changes toward promoting a genuine willingness to participate in PPE.

AUTHOR CONTRIBUTIONS

Younes A. Khadour: Formal analysis; methodology; writing—review and editing. **Ahmad M. Khadour:** Formal analysis. **Bashar M. Ebrahem:** Funding acquisition. **Fater A. Khadour:** Methodology; writing—review and editing.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Neijiang Normal University Institutional Review Board Consent Letter NUU-IRB 202304003. Written informed consent to participate in this study was provided by the participants' legal

guardian/next of kin. The research conformed with the Declaration of Helsinki for human subject research. All participants in the study provided informed consent. We described the aim of the survey and how to complete the questionnaire to each participant, and because it was all voluntary and no names were collected, we were able to collect anonymous data.

TRANSPARENCY STATEMENT

The lead author Fater A. Khadour affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Khadour YA, Khadour AM, Ebrahem BM, Khadour FA. Acceptance of peer physical examination in medical students in Wuhan, China: a cross-sectional study. *Health Sci Rep.* 2024;7:e1959. doi:10.1002/hsr2.1959