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REVIEW

Practicing Peer Physical Examination by Medical and Allied Health Professions Students: Why the Hesitation and Where are We Now? A Narrative Literature Review

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Objective: This narrative review aimed to examine the common existing factors that can influence medical students' attitudes and acceptability of peer physical examination, the presence of any variations of such attitudes over the time period included in the review, and provide measures to improve the acceptability of this practice, and directs attention to future research.

Methods: This study utilized a systematic and comprehensive search technique to find relevant publications based on pre-defined eligibility criteria. Electronic searches were conducted using two search engines, PubMed and Google Scholar, with an additional manual search on Medical Teacher Journal. In addition, a critical evaluation tool was applied to critically assess each article.

Results: Evidence indicated that gender is consistently reported as the most influential factor affecting the acceptance of peer physical examination among healthcare professionals, independent of the presence of other factors. Essentially, conservative cultures, religion, and particular ethnicities are still exerting their impacts on the participant's willingness to participate in this activity. In addition, the current study found no significant variations in accepting this practice by the students over the reviewed period of time.

Conclusion: According to the evidence provided by this review, a number of possible recommendations should be considered to boost and optimize the applicability of PPE. These include starting with non-sensitive areas, using single-gender pairing, and considering cultural and religious beliefs. Finally, there is a pressing need for future research, including multi-centric studies with larger and more diverse samples.

Keywords: peer physical examination, medical students, attitude, willingness, acceptance

Introduction

Background

The majority of medical schools consider teaching physical examination and clinical skills as a fundamental component of their pre-clinical years' curricula.[1,2] Thus, successful clinical skill implementation is an essential target of every medical education program and practice that should always be emphasized.[3]

Physical examination constitutes one of the important clinical skills that medical students must exhibit competence in.[4] The attention and worry are increasing regarding how much students and physicians are able to perform such basic and fundamental skills professionally as the proficiency and training to acquire them are decreasing in light of the increasing trend to use emerging technologies in the field of diagnostic tools.[5,6] Mutually, history and physical examination can diagnose approximately 60% of the cases accurately.[7] Thus, their importance cannot be compared or ignored.

Unfortunately, medical and educational institutions have undergone several changes that adversely affect medical students' abilities to master the required skills for their clinical development. Some of these changes are related to patient factors including shorter stay periods for patients in the hospitals, their exhausted bodies with multiple comorbidities and

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acute conditions, and their explicit frustrations, complaints, and refusal to be examined by multiple students. Other factors are student-related, like a dramatic increase in students' numbers. Such personal factors with the institutional ones have led to decreased chances for medical students to fulfil their needs in performing physical examinations on patients.[8,9] Accordingly, different methods of applying clinical skills have been adopted to tackle these hurdles such as using standardized patients, and peer physical examination (PPE). Standardized patients require a greater allocation of resources, in terms of the implementation costs, time demands, availability and the comprehensive training required for instructing standardized patients. Accordingly, peer physical examination has widely been adopted as a valuable alternative.[2,10]

In peer physical examination, peers practice the required skills on each other repeatedly in a low-stake environment to develop and improve their hands-on experiences.[10] This practice enables students to examine each other under valuable supervision in a mistake-forgiving setting to avoid early unprofessional practice and errors that are hard or impossible to accept when contacting real patients. Thus, this setting creates a safe controlled environment to acquire essential skills to protect patients from untrained novices.[2]

Orientation of the Study on Peer Physical Examination

Pros and Cons of PPE

The existing literature has shown that peer physical examination offers many benefits for medical students, faculty, faculty members, and patients.[1,2,10–12] Firstly, it allows students to learn from each other experiences and knowledge and helps in the establishment of good relationships and trust among classmates. This originates from the enhancement of the students' abilities to confidently examine and be familiar with normal anatomy, physiology, and features before discovering abnormal findings in patients. These points can support their confidence and clinical competence before encountering real patients. Secondly, it encourages student-student and student-teacher communications, allowing the provision of immediate feedback on students' performance both from supervisors and peers.[13,14] Thirdly, this process carries many benefits to patients as well including avoiding discomfort and inadmissible faults by novice students who are now ready to see and examine patients after being suitably prepared in advance through the course of PPE in addition to getting and giving empathy in this medical relation.[15,16] Economically, PPE is organized at a reasonable and affordable cost, competing with other highly-priced alternatives such as standardized patients.[1,2,12] Finally, in conjunction with the financial side, it can be easily coordinated in terms of organization.

While performing peer physical examination can provide opportunities for learning and building essential skills in the pre-clinical years, students can face some obstacles which may happen due to the lack of skills or supervision during this practice.[17] These include students' feelings of discomfort or embarrassment, especially when the examinees are exposed or undressed in front of their classmates during the examination,[2,18] and some sort of misbehavior or harm to examinees by some students or instructors.[2] Discovering unexpected abnormal findings during the examination of colleagues is low and approximate an incidence of 1.5% annually, thus, considering it an unimportant issue.[19]

Factors Limiting the Acceptance of PPE Practice

McLachlan and Patten[20] mentioned that the earliest recognition of using PPE as a live model in learning surface anatomy was disclosed by Metcalf et al.[21] Since then, it has been used in many medical and other health science schools worldwide as both a practical and assessment tool.[22] Despite its popularity amongst students, educators and faculties, there are a number of factors that can decrease its acceptability within educational settings. In general, these can include psychological barriers such as feelings of embarrassment, anxiety, and even sexual arousal by both genders, ethical issues related to privacy invasion, cultural norms among peers of different cultural backgrounds, religious considerations, body regions to be examined, and preconceptions about PPE.[10,17,18,23,24]

Study Rationale

According to my knowledge, the available review articles are scarce to none on the topic of PPE as the most recent review was conducted by Hendry in (2013)[15] only to highlight the barriers related to performing PPE on the lower limb and the strategies to mitigate them.

Aims and Objectives

This narrative review will provide a comprehensive view of the most important factors that affect medical students' attitudes and acceptance of peer physical examinations. It will also examine the presence of any gaps in the body of literature and try to outline how they should be fulfilled in the future. This study aims to provide benefits for the following:

Academic institutions and staff: by driving efforts to find fundamental solutions that can make PPE a comfortable, enjoyable, and easy experience.

Researchers: by motivating additional research on the topic and stimulating efforts to alleviate the issue of hesitation and propose practical solutions to promote performing PPE with more ease and less pressure.

Learners: by enabling students to see and understand the importance of PPE, making them believe in it, and strengthening their conviction in this practice through presenting evidence of its advantages and practicability.

The main objectives of this narrative review are to address the following:

Identify the factors which strongly influence students' attitudes and acceptability of peer physical examination in medical as well as other health science schools.

Evaluate the variations in the attitudes of students about peer physical examination in various health science schools in the reviewed period.

Provide measures for improving students' attitudes regarding PPE in medical education programs.

Methodology

Narrative review methodology was elected to examine and highlight factors that potentially affect the students' attitude and acceptance of peer physical examination in medical and other health science schools over a period of 12 years. This study was conducted after receiving ethical approval from the University of South Wales. Narrative reviews have been proven to be valuable qualitative instructional publications that can compress several articles into a comprehensible single work when providing wide perspectives on topics and serving as instructional summaries by conducting systematic reviews is impossible.[25]

As there are no clear instructions on the processes to be followed while conducting this type of review, guidance for systematic reviews and meta-analyses named PRISMA guidelines[26] were implemented to find, select, and critically evaluate relevant research, as well as to collect and analyze data from the included studies. The IMRAD structure was applied in this study as there is no general agreement on a standard structure for a narrative review.[27]

The steps below were undertaken in order to provide a systematic and comprehensive search of academic databases and other sources of literature:

Search Strategy

Electronic searches were conducted using two popular search engines, PubMed and Google Scholar. The first selected engine provides the most comprehensive medical education and scientific literature. The second, Google Scholar, offers a variety of sources as well as strong scientific studies.[28] In addition, manual searching through the Medical Teacher Journal was conducted to provide some additional records. The following relevant keywords were used throughout every database: "physical examination", "peer physical examination", "PPE", "medical students", "nursing student", "attitude", "willingness", "acceptance", and "perception". For Google Scholar and Medical Teacher search, non-MeSH headings terms were used while in PubMed MeSH terms were applied with the use of Boolean operators. The data was searched using applicable filters including time range (January 2010 to December 2022), English language, and others. This timeframe was adopted to properly fulfil the research question, aims and objectives as a limited time range did not provide sufficient and relevant research articles and could impede the discovery of the changes in PPE students' perspectives over time. Furthermore, the reference lists of the selected publications were manually reviewed for possible related articles. The narrative review process utilized a systematic and comprehensive search technique to identify relevant publications, with the selection of studies for inclusion based on pre-defined inclusion and exclusion criteria.[29] A thorough and in-depth reading strategy was utilized to analyze full-text publications, ensuring that the review was confined to the inclusion requirements (Table 1).

Table 1 Eligibility Criteria

Inclusion Criteria	Exclusion Criteria
1. Studies dealing with the perception, attitude, and acceptance of medical and other allied healthcare professions.	1. Papers published before 2010.
2. Those include medical, chiropractic, orthopedic, and nursing students.	2. The published papers that have subjects in PPE that reflect topics away from the study questions.
3. Studies published from January 2010 to December 2022.	3. Any type of published or unpublished work including dissertation, letters to editors, commentaries, and similar ones.
4. Only English language studies will be used.	4. Review articles.
5. Quantitative studies only with full-text access.	5. Qualitative and mixed studies (qualitative and quantitative studies).

Selection of Studies

The initial search through the electronic databases revealed (109) records which were reduced to (84) after the removal of duplicates and articles published before 2010. After further examination of the titles and abstracts of the remaining records, (67) records were removed due to incompatibility and irrelevance to the topic of interest, resulting in (17) records left for further assessment according to the eligibility criteria (Table 1). After a thorough full-text reading process of these (17) records, (7) publications were excluded due to unrelated content; hence, reaching a final number of (10) records to be included and reviewed in this research. Two out of the ten included articles were obtained as full-text copies through the library of the University of South Wales. The detailed selection process is shown in the flowchart (Figure 1).

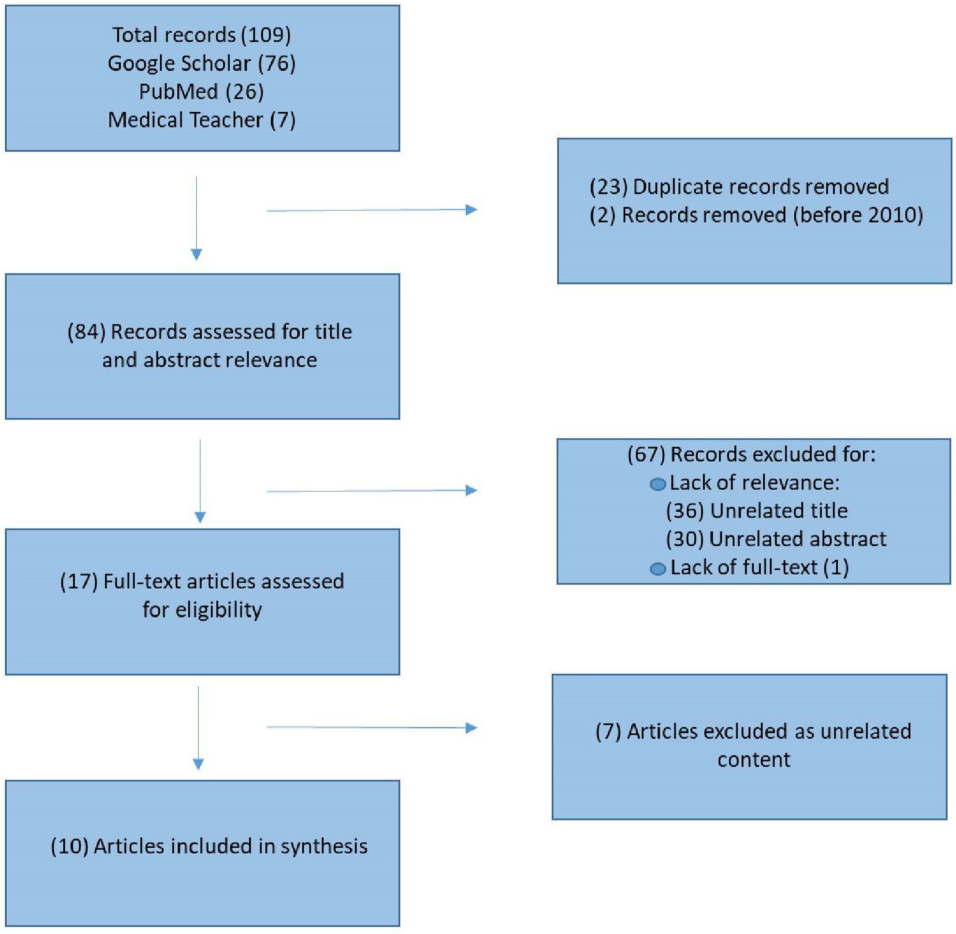

Figure 1 Flowchart of the literature selection process according to PRISMA guidelines 2020.

Data Extraction and Analysis

During the data extraction process, relevant information and details from the included studies were identified, collected, and sorted and some are arranged in (Table 2). Then, the extracted data were used in the analysis phase to organize this study's results into a few categories based on the emerging common themes from the ten included studies. Common categories were based on the targeted specialities in each reviewed article: peer physical examination in medicine, nursing, osteopathy, and chiropractic.

Critical Appraisal

Critical appraisal provides a deliberate, systematic approach, and transparent evaluation for assessing the strengths and weaknesses of a study. Without the help of critical appraisal, the researcher can provide ineffective recommendations or interventions to the user, reader or recipient. Various checklists are present to help justify the sample size, the analysis of data, identifying important findings, the methods used for assessing outcomes, the quality of the information provided by each paper and how it impacts the review topic.[34] Accordingly, the critical evaluation tool, Center for Evidence Based Management, (CEBMa) was applied in this study to critically assess each article. It consists of a number of questions that

Table 2 Studies Characteristics

Author/Year	Country of origin, Study design	Sampling/ Population	Title
Chen et al (2011)[17]	Country: China Design: survey (mixed: cross-sectional and longitudinal design).	n= 100 Medical students	Does medical student willingness to practise peer physical examination translate into action?
Consorti et al (2013)[30]	Italy Survey (cross-sectional)	Convenience sampling n= 241 Medical and osteopathic students	Evaluation of the acceptability of Peer Physical Examination (PPE) in medical and osteopathic students: a cross sectional survey
Wearn et al (2013)[31]	New Zealand Survey (Dual cohort, cross-sectional)	n= 128 Nursing students	Exploration of the attitudes of nursing students to peer physical examination and physical examination of patients
Manjunath et al (2014)[2]	India Survey (cross-sectional)	n= 53 Medical students	Medical Student's Perception And Preferences About Peer Physical Examination (PPE)
Reid et al (2015)[32]	Australia Survey	n= 243 Medical students	Abdomen and chest examinations in peer physical examination: Variation in participation by gender
Taylor and Shulruf (2016)[11]	Australia Survey	n= 130 Medical students	Australian medical students have fewer opportunities to do physical examination of peers of the opposite gender
Vaughan and Grace (2016)[12]	Australia Survey	n= 105 Osteopathic students	Perception of peer physical examination in two Australian osteopathy programs
Burggraf et al (2018)[33]	Germany Survey	n= 142 Medical students	Willingness of medical students to be examined in a physical examination course
Ardakani et al (2022)[10]	Australia Survey	Convenience sampling n= 184 Chiropractic students	Exploring 1st- and 2nd-year chiropractic students' willingness and attitudes toward peer physical examination
Soqia et al (2022)[18]	Syria Survey (cross-sectional)	n= 657 Medical students	Syrian medical students' acceptance of peer physical examination and its associating factors: a cross-sectional study

assess different aspects of each study's methodology, thus, evaluating the quality and strengths of the provided evidence by each study through critically appraising its methodology, potential bias, and limitations. The critical appraisal is presented in the results section within each included study.[35]

Results

The final ten selected studies will be discussed in detail based on the four main categories and some of their characteristics are organized in (Table 2).

PPE in Different Healthcare Programs

Despite the fact that PPE is practiced in a variety of healthcare courses and programs, the emphasis of the majority of the previous studies has been on PPE for medical students. Fewer numbers of studies have dealt with this method in other related fields such as nursing, osteopathic, and chiropractic programs. To a particular extent, physical examination is practiced similarly in medical, nursing, osteopathic and chiropractic programs. However, each of these fields has its unique curriculum and requirements. For instance, nursing, chiropractic and osteopathic programs are recognized by an earlier and more concentrated focus on hands-on experiences than in the medical field. Accordingly, these differences may affect the degree of PPE acceptance in each program. Further details about the similarities and differences in PPE practice and acceptance among these four fields are demonstrated under the categories below:

PPE in Medicine

In the last decade, the bulk of the available literature has focused on PPE in the medical college program. Some of these studies were conducted in different countries such as Australia,[11,32] Hong Kong,[17] Syria,[18] and other regions in an attempt to help identify different trends in practicing PPE in such extremely different areas.

At the University of Hong Kong,[17] a mixed cross-sectional and longitudinal study by Chen et al stated a specific and clear research question, including examining whether the participants' willingness to practice PPE transforms into real participation or not, through using a valid self-reported Examining Fellow Students (EFS) questionnaire before and after a mandatory engagement in this activity. The study did not mention a clear approach for selecting the sample which can result in a selection bias. The response rates for the first and second administered surveys were 97% and 78%, respectively. In addition, the study was performed at a single university which may affect its applicability in other similar settings. The majority of learners (>90%) answered that they were willing to practice this type of examination on their colleagues for the majority of body areas, with the exception of intimate areas such as the upper body part (breast), groin, male and female genitalia, and pelvis. Participants were more eager to practice PPE on colleagues of the same gender than on peers of the opposite sex, regarding non-sensitive body areas. According to the type of examination, for each anatomical part, more learners reported being more convinced to examine rather than being examined. Male students had no objection to being examined by both genders. On the contrary, more females favored peers of the same gender to examine them; however, they showed an attitude of refusal to examine their breasts and hips by any examiner. Unexpectedly, a large portion of participants with positive agreeable attitudes did not put their willingness to actual performance in the clinical sessions regarding all body parts, especially for the back (60%) and hip region (48.2%).[17]

In a brief Indian cross-sectional study conducted by Manjunath et al[2] only 53 medical students voluntarily answered a well-designed and validated questionnaire. The study should be considered with caution as the sample was not provided in the methodology in terms of its selection procedure, representativeness to the population from which it was taken, and whether it is homogeneous or heterogeneous in terms of the participants' ages, hometowns, ethnicity, and religion. In addition, there was some missing information about the educational institute in which the study was conducted. Finally, although the authors mentioned similar response patterns for males and females, the response rate was not documented in their work. All the data were statistically analyzed with the aid of a chi-square test and were represented in percentages only. The authors confirmed a high degree of acceptance of peer examination for non-intimate body areas, approximately 82%. About two-thirds of participants preferred the same-gender examination over the opposite one and the majority preferred to be an examiner rather than take the role of patient. Examining peers rather than standardized patients was also favored by the students.[2] The work provided similar gender-related findings to the earlier mentioned literature[17] in

that females were more comfortless in comparison to males. To be examined for highly sensitive regions (breast, genitalia and rectum), the study documented the agreement of only 2.17% of participants for such contribution.[2]

By continuing the series of research, Reid et al[32] explored the role of gender and moderately sensitive body parts, chest and abdomen, on both attitudes and participation in PPE in addition to determining whether attitudes and participation as examinees are interrelated or not. The 243 included medical students were heterogeneous regarding their hometown, ethnicity, and degrees before entry to medical school, undergraduate and graduate entrants. The sampling procedure was not adequately described and it was obtained from a single educational organization, making the study results restricted in its applicability to similar contexts. The study found that students agreed to participate as examinees in the abdominal examinations more than in the chest. Gender differences in participation were evident in that males and females had similar frequencies for abdominal examinations, but they showed uneven frequencies for chest physical exams in which females volunteered less often than males in this body part. This resulted in raising the frequency of males being examined approximately more than 4 times compared to females.[32] Regarding the students' attitudes, the results echoed that of Chen et al[17] in which high willingness was expressed by participants. Moreover, the authors highlighted that most medical learners of both genders complemented their formal PPE sessions held at the school with less formal ones outside the educational institute with a medical student (56.4%), family member (>40%), or friend (47.3%). Hopefully, this study adds to the expanding corpus of research on the influence of gender on real participation in physical examination sessions and highlights the need to tackle gender inequity in healthcare systems.[32]

In another cross-sectional study in 2016, Taylor and Shulruf limited their study objectives to explore two main potential factors impacting engagement with PPE, gender and the learner's self-perception (outlook). Although many learners (538) were asked to participate in this study, surprisingly, a response rate of only 24.2% was achieved by 130 valid answers. Regarding the reliability and validity of the used questionnaire, its reliability could not be assessed, but face validity was present. Their findings demonstrated a gender disparity in the opportunity for learners to examine each other, which is more noticeable when male students examine female classmates. More precisely, approximately a minimum of 25% of male learners missed the opportunity to examine the opposite gender for each body area.[11] This is congruent with the research, which showed that same-sex pairing of students in examination sessions is preferable to matching students of different genders.[8,10,18] According to the authors, the outlook is a student self-estimation related to personal attitudes and beliefs, including consideration for religion and culture. The outlook of the respondents was divided into three categories: conservative, liberal, and average (the majority). Individuals who regarded themselves as conservative in outlook had the greatest opportunities for examining all body parts. Comparing gender and outlook, the examinee's gender is the most essential variable in deciding whether the examiner student may have an opportunity for examination or not. This is true for each body part, including ones that may be considered to cause the slightest embarrassment or distress. The limitations of the work rely on the self-assessment of outlook by the respondents themselves and providing vague and ill-defined terminology of outlook, affecting its perceived meaning by participants.[11]

Assessing the willingness of students, at a single medical college in Germany, to be physically examined in a PPE course was obviously evaluated by Burggraf et al.[33] Although only 3rd year students were invited to take part in this survey-based study, their recruitment method was not pointed out clearly, thus, making selection bias a possibility. The authors designed their own self-administered survey which was not mentioned as being previously used and/or validated. Interestingly, the study achieved a very high response rate reaching nearly 100%. When it comes to the body areas to be examined by either a tutor or peer of a different gender, Burggraf et al found that females showed the lowest percentages in accepting this method, being 6% (for a tutor) and 7% (for a peer) with regards to the breast region. This was followed by the groin area with an acceptance rate of 23% and 29% when being examined by the tutor and peer, respectively. The head, neck, and hand scored the highest rates among all body areas. Students with strict religious beliefs were considerably less inclined to have any component of their bodies examined than less and non-religious students with the exception of hands with a p-value ranging from 0.02 to 0.001. The study showed that examination by an academic expert had no effect on increasing the student's acceptance of this practice. Body mass index (BMI) did not exert a significant effect on willingness too.[33]

A Syrian study by Soqia et al[18] shed light on the acceptance of PPE and its related factors during COVID-19 at a wide range of universities, 12 in total. The study's large sample can be considered a representative one with an acceptable response

rate of 74.5%. By relying on previously utilized and validated questionnaires,[30,31] the authors designed their own one that gained an acceptable value for reliability by using Cronbach's Alpha Coefficient. Due to the nature of the society in which this study is conducted and the fact that the work included a large number of medical schools and students, it can give a good view or resemblance to the state of PPE in other Eastern societies.[18] In line with the outcomes of the existing literature in developed countries,[31,33] this Syrian research yielded similar findings regarding a number of factors, namely gender, religion and body parts to examine, with a significant difference in the willingness between the two genders. Such variation between males and females can be attributed to some underlying causes like religion and body image. Also, the study evaluated some exclusive variables such as the impact of COVID-19, financial status, and academic performance on engagement with PPE. By using one-way ANOVA, there was no significant effect of such variables on the engagement degree. The majority of Syrian medical students (80%) accepted PPE while the remaining 3% and 17% showed negative and neutral options, respectively. A critical and interesting finding was related to the role of the tutor in PPE. The presence of the tutor, either for providing guidance or examining students during physical examination sessions, was well received by the participants.[18]

PPE in Nursing

Being a student in a nursing school is slightly different from being so in other health professions as early clinical learning is a strong tradition of the nursing curriculum from the start. Nurses spend more time in a clinical setting where they learn and acquire their abilities and experiences with actual patients. Furthermore, there are two distinctions that may influence nursing students' use of PPE. The first one is that the nursing school, in most contexts, has a majority of female intake which can give clearer evidence of the effect of gender on their attitudes. The second one is related to early and frequent interactions with patients, including caring for and evaluating patients.[31]

A cross-sectional study was conducted on PPE in the nursing program by Wearn et al[31] at a single medical college in New Zealand with an acceptable response rate (76%). They planned to target and explore three specific aims including the identification of the students' attitudes regarding PPE, their comfort when examining patients, and the correlation of their demographical data with the attitudes when performing examinations. The majority of participants showed no features of discomfort with the examination of non-sensitive body areas with a rate ranging from 78.2%-100% in relation to peer examination and 92.3%-100% in relation to patient examination, indicating more willingness to examine patients than peers. Although male nurses accounted for a minority of participants in this study (7%), they felt more comfortable regarding examining non-sensitive parts of their fellows compared to female nurses. Students of different backgrounds, especially Asian ones, were substantially less likely to participate in this type of examination with fellows of the opposite sex ($p<0.007$). Moreover, the research emphasized more acceptance of examining peers and patients when moving from 1st to 3rd year, indicating an effective role of personal and professional maturation across years. Despite its limitations such as the possible presence of type 1 error and limited generalizability, the study added important information on PPE for nursing education and may open the way for further research in this field.[31]

PPE in Osteopathy

Studying osteopathy has gained popularity due to its hands-on approach that focuses on diagnosing and treating the underlying causes of the patient's complaints in the muscles and/or joints instead of just masking the symptoms. The use of PPE in osteopathic medical education has become a widespread practice, being incorporated into the osteopathy curriculum from the early stages of training.[12]

In Italy, Consorti et al[30] completed a cross-sectional study addressing well-structured and focused objectives to assess how much medical and osteopathic learners can accept PPE activity and to compare the acceptance of these two groups. Two valid and reliable types of questionnaires were used for this purpose. A high response rate on the survey collection day was achieved, being (92.14%) for medical students and (97.4%) for osteopathic ones. The method of selecting the participants can introduce some sort of bias due to the use of convenience type of sampling. According to the used questionnaires, a linear regression analysis showed that the only two independent factors that substantially predicted the scores of the updated survey were gender and whether the student was a medical or osteopathic participant. Likewise, the Examining Fellow Students (EFS) main scores revealed a difference between osteopathic and medical respondents that was statistically significant ($p<0.01$). The results confirmed that osteopathic students showed higher

positive views and accepted PPE more than medical ones. None of the demographic or culture-related issues could account for the result. Such findings boost the belief that osteopathic students are more readily accepting the idea of physical touch and contact. The study also found that medical females expressed more worry about this practice than males, but this was not the situation for osteopathic learners. In addition, gender differences for osteopathic learners did not attain statistical significance. The research provided valuable insight into the PPE state in osteopathy in comparison to medicine as there is a scarcity of literature on the place of PPE in other health professions.[30]

To my knowledge, the study by Vaughan and Grace[12] was the first study on PPE in osteopathy education that targeted two Australian universities, Victoria and Southern Cross Universities, to evaluate the perception of first-year students before and after engagement in PPE sessions. The samples for the two universities were different as in Victoria University the respondents were more in number and younger than those of Southern Cross University. For these two institutions, the response rates were satisfactory and high, especially, prior to PPE than after finishing these sessions. Being a female, a non-Australian citizen, expressing a particular religious faith, and being an older osteopathic student resulted in refusal or unwillingness to perform this practice. Overall, osteopathic learners considered PPE as an important academic experience and became less concerned and more open toward the end of the 12-week training activity. This work is valuable in terms of adding more information to PPE in osteopathy and medical education in general and in targeting attention to investigate this practice in this profession and other healthcare fields.[12]

PPE in Chiropractic

Like in osteopathy, chiropractic is a physically active profession that concentrates on treating neuro-musculoskeletal system issues with the most focus on the spine and spinal cord. The chiropractors' treatment strategies heavily rely on physical examination together with manual therapy. In comparison to other professions like medical and nursing fields, chiropractic involves more exposure to physical examination and hands-on procedures. As PPE is a necessary and indispensable part of the undergraduate chiropractic program, the utilization of this procedure begins at the early stage of the course and extends until the start of the final year when students begin treating patients under the supervision of physicians.[10]

Ardakani et al's study,[10] the most recent and the first of its kind in the chiropractic field, was conducted at Murdoch University in Australia to exclusively investigate the students' attitudes and willingness to PPE in both the first and second years of the chiropractic program. Specifically, three main and precise variables (gender, age, and program year or class) were chosen to investigate if any of them have an influence on PPE in terms of willingness and comfort. Professionalism and students' views about the convenience of PPE were considered too. The authors used a convenient sample with no calculation for the sample size. They provided the participants with a modified version of an approved questionnaire, reaching a good response rate (76.6%). The survey questions were restricted to close-ended questions only that usually lack an extensive exploration of students' views and attitudes. The results showed that the majority of chiropractic participants in both first and second years as a whole felt comfortable performing physical examinations when taking a position with a fellow as an examiner and examinee (90%) and 82% of students felt comfortable in inguinal examination with the same gender. However, some students saw themselves being uncovered in front of their classmates (29%) and only 5% were worried about getting aroused while examining each other. Younger females and older males were less comfortable in PPE than others, especially when being a volunteer in the inguinal region examination. When analyzing the three main variables mentioned earlier separately, they had no different effects on PPE, rather, their interactions together showed an impact on the attitudes.[10] Finally, most respondents acknowledged that peer physical examination is a suitable, worthy and professional tool in that it allows them to spend more time learning, and competently improving their clinical skills as mentioned by other research.[2,12,30]

Discussion

This narrative review was performed to explore the most important factors affecting students' attitudes and acceptance of peer physical examination, provide recommendations in terms of solutions for the issue and directions for future research, and highlight any gaps in the body of literature over the study period. This research used the gathered information to answer its proposed aims which were:

1. Identifying the factors which strongly influence students' attitudes and acceptability of peer physical examination in medical as well as other health science schools.
2. Evaluating the variations in the attitudes of students about peer physical examination in various health science schools in the reviewed period.
3. Providing measures for improving students' attitudes regarding PPE in medical education programs as recommendations.

Before discussing how this narrative review answered these aims, one important general conclusion emerged from all ten included quantitative studies indicating high attitudes and acceptance rates of PPE among participants globally. These high percentages are true for non-sensitive body regions. Females were more hesitant and worried about engaging in this type of experience than males, especially in intimate areas like breasts and genitalia.

The current study aims to give answers to the structured objectives as follows:

For answering the first aim, despite the presence of numerous factors that influence PPE practice among medical and other healthcare specialities, gender remained at the top of the most influencing factors as female students were more reluctant and less comfortable than the opposite gender, especially during examinations of sensitive body areas. Additionally, among different body parts, the most sensitive areas namely, the breast, groin and genitalia were found to cause more hesitation and sexual arousal than other parts. Accordingly, excluding sensitive areas from peer examination classes is recommended, especially in the earlier years of study. Regarding the type of examination, whether male or female, the student preferred to do examinations on their peers rather than to be a candidate for the examination.[17,31] Substantially, conservative cultures and particular ethnicities are still exerting their impacts on the willingness to participate in this activity.[12,18,31] Conservative people usually follow socially accepted behaviors in their communities and are confined by certain religious beliefs and behavioral norms practiced by their society. Such cultures can influence participation in the physical examination as a result of sensitivity towards body exposure and touch.[17,18] Although the role of religion and its degree was not studied extensively by all the reviewed literature, some of them found that the degree of religiousness affects the acceptance of participating in PPE courses.[12,18,33] However, the level of religiousness has not been rated precisely, thus, requiring further research to focus on this issue.

Importantly, it is crucial to consider here that a number of authors advocated the importance of interaction among these factors to exhibit noticeable and stronger effects on the students' attitudes and acceptance rather than analyzing them individually.[10,18] Finally, this study's results confirmed the need for further research to explore and investigate some other variables that have not yet been investigated, for instance, trust, communication, skill levels and bullying.

To address the second aim, while the included studies can be helpful and informative for explaining the presence of any variations or changes in attitudes over time, the current study found no significant variations in accepting this practice over the reviewed 12 years period as the earliest study conducted by Chen et al[17] showed, generally, similar results to the most recent studies.[10,18]

For the third aim, strategies to mitigate hurdles and improve engagement in peer physical examination sessions will be explained in detail subsequently under the title of recommendation.

Some general themes were discovered and highlighted from the selected studies. All the conducted studies over the review period investigated the most potential factors acting as barriers to PPE practice among participants. However, none of the studies was comprehensive in including all the responsible factors impacting PPE, either as barriers or facilitators to this practice. On the other hand, some studies were innovative in investigating the effect of some new and exclusive factors such as BMI,[33] COVID-19,[18] financial state,[18] and outlook.[11] Several authors made significant efforts to add more information to the field of PPE practice by examining the presence of any differences and making comparisons regarding pre/post-PPE responses,[12,17] medical vs other health professions,[30] and the effect of age difference.[10,17,31]

Recommendations

For the purpose of maximum use of PPE as a safe, efficient, and trusted educational modality in the health professions curricula, this study will provide a number of possible recommendations for both potential strategies to improve and maintain the applicability of PPE and possible areas of exploration in future research.

Recommendations for improving PPE acceptance:

For students: candidates who are considered to be admitted to medical healthcare programs should be educated, first by their parents and second by colleges' arrangement of summer workshops, to consider feelings of the opposite gender, accept physical contact as part of the curriculum, encourage them to participate in any clinical activity, and inculcate values and ethical behaviors necessary to eliminate any potential for harassment. Finally, learners should be given the freedom to choose their group members with their preference of particular ethnicity, gender, religion and cultural background, particularly at the beginning, to feel more comfortable and reduce their hesitation about PPE until they get used to the environment, then, mixed groups can be developed.

For supervisors: as most studies reported the essential role of tutors in this clinical practice as both educators and facilitators, supervisors should be well trained and prepared to deal with critical issues arising during conducting such educational and experiential PPE sessions. They should open discussions about what PPE may include, its benefits and risks, and the students' concerns. Direct supervision, availability, and immediate feedback from the tutors are extremely important in these sessions to monitor students' progress, increase their confidence, correct mistakes, ensure adherence to written protocols, and implement discipline. In addition, receiving feedback from students is necessary to improve future sessions and reduce hesitation.

For educational institutions: most studies emphasized the use of clear and precise guidelines, policies, and informed consent. So, all educational institutions should develop and continuously update such documents jointly with the aid of the faculty members and learners to protect these three parties and enhance adherence to these rules. Voluntary participation in non-intimate body examinations in a non-obligatory manner should be established with the exclusion of sensitive body areas as these are not fundamental components of their curricula.

Recommendations for further research:

As the majority of studies on peer physical examination are cross-sectional, there is a strong need for a longitudinal design to detect any changes over time, including multi-centric studies with larger and heterogeneous samples to obtain more comprehensive, accurate and precise results. Some factors related to the tutor's personal characteristics such as age, ethnicity and religious belief need to be targeted in-depth as existing studies demonstrated the essential role of tutors in physical examination sessions as both educators and facilitators which can influence learners' attitudes. Further studies may also investigate how PPE is used in other fields like sports medicine, physiotherapy and psychiatry. Finally, further research in the East is required due to their scarcity in the meantime.

Limitations and Strengths

The limitations of this study lie in the following: This research is conducted in a narrative review form which is not as rigorous as a systematic review. As this work relies on the author's opinions in the interpretation of literature, it can be prone to bias. The restricted time span of this review, being 12 years, and the presence of limited published studies in this period can affect the strength of the provided evidence. Restriction to the English language and inclusion of only quantitative type of studies may have prevented the inclusion of important articles. Additional limitations are attributed to the nature of the included studies themselves, particularly in being cross-sectional studies that are not on the top of the hierarchy of evidence, missing information about the eligibility criteria, the possibility of selection bias, and the absence of describing the participants' selection procedure.

Despite the limitations mentioned above, the strengths of this work stand behind the fact that this narrative review, up to my knowledge, represents the first comprehensive analysis and critical appraisal of the literature on medical healthcare professionals and the use of peer physical examination in the past 12 years, aiming to bridge the gap in knowledge and providing clarity on ambiguous aspects of this topic. In addition, CEBMa was used as a well-structured and validated critical appraisal tool in order to aid in synthesising a piece of strong evidence and reducing any risk of bias. Moreover, two major databases and Medical Teacher Journal were used which provide a wide variety of academic articles.

Conclusion

Peer physical examination is a widely adopted educational strategy for learning clinical skills as a result of its proven advantages. However, there are still certain questions about its drawbacks, ethical considerations, and potential policies.

The reviewed literature has documented some sort of hesitation by the students about participation in PPE. The provided evidence showed that certain factors are blamed for contributing to or being the source of such reluctance towards performing PPE comfortably. According to the evidence provided by this review, a number of possible recommendations should be considered as potential strategies to boost and optimize the applicability of PPE and possible areas of exploration in future research. Some innovative and practical suggestions can be implemented, including performing this experience in a safe environment, starting with non-sensitive areas, single-gender pairing, and considering cultural and religious beliefs into account. Importantly, PPE should be supported by the presence of mindful, wise and well-trained supervisors and the establishment and application of clear policies and guidelines. Additionally, it should be a voluntary activity without coercion. Lastly, this work provided a piece of evidence that emphasized a strong need for more multi-centric studies, including the Middle East.

Abbreviations

ANOVA, Analysis of Variance; BMI, body mass index; CEBMa, Center for Evidence-Based Management; COVID-19, coronavirus disease; EFS, Examining Fellow Students; IMRAD, Introduction, Methods, Results, and Discussion; n, sample size; PPE, peer physical examination; vs, versus.

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