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ORIGINAL ARTICLE

Exploring 1st- and 2nd-year chiropractic students' willingness and attitudes toward peer physical examination

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ABSTRACT

Objective: This study aimed to explore chiropractic students' perceptions and attitudes about the appropriateness of peer physical examination as a teaching tool and their willingness and comfort with it.

Methods: A modified version of a validated questionnaire was used. First- and 2nd-year chiropractic students at Murdoch University were approached during their practical sessions. The responses were analyzed using descriptive statistics reporting frequencies and percentages. Comparison between classes, age, and sex was evaluated by cross-tabulation.

Results: A total of 184 questionnaires were completed with a response rate of 76.6%. Our results demonstrated that most students were comfortable with and willing to participate in peer physical examination as well as trusted it as an appropriate part of their training and a valuable learning experience. Nevertheless, a small percentage were uncomfortable with peer physical examination and regarded it as an unprofessional activity. In addition, it was revealed that younger females ($\leq$20 years) reported feeling unnecessarily exposed and therefore significantly less comfortable with peer physical examination. They were also less comfortable when examined in the inguinal area by a student of the opposite sex.

Conclusion: Although peer physical examination appears to be a very popular training tool, it still has a few areas of concern that need to be investigated and addressed to improve students' attitude, perception, and comfort with this teaching technique. Further studies could investigate how other factors such as religious beliefs contribute toward students' perception and attitudes regarding peer physical examination.

Key Indexing Terms: Chiropractic; Education; Physical Examination

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INTRODUCTION

As a form of simulation-based training, peer physical examination is a fundamental component of health professions education, providing both educational and practical benefits for developing students' clinical skills.[1] Peer physical examination can be used in procedural skills training because it offers students the opportunity to improve and advance their skills through repetitive practice in a low-risk, learner-centered environment.[2–8] In this safe setting, peer physical examination can help anxious students overcome their nervousness and allow them to improve their clinical skills through repeated practice.[5] Through a process referred to as peer-assisted learning, students have the opportunity to receive instantaneous feedback on their performance while having the possibility to examine a wide range of different body types.[6,9,10] Peer physical examination plays a crucial role in developing professionalism and improving clinical interaction and effective communication skills among students.[6,9] The growing need for peer physical examination has been reaffirmed due to the ethical considerations and the cost of using other alternative methods such as standardized patient or simulation systems and manikins.[3]

Despite numerous benefits of peer physical examination, students may still experience anxiety, embarrassment, or reluctance to engage in peer physical examination, as it could be perceived as a potential source of student misconduct and inappropriate behavior.[1,6] Factors that have been found to influence students' perception of peer physical examination include the body region being examined, age, sex, ethnicity, and religion. According to some research, almost all medical students are willing to either be examined or examine nonintimate body regions

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during peer physical examination. However, many are not as willing to be examined or have intimate parts, such as the breast, genital, and rectal regions, examined.[2,3,6,11,12] These findings were not supported by Vaughan and Grace,[9] who found that students were generally willing to examine and be examined by a peer in all body regions.

The student's age has been found to be the most inconsistent factor influencing their perception and attitudes toward peer physical examination, with several studies providing conflicting outcomes. According to Rees et al,[5] older students were less likely to be comfortable with peer physical examination on sensitive regions such as the lower back and abdomen as compared with younger students. This contrasts with Wearn et al,[12] who reported that older students were more willing to engage in peer physical examination with intimate body regions, probably because of their greater maturity.[12] However, Chang and Power[4] emphasized that age alone did not influence students' attitudes toward peer physical examination but instead observed a sex and age interaction. They also argued that older men and younger women felt most comfortable with peer physical examination.[4]

Ethnicity and religion have also been identified as critical determinants of students' attitude toward and willingness to engage in peer physical examination. For instance, Caucasian students born within Australia were most comfortable performing peer physical examination.[1,5,6,9,12] Still, the most extensively explored and influential factor has been found to be the student's sex. Vaughan and Grace[9] and Rees et al[5] in their studies showed that students preferred to perform peer physical examination with peers of the same sex and would rather be the examiner than the examinee when examining a peer of the opposite sex. Thus, many factors appear to be influential and would need to be considered when determining students' attitude toward and willingness to engage in peer physical examination.

The existing literature concerning students' perceptions and attitudes toward peer physical examination has mainly focused on nonmanual therapy–oriented health professions such as medical and nursing students, while minimal research has been conducted on manual therapy disciplines such as osteopathy,[9,13] and thus far, no studies have been conducted on chiropractic students. Educational curricula vary substantially across different health professions regarding the amount of physical examination and manual therapy techniques studied. Because chiropractic education relies so heavily on peer physical examination and palpation, and because chiropractic courses focus mainly on the development of hands-on examination and therapeutic techniques in comparison with other health care professions, there is a need to develop a better understanding of chiropractic students' attitude toward and willingness to engage in peer physical examination.

Chiropractic is a hands-on profession that deals with complaints of the musculoskeletal system, focusing on the spine.[14] Manual therapy plays an integral role in the chiropractors' treatment plans, with extensive use of physical examination. The development of these clinical examination skills is essential for the chiropractors' clinical practice, and such skills are mainly developed at an undergraduate level through peer physical examination. This suggests that the amount of exposure to physical examination and manual therapy techniques is greater in chiropractic than in other professions, such as medicine or nursing.

In the chiropractic program at Murdoch University, the use of hands-on techniques in which students engage in peer-assisted learning and peer physical examination starts from the very beginning of the course and continues until the commencement of the fifth year, when students first start managing patients under clinicians' supervision. Hence, peer physical examination is an integral and irreplaceable element of the undergraduate chiropractic curriculum at Murdoch University. Although physical examination of the breast, rectum, and genital region does not form part of the curriculum, examination of other intimate regions such as the femoral triangle and chest (excluding the breasts) is still included in the curriculum. Classes include both female and male students pairing up in same- or mixed-sex pairs, in which students act as simulated patients and examiners for each other. Students are sometimes requested by instructors to partner with the opposite sex regardless of their or their partner's preference.

Within the 1st and 2nd years of the undergraduate chiropractic course, students are taught draping techniques demonstrated by the lecturers within practical classes. However, training in cultural and diversity beliefs are taught only in later years (4th and 5th years). Given the large amount of peer physical examination in the chiropractic course, careful exploration and understanding of students' willingness and attitude toward peer physical examination seem crucial for curriculum developers because of its centrality in developing procedural skills for chiropractic students.

Therefore, the aims of this study were (1) to evaluate chiropractic students' willingness and comfort regarding peer physical examination, (2) to investigate their perception and attitude toward the appropriateness of peer physical examination and its value as a learning tool, and (3) to examine for any difference between age, sex, and year/class on their attitude toward and willingness to engage in peer physical examination.

METHODS

All 1st- and 2nd-year chiropractic students at Murdoch University were invited to take part in this study. First- and 2nd-year chiropractic students were included to gather the viewpoint of students early within the chiropractic course, with the intention to later follow-up the same students and see how their responses may change over time. A member of the research team approached the students in October 2018 during their practical sessions/labs of physical examination and surface (living) anatomy (6 classes) over a 2-week period. The 2nd week was to capture any students who were absent during the previous

week. No sample size calculation was undertaken, as a convenience sample was used. Following an oral explanation of the purpose and process of the study, a consent form, an information letter, and a questionnaire (paper-based) were distributed to the willing students to be filled out on the spot. Potential participants were assured of their anonymity by ensuring consent forms and questionnaires were collected separately, and there was no identifying information on the questionnaire.

The questionnaire used in this study was a modified version of a validated questionnaire previously used in similar studies on medical students.[3,4] The same questions were used, but the words *medical students* were replaced by *chiropractic students*. The modified questionnaire was also sent and verified by the author of the original questionnaire.[4] Our modified questionnaire consisted of 18 questions in total, 15 content questions (8 designed to evaluate students' willingness and comfort, and 7 to assess their perception and attitude toward the appropriateness of peer physical examination and professionalism), and 3 demographic questions regarding age, sex, and year of study. Participants indicated their level of agreement with each of the 15 statements using a 5-point Likert scale in which 1 = *strongly agree*, 2 = *agree*, 3 = *neutral*, 4 = *disagree*, and 5 = *strongly disagree*. The students were informed that for the purposes of this study, peer physical examination and palpation would not include the examination of sensitive areas such as breast and genitals, as these regions are not typically part of the chiropractic curriculum at Murdoch University.

Responses were entered into SPSS v.22, (IBM Corp, Armonk, NY, USA), and the data were analyzed using descriptive statistics reporting frequencies and percentages. Data were checked and verified for accuracy by 2 research team members. For ease of analysis and reporting, the Likert scale was dichotomized. Therefore, *strongly agree* and *agree* responses were merged to form an *agree* option, and *neutral*, *disagree*, and *strongly disagree* were combined to a *neutral/disagree* option. The neutral was paired up with disagree and strongly disagree as we wanted an unequivocal agreement on the statements. Age was collapsed into 2 categories based on the median split. Individual chi-square test for association was conducted for age groups, sex, year/class, and willingness/comfort and appropriateness/professionalism. Then, any interactions between those variables were tested. Chi-square or Fisher exact test was used to report any significant association between variables. Murdoch University Human Ethics Research Committee approved this study (project No. 2018/188).

RESULTS

Of 240 eligible 1st- and 2nd-year chiropractic students, 184 (76.6%) completed the questionnaire; 103 (56%) were female and 101 (55%) were 1st-year students (Fig. 1). The age of the respondents ranged from 17 to 52 years, with an average of 22.7 years, and 101 (55%) were aged ≤20 years.

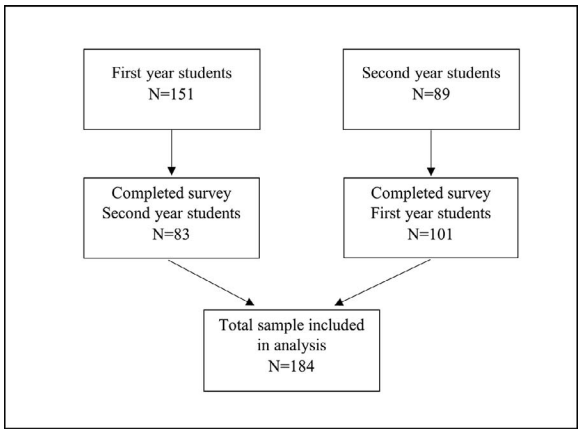

Figure 1 - Flow chart of chiropractic students included in the study.

Students' Willingness to Participate in and Comfort With Peer Physical Examination

Table 1 summarizes the overall responses to the comfort part of the questionnaire. First- and 2nd-year chiropractic students were frequently comfortable with performing a physical examination on their peers and with being examined by them (90%). Twenty-nine percent of students reported feeling exposed by being undressed for physical examination in front of a group of their peers. A minority of respondents (5%) were concerned that they might get aroused while practicing peer physical examination on one another. When examining the inguinal region, 82% reported being comfortable taking turns palpating this region with students of the same sex, whereas 67% were comfortable with the opposite sex.

Students' Perception of Professionalism and Appropriateness of Peer Physical Examination

Most respondents considered peer physical examination an appropriate part of their training and a valuable learning experience. However, a minority of students (8%) believed that practicing physical examination on future colleagues was unprofessional. Most students found it preferable to practice physical examination on each other rather than patients and agreed that taking turns practicing on each other allowed for more time to learn examination skills properly. The details of students' attitudes toward professionalism and appropriateness of peer physical examination can be found in Table 2.

Sex, Age Group, and Year/Class Difference
Willingness and Comfort

No differences were found in terms of age, sex, and class/year when examined individually regarding willingness and comfort with peer physical examination. However, the results showed that younger females (≤20 years) were significantly less comfortable with peer physical examination due to feeling more exposed compared with their younger male counterparts (35%

Table 1 - Summary of Responses on Comfort Toward Peer Physical Examination

Comfort with peer physical examination	*n* (%) Agree	Neutral/ Disagree
In general, I am comfortable with:		
other chiropractic students' physical examination/palpation of me.	166 (90)	18 (10)
me practicing physical examination/palpation on other classmates.	166 (90)	18 (10)
I am comfortable with taking turns practicing physical examination/palpation skills		
with another chiropractic student	167 (91)	17 (9)
with a chiropractic student of the same sex.	168 (91)	16 (9)
with a chiropractic student of the opposite sex.	153 (83)	31 (17)
I am comfortable with taking turns examining/palpating *the chest* (such as for palpation of the heart)		
with another chiropractic student	163 (89)	21 (11)
with a chiropractic student of the same sex.	161 (88)	23 (12)
with a chiropractic student of the opposite sex.	142 (77)	42 (23)
I am comfortable with taking turns examining/palpating *the inguinal area* (such as feeling for the femoral pulse, palpating the inguinal ligament)		
with another chiropractic student.	149 (81)	35 (19)
with a chiropractic student of the same sex.	150 (82)	34 (18)
with a chiropractic student of the opposite sex.	123 (67)	61 (33)
I am comfortable in setting limits or boundaries with another student before being examined/palpated by them (such as, "Please don't perform ____" [part of the exam]).	153 (83)	31 (17)
Being undressed for a physical examination/palpation in front of a group of my classmates would make me feel exposed.	53 (29)	131 (71)
I am concerned that I might get aroused while taking turns practicing physical examination/palpation skills with a classmate.	10 (5)	174 (95)
I have had an uncomfortable experience while practicing physical examination/palpation skills in which		
my discomfort was mainly caused by my tutor.	7 (4)	177 (96)
my discomfort was mainly caused by a classmate.	11 (6)	173 (94)

vs 28%), $\chi^2(1) = 3.91$, $p = .038$. Whereas older 1st-year students (>20 years) were significantly less happy with the inguinal area being examined by their peers compared with the younger 1st-year students (30% vs 10%), $\chi^2(1) = 6.35$, $p = .014$, 1st-year female students were also significantly less comfortable when a peer of the opposite sex examined their inguinal area compared with their male counterparts (38% vs 20%), $\chi^2(1) = 3.94$, $p = .038$.

Appropriateness and Professionalism

Adding sex and year/class alone did not make any difference to the results. Nevertheless, older 1st-year students were significantly more likely to hold the opinion that peer physical examination was not an appropriate part of chiropractic training (15% vs 3%), $\chi^2(1) = 5.14$, $p = .036$. Older 1st-year students also believed that practicing peer physical examination on a future colleague was an unprofessional act (21% vs 3%), $\chi^2(1) = 9.14$, $p = .005$.

Table 2 - Summary of Responses to the Appropriateness and Professionalism

Professionalism/appropriateness of peer physical examination	*n* (%) Agree	Neutral/ Disagree
In general, I believe that practicing physical examination/palpation on classmates is an appropriate part of chiropractic training.	170 (92)	14 (8)
In general, I believe that practicing physical examination/palpation on classmates is a valuable learning experience.	172 (93)	12 (7)
Taking turns practicing physical examination/palpation with classmates allows for more time to learn examination skills properly.	161 (88)	23 (12)
Taking turns practicing physical examination/palpation skills on my classmates is preferable to learning on standardized patients (ie, paid patients or simulators).	140 (76)	44 (24)
I get valuable feedback about my exam/palpation technique from a classmate.	127 (69)	57 (31)
I believe that it is unprofessional to practice physical examination/palpation on my future colleagues.	15 (8)	169 (92)
Practicing physical examination/palpation on classmates strains my relationship with them.	21 (11)	163 (89)

DISCUSSION

This study primarily aimed to explore chiropractic students' comfort, perception, and attitude toward peer physical examination. In addition, some key factors previously identified by studies conducted in different disciplines such as age, sex, and year/class were investigated for difference.

The fact that 1st- and 2nd-year chiropractic students were generally comfortable when examining their peers and being examined by them, and that most students were more comfortable with taking turns with a student of the same sex, is consistent with previous studies conducted on medical and osteopathy students.[1,3–6,9] We also found that students were less comfortable performing peer physical examination on the inguinal region than the chest, especially with a student of the opposite sex. This study confirmed that chiropractic students, like students of other health professions, were most comfortable with performing peer physical examination on peers of the same sex but less so when practicing peer physical examination on a peer of the opposite sex, especially when examining the chest and inguinal regions.[3,4,9] Even though breasts and genitals are not generally exposed when examining these areas, students may still experience increased anxiety in fear of a possible "inappropriate/accidental palpation" of a sensitive structure during peer physical examination. Similar studies done on other health professionals have suggested that this increased anxiety may be due to a multiple of reasons such as the concern of criticism and teasing comments, body image issues,[9] and awkwardness of overexposing the body.[5,6]

Some considerations can help familiarize students with practicing peer physical examination while at the same time reducing their level of discomfort, especially with the opposite sex. Barnette et al[15] discussed significant differences in willingness to perform peer physical examination with the opposite sex, depending on whether the student considered their fellow participants a friend or stranger. Therefore, allowing same-sex pairing or pairing with peers with whom they are familiar for the initial weeks of practicing peer physical examination and then slowly introducing opposite-sex pairing in the subsequent weeks when the students have become more confident in their palpation skills and draping techniques may ease students' stress and anxiety.

Similar to other studies,[4] this study revealed that a small portion of the students felt exposed when being undressed for physical examination in front of their classmates. This feeling of being exposed is perhaps due to several factors identified and explored previously, such as having a negative self-image, religious beliefs/limitations, feeling "awkward" or "embarrassed," or being afraid of physical contact.[1,3,5,6,9] A discussion about body image prior to peer physical examination sessions and using proper draping techniques might help decrease those feelings and ease these concerns. Also, creating opportunities for students to discuss their concerns and providing learning alternatives can be considered. Seemingly, a small number of students had difficulty setting boundaries with their peers before peer physical examination or reported an uncomfortable feeling caused by their tutor or a classmate. Clear, direct, and effective communication about peer physical examination and what is expected of it might be beneficial in this regard. Furthermore, regular evaluation of tutors on their professional behavior may help reduce the "uncomfortable experience" expressed by some students.

A small percentage of students thought that practicing physical examination on future colleagues is unprofessional and may place a strain on their relationship. A key element in analyzing the professionalism of peer physical examination is the students' understanding of this term. Students in the present study may perceive professionalism in diverse ways and ascribe its meaning differently, especially the 1st-year students, possibly with limited knowledge about chiropractic and minimal experience of peer physical examination. Although this study did not explore students' understanding of professionalism, differentiating unprofessional behavior from disruptive or inappropriate behavior is essential.[16–18]

Development of professionalism is a significant component of the course structure at Murdoch University. As students progress through the curriculum, they learn to develop a professional attitude and relationships with their classmates. Once students start to acknowledge peer physical examination as a professional way of learning from each other, its acceptance and the student's willingness to use peer physical examination should increase both for the student who is examining and the student being examined. This acknowledgment was reflected in our results by the increase in the reported comfort levels of 2nd-year students when performing peer physical examination on the inguinal area. However, cultural and diversity training are taught only in later years (4th and 5th years). Therefore, it may be beneficial to include cultural and diversity training throughout the curriculum rather than just toward the end of the course.

Chang and Power[4] pointed out that peer physical examination ensures proper skill practice within a supervised and safe environment for students who are not confident enough about their physical examination skills on real patients and protects patients from repeated, often uncomfortable examinations performed by novice practitioners.[4] This concept was supported by most participants in this study. Moreover, taking turns during peer physical examination provides an opportunity for students to gain an appreciation of normal variations in anatomy and function.[16] This assumption is supported by most students in this study who valued examining a wide variety of individuals and obtaining constructive feedback from tutors and peers before they manage real patients.

Some other studies reported that sex would be a significant variable shaping willingness to participate in and comfort with peer physical examination. For instance, female students were much less comfortable with the examination of the chest and inguinal regions than males were.[3,5] In our study, age group, sex, and class/year failed to produce any significant differences in responses when examined individually. Our findings

largely corresponded to a similar study carried out on medical students, in which the authors found that age alone did not influence responses and that there is a strong age-sex interaction when looking at the examination of the inguinal area.[4] The failure of sex, age group, and class/year alone to produce any significant differences regarding the comfort of peer physical examination may suggest that it is not 1-dimensional as most people may assume but rather an interaction between them that affects people's responses.

In addition, it was seen that as the age of the students increased, the students seemed to be more comfortable examining sensitive areas such as the inguinal region of the opposite sex. One possible explanation could be the limited exposure to peer physical examination of 1st-year students, which makes them feel less comfortable taking turns examining/palpating the inguinal area. First-year students may be cautious in examining the inguinal region based on the fear of accidentally touching their peer's genitals and making themselves or their partner uncomfortable. The lack of a thorough understanding of the importance of doing an inguinal examination/palpation also adds to the uncertainty.

There are potentially important considerations for curriculum development and specific methods that could be used to increase the students' level of comfort and willingness to participate in peer physical examination. This may include allowing same-sex pairings, allowing students to initially work in groups with peers with whom they are familiar when practicing peer physical examination, providing regular tutor education and evaluation of professional behavior, setting professional behavior standards, and undertaking a formal peer physical examination participation consent process.

Limitations

First, this study used a questionnaire that contained only close-ended questions. Therefore, participants' subjective responses and thoughts were restricted. Second, previous research has found equivocal findings about the effect of religious beliefs held by students on comfort with and attitudes toward peer physical examination.[3,9] We intentionally chose not to include this concept in our study. Therefore, the association between students' religious beliefs and their willingness and attitudes toward peer physical examination could not be explored. It could be of benefit to investigate the influence of chiropractic students' religious beliefs on their attitude toward and comfort with peer physical examination in future. Third, we also did not explore students' understanding of professionalism. This study recruited only students from a single chiropractic program within the 1st and 2nd years. A multicentered study, with a large sample and including or comparing later-year students, might provide a better understanding of student's attitudes in this regard, and this could be an avenue of future research. Finally, the recruitment period occurred over 6 classes over 2 weeks; therefore, it may have given students in later classes time to discuss their responses.

CONCLUSION

To our knowledge, this study is the first to examine chiropractic students' attitudes and willingness toward and comfort with peer physical examination. Most students were comfortable with and willing to participate in peer physical examination, trusted it as an appropriate part of their training, and viewed it as a valuable learning experience. A small percentage of students were uncomfortable with peer physical examination and regarded it as an unprofessional activity. Younger females were significantly less comfortable with peer physical examination. They were also less comfortable when examined in the inguinal area by a student of the opposite sex. There is a need to replicate this study in chiropractic programs offered at other institutions. Qualitative studies may further elucidate factors that contribute to students' willingness to engage in and feel comfortable with peer physical examination. Such information may be useful in designing chiropractic curricula.

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pretation: EA, AB. Literature search: EA. Writing: EA, JT, AB, BL. Critical review: EA, JT, AB, BL.

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