Gender matters: Students' perceptions of peer learning in clinical education

J. H-M. Tai[1, 2], B. J. Canny[2, 3], E. K. Molloy[4] & T. P. Haines[2, 5]

Abstract

Introduction: Peer-assisted learning (PAL) is an increasingly used learning method, with demonstrated equivalence to conventional teaching methods in students' knowledge and skill gain. Despite this, student satisfaction with PAL is varied. There are few investigations of gender as a factor influencing students' perceptions of peer-assisted learning, and less is known about gender's impact on participation in PAL.

Methods: This study investigated the influence of gender on students' attitudes towards, and participation in, PAL activities. One hundred ninety-one students in their first clinical year completed a self-report questionnaire over a 3-year period. The questionnaire included questions on engagement in specific PAL activities and the advantages and disadvantages of PAL.

Results: Male and female students reported similar participation rates in PAL activities. Female students were more likely to report that observing others undertake a history or examination was useful to their learning. Female students were also more likely to report that PAL provided a "safe" learning environment, allowing them to take more time, let down their guard and ask questions.

Conclusions: Variation in students' attitudes when introducing PAL activities may affect their uptake. Gender is unlikely to be the sole factor affecting perceptions of PAL, but it may have an impact on readiness to engage and patterns of engagement. The perceived relative safety of PAL identified in this study, when contrasted to recent reports of bullying and harassment within medical training in Australia, may suggest that educating clinicians and students on the role of PAL could result in safer learning environments and improve learner experiences.

1 Centre for Research in Assessment and Digital Learning, Deakin University, Geelong
2 Faculty of Medicine, Nursing and Health Sciences, Monash University, Clayton
3 School of Medicine, Faculty of Health, University of Tasmania, Hobart
4 Department of Medical Education, Melbourne Medical School, University of Melbourne
5 Allied Health Research Unit, Monash Health

Correspondence
Joanna Hong-Ming Tai
Centre for Research in Assessment and Digital Learning
Deakin University
Locked Bag 20001
Geelong
Victoria 3220
Australia
Tel: +61 3 924 43780
Email: joanna.tai@deakin.edu.au

ISSN 1442-1100

Keywords: Peer-assisted learning; gender; clinical education.

Introduction

Peer-assisted learning is a frequently used learning method for medical students. Peer-assisted learning is defined as "people from similar social groupings, who are not professional teachers, helping each other to learn and by so doing, learning themselves" (Topping & Ehly, 1998, p. 1). Peer-assisted learning can occur in both formal, organised situations, such as the classroom (e.g., clinical skills teaching), and informally as an adjunct to the curriculum (Kommalage, Thabrew, & Kommelage, 2011). Student performance when learning from peers has been shown to be equivalent to conventional teaching, for both knowledge gain and skills (Yu, Wilson, & Singh, 2011), while students acting as tutors also developed professional attributes (Burgess, McGregor, & Mellis, 2014). Student satisfaction with peer-assisted learning has generally been high (Cushing, Abbott, Lothian, Hall, & Westwood, 2011; Weyrich et al., 2008), though some students have been less satisfied, preferring to participate in conventional learning sessions (Hulsman, Harmsen, & Fabriek, 2009). It is therefore plausible that universal incorporation of peer-assisted learning activities into education curricula may not benefit some student groups, and that a more targeted approach is required.

One factor that may influence whether students prefer, engage in or benefit from the introduction of formal peer-assisted learning activities in education curricula is gender (Kassab, Abu-Hijleh, Al-Shboul, & Hamdy, 2005). The limited research in this area has tended to focus on preferences and engagement but has not directly addressed the issue of benefit. Knobe et al. (2012) found that female medical students were more satisfied with their peer tutors than males. However, Kassab et al. (2005) reported female medical students were less satisfied with their peer tutors, despite more readily engaging in teamwork activities. In a PBL-based peer assessment activity, Papinczak, Young, Groves, & Haynes (2007) did not detect a difference in the marks given to peers based on gender.

Research that has directly addressed the issue of the influence and effect of gender on engagement in peer learning provides little clarity. More distantly-related research has examined the impact that gender has on the medical student experience at the pre-clinical and clinical levels. Medical students perceive that female medical students are placed under more stress and must perform better in order to be treated equally (Verdonk, Räntzsch, de Vries, & Houkes, 2014). Babaria, Bernheim and Nunez-Smith (2011) described how male students were reported to dominate the classroom, with greater levels of aggressive behaviour. Lempp & Seale (2006) also highlighted a range of gender inequalities perceived by medical students in clinical environments, including a lack of female role models and gender stereotyping of students to ascribe attributes (e.g., women are naturally more caring and communicative) and future specialities (e.g., paediatrics or family medicine as opposed to surgical specialities for women). Vnuk, Wearn and Rees (2016) found both students and tutors made gender-based assumptions about students' comfort and participation in peer physical examination. Tutors perpetuated inequities in participation through making male students feel obliged to act as the examinee, while female students took action and fought to also

ISSN 1442-1100

be included as examinees. One could hypothesise a range of impacts that these factors may have on student proclivity towards peer-assisted learning. These relationships will remain unknown without further research directly addressing this issue.

This research aimed to investigate the influence of gender on students' self-reported attitudes towards and participation in peer-assisted learning activities.

Methods

Design

This was an analytic, cross-sectional survey conducted with three successive cohorts of Year 3 medical students.

Participants and setting

We engaged research participants across the 15 clinical campuses of a single university from three successive cohorts of Year 3 Bachelor of Medicine/Bachelor of Surgery students from 2012–2014 (i.e., in their first clinical year). Students spend the first 2 years attending lectures, tutorials and practical sessions at a university campus. Many learning activities in these pre-clinical years employ peer-assisted learning to achieve knowledge and skill gain. Years 3 to 5 are spent on clinical placements. Learning outcomes in these years may require aspects of peer-assisted learning to be employed (e.g., communication with colleagues), however activities do not explicitly require the use of peer-assisted learning, nor is it mandated.

The first clinical year, Year 3, was chosen for this study because students spend the entire academic year at one clinical site, rotating through medical and surgical placements in an allocated student group of five or six students. They spend 1 day a week in didactic classroom sessions and attend tutorials on the other days, including those for problem-based learning and bedside teaching. Outside of these times, students are expected to participate in ward-based activities according to their rotation, such as outpatient clinics, ward rounds and operating theatre lists. There are additional optional peer-learning activities, such as mentoring by final-year students (Raghunath, Tai, & Zimmerman, 2011). Given the flexible nature of this first clinical year, students have ample opportunity for self-directed learning, including learning with peers.

Procedure

All students were invited to participate. Invitations were issued as a news announcement through the university online teaching system. Where possible, students were also addressed in person on a day where they attended lectures. A researcher (JT) explained the purpose of the project and handed out leaflets containing the URL for the survey. The explanatory participant statement was contained in the first page of the online survey. Consent was implied through the return of the survey. The chance to win a double movie pass was offered as an incentive for students who completed the survey. This was randomly awarded to a student who had supplied their contact details in a separate, non-linkable form. The survey remained open online for 1 month at approximately the same time each year, in the second semester, when students had settled into their placements.

ISSN 1442-1100

Instrument

A four-page survey on peer learning developed and described by Tai, Haines, Canny, & Molloy (2014) was used. The survey was constructed based on the research aims. The survey was written by JT and reviewed by the research team, who examined each question for clarity and intended meaning. Several items were then re-written to ensure the desired information was collected. The investigators' past experiences of the types of peer-assisted learning interactions that occur during clinical placements was crucial to the development of the first part of the survey. The survey also drew from the published medical and higher education literature reporting on the advantages and disadvantages of peer-assisted learning (Krych et al., 2005; Lincoln & McAllister, 1993; Weyrich et al., 2008). The survey asked students to report their experiences of 10 separate peer-assisted learning activities. The weekly frequencies of the activities were recorded, while the self-perceived utility of each activity for the student's learning was scored on a scale of 1 (not useful at all) to 5 (extremely useful), with the intermediate points not being labelled. In addition, students were asked to indicate who had initiated the activity and the location of the activity. The second part of the survey sought information about the advantages and disadvantages of peer-assisted learning and students' experiences of learning in the clinical environment. A Likert-type scale of 1 (strongly disagree) to 5 (strongly agree) was used for this part of the survey.

Analysis

Data were analysed using Microsoft Excel 2010 (Version 14.0.7140.5002) and Stata/IC 11.0. Analyses were conducted to detect differences between male and female respondents according to the question and resultant data type.

Frequency of participation

Ten survey questions asked students to nominate the number of occasions that they engaged in specific activities related to peer-assisted learning (e.g., observing a peer perform a patient assessment). These data were treated as count data and were compared between male and female respondents using negative binomial regression.

Source of initiation

Respondents were asked to nominate the source of initiation for each peer-assisted learning activity. These were classified as self-initiated, initiated by others (tutor or peer) or both. The χ^2 statistic was used to compare the proportion of respondents nominating each source of initiation between the genders.

Location of occurrence

Participants were able to choose more than one location from a list (on the wards, in clinics, in a bedside tutorial, in a non-bedside tutorial, student common room, cafeteria, outside the hospital) for the occurrence of each of the peer-assisted learning activities. Responses to the location question were re-coded into three categories: formal (only in tutorials), informal (wards, clinic, student common room, cafeteria or outside the hospital) and both (any combination). The χ^2 statistic was then used to compare the proportion of respondents in the three collapsed categories between the two genders.

ISSN 1442-1100

Utility of peer-assisted learning activity

Likert-type response categories used to scale responses to utility questions (1 = not at all useful to 5 = extremely useful) were held to be ordinal data. Ordinal logistical regression was used to detect differences between genders for these items. The percentage of respondents who rated the item as 4 or 5 on a scale of 1–5 was calculated and presented.

Perceived advantages and disadvantages

Likert-type response categories used to scale responses to perceive advantages and disadvantages questions (1 = strongly disagree to 5 = strongly agree) were held to be ordinal data. Ordinal logistical regression was used to detect differences between genders for these items. The percentage of respondents who rated the item as "agree" or "strongly agree" was calculated and presented.

The project was approved by the Monash University Human Research Ethics Committee, approval number CF12/2429 – 2012001312 and Monash Health, Project number 13167L.

Results

Demographics

In total, 191 responses (16% of the potential population) were gathered over the 3 years. Respondents' median age was 21 (range 19–47, mean 21.83); 24 students did not list their age. Eighty-eight (46%) identified as male; 22 (12%) were enrolled as international students; and 31 (16%) were graduate-entry students. The survey respondents were approximately representative of the overall medical student population at Monash, which for the years the survey was conducted was 55% male, 18% international students and 22% graduate students.

Self-report of specific peer-assisted learning activities

Frequency of participation

The total frequency of peer-assisted learning activity ranged from 3 to 67 times per week (Table 1), with the average being 21.42 episodes. There were no statistically significant differences in peer-assisted learning frequency between male and female students overall or for individual activities. Both male and female students reported observing a peer performing a history or examination as the most frequently undertaken activity (3.26 and 3.36, $p = 0.518$), while demonstrating a specific skill to a peer was the least frequently undertaken activity (0.81 and 1.00, $p = 0.416$)

Source of initiation

The majority of reported peer-assisted learning activity was self-initiated (Table 1), however a number of students reported that their involvement in peer-assisted learning activities was through other student or tutor invitation. There were no statistically significant differences in peer-assisted learning initiation between genders.

ISSN 1442-1100

Table 1
Peer-Assisted Learning (PAL) Activity: Frequency, Utility and Reasons for Partaking

	Frequency of PAL Activity (events per week)				N	Utility of PAL Activity for Learning Needs*				N	Reason for Partaking in the Activity†				N
	Male	Female	Total	*p*-value nbreg		Male	Female	Total	ologit P>|z|		Self-initiated (%)	Initiated by others (%)	Initiated by self and others (%)	*p*-value $\chi 2$	
I observed a peer performing a history/examination	3.26	3.36	3.33	0.518	155	43%	65%	55%	0.008**	146	58 (48)	25 (21)	30 (25)	0.065	120
I was observed by a peer performing a history/examination	2.30	2.20	2.27	0.873	155	65%	79%	73%	0.197	145	64 (57)	25 (22)	18 (16)	0.220	113
I taught a peer about a topic	2.17	1.81	1.97	0.180	155	76%	78%	77%	0.642	135	50 (42)	25 (22)	24 (21)	0.254	115
I was taught by a peer about a topic	2.10	2.63	2.39	0.088	155	82%	77%	79%	0.955	144	69 (64)	10 (9)	15 (15)	0.476	107
I demonstrated a skill to a peer	0.81	1.00	0.91	0.416	155	57%	67%	62%	0.458	116	40 (37)	21 (20)	10 (9)	0.871	107
A peer demonstrated a skill to me	0.81	1.12	0.97	0.130	155	55%	62%	59%	0.141	121	42 (41)	20 (19)	5 (5)	0.183	103
I gave feedback to a peer on their performance/ knowledge	1.84	1.79	1.84	0.720	155	43%	49%	47%	0.553	135	45 (41)	30 (27)	15 (14)	0.691	110
I received feedback from a peer on my performance/ knowledge	1.73	1.64	1.71	0.757	155	75%	77%	76%	0.742	134	58 (54)	16 (15)	10 (9)	0.602	108
I discussed a case with a peer	2.87	3.26	3.08	0.378	155	70%	66%	68%	0.443	137	82 (73)	2 (2)	18 (16)	0.409	113
A peer discussed a case with me	2.56	3.18	2.89	0.125	154	60%	64%	62%	0.102	138	62 (54)	17 (15)	22 (19)	0.891	115
Total	20.46	22.11	21.42	0.323											

* Responses were measured on a scale of 1 = not at all useful to 5 = extremely useful, with no intermediary descriptors used for points 2, 3 and 4. In the above table, responses greater than 3 were pooled.

† Students were able to choose from "I chose to do it", "a peer asked me to do it" and "a tutor asked me to do it". Responses have been recoded; those who did not select any of the three are not represented in the table but can be calculated from the total number of students responding.

** Indicates statistically significant difference between genders

nbreg = negative binomial regression

ologit = ordinal logistical regression

Location of occurrence

Students reported on the location of peer-assisted learning activity (Table 2). The majority of students undertook peer-assisted learning in both formal (e.g., tutorials) and informal (e.g., on wards, in the student common room, the cafeteria) settings, with no differences between male and female students ($\chi^2 = 3.58$, $p = 0.167$).

ISSN 1442-1100

Table 2
Reported Location of Peer-Assisted Learning Activity

	Male	Female	Total
Formal settings	4	7	11
Informal settings	13	7	20
Both formal & informal settings	56	72	128
Total	73	86	159

$\chi^2 = 3.58$, $p = 0.167$

Utility of peer-assisted learning activity

Students perceived the most useful peer-assisted learning activity was: "I was taught by a peer," with 79% awarding a rating of 4 or 5, where 1 = not useful at all and 5 = extremely useful. The activities described as "I taught a peer about a topic" (77%) and "I received feedback from a peer on my performance/knowledge" (76%) were also perceived as useful by both genders. For the peer-assisted learning activity: "I observed a peer performing a history or examination", female students were significantly more likely to find it useful than males ($p = 0.008$). However, this activity was the second least useful of all listed activities, with "I gave feedback to a peer on their performance/knowledge" being the least useful item for both male and female students (47%).

Perceived advantages and disadvantages of peer-assisted learning

While male and female students agreed on the majority of peer-assisted learning advantages (Table 3), several differences were identified. While 80% of female students agreed or strongly agreed with the statement that peer-assisted learning "allows me to ask 'dumb' questions that I might not be willing to ask of an expert", only 61% of males did ($p = 0.01$). There were also differences for "allows me to express myself/let down my guard" (females 75%, males 58%, $p = 0.03$), "gives me extra time to increase my understanding" (females 78%, males 63%, $p = 0.01$) and "helps me to reflect on my learning" (females 75%, males 56%, $p = 0.03$). Female students agreed most with the statement "allows me to measure my progress against my peers" (84%), while males agreed most with the statement that peer-assisted learning "improves my teaching skills" (81 %), although gender differences were not detected in the responses to these items.

The only disadvantage of peer-assisted learning with a statistically significant gender difference in agreement was "peers focus on aspects of my performance that I feel are not key to improvement" (females 9%, males 28%, $p = 0.04$). Both male and female students agreed least with the statement "it encourages unhealthy competition" (17% for males and females, $p = 0.54$). Female students agreed most with the statement "I cannot trust my own judgement about my peers' knowledge or performance" (49%), while male students were most concerned that "my peers hesitate to provide me with constructive feedback (i.e., identify negative aspects of practice)" (44%).

ISSN 1442-1100

Table 3
Perceived Peer-Assisted Learning (PAL) Advantages and Disadvantages

% Reporting Agree or Strongly Agree	N	Male	Female	Total	ologit P>|z|
Perceived PAL Advantages					
Is less threatening	140	66%	74%	70%	0.22
Increases confidence & self-esteem	140	55%	64%	60%	0.31
Reassures me that I am at an appropriate stage of learning (on the right track)	140	55%	64%	60%	0.39
Allows me to measure my progress against my peers	140	80%	84%	82%	0.65
Provides emotional support	139	50%	64%	58%	0.24
Allows me to ask "dumb" questions that I might not be willing to ask an expert	140	61%	80%	71%	0.01**
Allows me to express myself/let down my guard	140	58%	75%	67%	0.03**
Gives me extra time to increase my understanding	140	63%	78%	71%	0.01**
Gives me different strategies and perspectives on how to learn material	140	69%	82%	76%	0.24
Improves my communication skills	140	50%	62%	56%	0.37
Improves my teaching skills	140	81%	79%	80%	0.43
Improves my decision making	140	47%	49%	48%	0.91
Improves my leadership skills	140	66%	51%	58%	0.12
Helps me to reflect on my learning	140	56%	75%	66%	0.03**
Increases my respect for peers	139	60%	68%	65%	0.58
Perceived PAL Disadvantages					
I cannot trust my own judgement about my peers' knowledge or performance	140	39%	49%	44%	0.70
I cannot trust my peers' judgement about my knowledge or performance	140	33%	42%	38%	0.56
Peers focus on aspects of my performance that I feel are not key to improvement	139	28%	9%	18%	0.04**
It encourages unhealthy competition	140	17%	17%	17%	0.54
It increases strain on friendships	139	36%	25%	30%	0.78
It reduces opportunities to hear feedback or receive teaching from experts (i.e., supervisor)	140	41%	34%	37%	0.54
My peers hesitate to provide me with constructive feedback (i.e., identify negative aspects of practice)	140	44%	37%	40%	0.35
I feel uncomfortable giving my peers constructive feedback about their performance (i.e., identify negative aspects of performance)	140	28%	34%	31%	0.59
Learning in the Clinical Environment					
Peers understand my learning struggles	94	64%	67%	66%	0.38
Supervisors understand my learning struggles	94	41%	24%	31%	0.07
I learn well from someone closer in skill level/knowledge to myself	94	41%	53%	48%	0.24
I learn well from a recognised expert	94	92%	85%	88%	0.06
Teaching a concept to a peer helps me to understand the concept	94	95%	91%	93%	0.20
Explaining/teaching a concept to an expert helps me to understand the concept	94	64%	60%	62%	0.24
Teaching a skill to a peer helps me to perform the skill	94	77%	85%	82%	0.79
Demonstrating a skill to an expert helps me to perform the skill	93	87%	78%	82%	0.06

** = statistically significant difference
ologit = ordinal logistical regression

ISSN 1442-1100

Gender differences in agreement for some statements about learning in the clinical environment approached statistical significance. While 41% of male students agreed that "supervisors understand my learning struggles", only 24% of female students also agreed (p = 0.07). Other statements for which differences approached statistical significance were "I learn well from a recognised expert" (males 92%, females 85%, p = 0.06) and "demonstrating a skill to an expert helps me to perform the skill" (males 87%, females 78%, p = 0.06). However, almost all students (females 91%, males 95%, p = 0.20) agreed that "teaching a concept to a peer helps me to understand the concept".

Discussion

This study investigated students' perceptions of peer-assisted learning on clinical placements. Unlike previous studies of gender-based peer-assisted learning perceptions, this study did not focus on a particular intervention (Kassab et al., 2005; Knobe et al., 2012), affording a broader picture of students' peer-assisted learning activity and perceptions of utility. Both male and female students used peer-assisted learning to a similar degree throughout the week, however there were differences in their perceptions of utility, which might be due to a range of previously described phenomena.

Gender stereotypes have been expressed by medical students and their tutors previously (Lempp & Seale, 2006; Verdonk et al., 2014; Vnuk et al., 2016) and may also apply in this setting. Male students have been reported to be dominating and aggressive in tutorials (Babaria et al., 2011; Wayne, Vermillion, & Uijtdehaage, 2010). A concomitant reluctance to appear vulnerable may have led to lower agreement with the statements "allows me to ask 'dumb' questions that I might not be willing to ask of an expert", "peers focus on aspects of my performance that I feel are not key to improvement" and "helps me to reflect on my learning". Conversely, it has been demonstrated that female students value modesty and humility, while downplaying their competence, even to the extent of self-assessing themselves as performing more poorly than they actually are (Blanch, Hall, Roter, & Frankel, 2008; Rees, 2003). These traits might cause female students to value their peers' input more, in the belief that anything will help them to improve. If female students have had more experience being a bystander and observing other students' performance in tutorial situations, it may be that their capacity to learn from observation is heightened through practice, resulting in the significantly higher rating for the utility of observing a peer in this study.

Female students' preference for a peer-assisted learning environment may also be influenced by their experiences in other learning situations. Humiliation of vulnerable students in tutorial settings has been previously reported, which was noted to be both gender and racially based (Lempp & Seale, 2006). Wayne et al. (2010) found that a specific emphasis on the psychological safety of the situation resulted in more female students volunteering to act as a leader, a more exposed role than being a group member. Differences in feedback to students from tutors based on gender have also been identified. Carney, Dietrich, Eliassen, Pipas and Donahue (2000) reported that female preceptors gave less feedback to female students than male students, and the dyad that resulted in the most feedback was male preceptors and male students. Rees

ISSN 1442-1100

(2003) also reported a trend that preceptor–student dyads with different genders gave lower marks on portfolios, suggesting that tutor gender may also have an effect on classroom experiences. Given the complexity of workplace learning and the paucity of feedback within standard learning environments, peer-assisted learning activities with the promise of a safe environment and feedback from a range of sources might be preferable.

Gender cannot be the only factor impacting on attitudes towards learning. We would have liked to further investigate other factors such as culture, race and social standing in an intersectional model, as suggested by Tsouroufli, Rees, Monrouxe and Sundaram (2011). The data suggested that students from culturally-diverse backgrounds may experience peer-assisted learning differently; however, the group sizes and survey instrument precluded analysis. We hypothesise also that previous learning experiences may impact on medical students' attitudes to peer-assisted learning. Blackman and Darmawan (2004) identified that not only gender, but undergraduate performance and type of course studied were factors in clinical performance of graduate-entry medical students; this may extend to peer-assisted learning activities. Similarities between feedback in music or athletic performance and medicine have been previously drawn (Watling, Driessen, van der Vleuten, & Lingard, 2014). Participation in sports teams or ensemble music playing (i.e., successful team ventures) may also lead to a greater appreciation of peer-assisted learning and the ability to work in groups. These factors could be further explored in a more expansive survey.

Sixty-seven percent of students agreed or strongly agreed that peer-assisted learning "allows me to express myself/let down my guard", and this may be indicative of a perceived need to be more cautious around senior staff. There may be a number of reasons for this; for example, students might wish to conceal weaknesses from supervisors who are responsible for grades (Bearman, Molloy, Ajjawi, & Keating, 2013). Students may also fear other repercussions of appearing less knowledgeable—a loss of favour or status, or even punishment. When this finding is interpreted in light of recent media reports and reported cases of bullying and sexual harassment within the medical profession (Ivory & Scott, 2015; Medew, 2015; Verdonk et al., 2014), it may lend weight to the suggestion that there is a need for widespread anti-bullying and gender equality policy and training (Low, 2014). Reducing conscious and unconscious biases (whether they be gender based or otherwise) for both students and clinicians may contribute to an environment more conducive for learning.

Strengths and limitations

This study was conducted at a single university over three cohorts of medical students. Therefore, all students had a similar pre-clinical experience of peer-assisted learning. However, students are placed in a range of clinical environments, including rural and metropolitan generalist hospitals, and larger tertiary teaching hospitals. Some students also have the opportunity to spend time at an international campus. This represents a wide range of clinical placement experiences.

ISSN 1442-1100

We have identified that there are some gender differences in students' perceptions of peer-assisted learning. This information may be helpful for educators and clinicians wishing to encourage the use of peer-assisted learning, as a different strategy may be required for male and female students. We are aware, however, that such a binary analysis is unlikely to include all the complexities contained in an intersectional approach. Future studies should examine the impact of multiple factors upon student preference for learning with peers and the extent to which targeted peer-assisted learning curriculum initiatives, including repeated exposure from early in the pre-clinical setting, influence learning approaches over time. We also acknowledge the low response rate for a voluntary survey, with its attendant potential for responder bias. Though gender representation in the sample was similar to that of the population, respondents may still have had contrasting approaches to learning in comparison with the larger population.

Conclusion

Peer-assisted learning is a useful adjunct to traditional teacher-led learning opportunities in clinical medical education. This study supports the existence of gender-related differences in the perception of peer-assisted learning, which may impact on students' willingness and ability to learn from peer-assisted learning activities. Male students may find undertaking observational roles less useful and may find appearing vulnerable in front of their peers more challenging than their female peers. Female students may identify greater advantages to peer-assisted learning as a result of their previous learning experience, both positive and negative. These findings should inform educators' strategies for encouraging peer-assisted learning. Gender is likely just one of many factors impacting on students' experiences. Future studies using an intersectional framework to examine the factors impacting on student peer-assisted learning experience are recommended, and both student and educator biases could be explored.

References

Babaria, P., Bernheim, S., & Nunez-Smith, M. (2011). Gender and the pre-clinical experiences of female medical students: A taxonomy. *Medical Education*, *45*, 249–260. doi:10.1111/j.1365-2923.2010.03856.x

Bearman, M., Molloy, E., Ajjawi, R., & Keating, J. (2013). "Is there a plan B?": Clinical educators supporting underperforming students in practice settings. *Teaching in Higher Education*, *18*(5), 531–544. doi:10.1080/13562517.2012.752732

Blackman, I., & Darmawan, I. G. N. (2004). Graduate-entry medical student variables that predict academic and clinical achievement. *International Education Journal*, *4*(4), 30–41.

Blanch, D. C., Hall, J. A., Roter, D. L., & Frankel, R. M. (2008). Medical student gender and issues of confidence. *Patient Education and Counseling*, *72*, 374–381. doi:10.1016/j.pec.2008.05.021

Burgess, A., McGregor, D., & Mellis, C. (2014). Medical students as peer tutors: A systematic review. *BMC Medical Education*, *14*(1), 115. doi:10.1186/1472-6920-14-115

ISSN 1442-1100

Carney, P. A., Dietrich, A. J., Eliassen, S., Pipas, C., & Donahue, D. (2000). Differences in ambulatory teaching and learning by gender match of preceptors and students. *Family Medicine*, *32*(9), 618–623.

Cushing, A., Abbott, S., Lothian, D., Hall, A., & Westwood, O. M. R. (2011). Peer feedback as an aid to learning—What do we want? Feedback. When do we want it? Now! *Medical Teacher*, *33*(2), e105–e112.

Hulsman, R. L., Harmsen, A. B., & Fabriek, M. (2009). Reflective teaching of medical communication skills with DiViDU: Assessing the level of student reflection on recorded consultations with simulated patients. *Patient Education and Counseling*, *74*(2), 142–149.

Ivory, K., & Scott, K. (2015). Let's stop the bullying of trainee doctors—for patients' sake. *The Conversation*. Retrieved from http://theconversation.com/lets-stop-the-bullying-of-trainee-doctors-for-patients-sake-42243

Kassab, S., Abu-Hijleh, M., Al-Shboul, Q., & Hamdy, H. (2005). Gender-related differences in learning in student-led PBL tutorials. *Education for Health*, *18*(2), 272–282. doi:10.1080/13576280500148577

Knobe, M., Holschen, M., Mooij, S. C., Sellei, R. M., Münker, R., Antony, P., . . . Pape, H.-C. (2012). Knowledge transfer of spinal manipulation skills by student-teachers: A randomised controlled trial. *European Spine Journal*, *21*(5), 992–998. doi:10.1007/s00586-011-2140-8

Kommalage, M., Thabrew, H., & Kommelage, M. (2011). Student-led peer-assisted learning: The Kuppi experience at the medical school of the University of Ruhuna in Sri Lanka. *Education for Health*, *24*(2), 12.

Krych, A. J., March, C. N., Bryan, R. E., Peake, B. J., Pawlina, W., & Carmichael, S. W. (2005). Reciprocal peer teaching: Students teaching students in the gross anatomy laboratory. *Clinical Anatomy*, *18*(4), 296–301. doi:10.1002/ca.20090

Lempp, H., & Seale, C. (2006). Medical students' perceptions in relation to ethnicity and gender: A qualitative study. *BMC Medical Education*, *6*, 17. doi:10.1186/1472-6920-6-17

Lincoln, M. A., & McAllister, L. (1993). Peer learning in clinical education. *Medical Teacher*, *15*(1), 17–25.

Low, T. (2014, May 5). Beating bullies. *MJA Insight*. Retrieved from http://www.doctorportal.com.au/mjainsight/2014/15/trish-low-beating-bullies/

Medew, J. (2015, May 24). Medical students under pressure amid reports of bullying in Australian hospitals. *Sydney Morning Herald*. Retrieved from http://www.smh.com.au/national/medical-students-under-pressure-amid-reports-of-bullying-in-australian-hospitals-20150524-gh8jq5.html

Papinczak, T., Young, L., Groves, M., & Haynes, M. (2007). An analysis of peer, self, and tutor assessment in problem-based learning tutorials. *Medical Teacher*, *29*(5), e122–e132. doi:10.1080/01421590701294323

Raghunath, S., Tai, J., & Zimmerman, J. (2011). *Evaluating a near-peer mentorship program for medical students*. Proceedings of the Australian and New Zealand Health Professional Educators (ANZAHPE) Conference, Alice Springs, Australia.

ISSN 1442-1100

Rees, C. (2003). Self-assessment scores and gender. *Medical Education*, *37*, 572–573. doi:10.1046/j.1365-2923.2003.01544.x

Tai, J., Haines, T. P., Canny, B. J., & Molloy, E. K. (2014). A study of medical students' peer learning on clinical placements: What they have taught themselves to do. *Journal of Peer Learning*, *7*, 57–80.

Topping, K., & Ehly, S. (1998). Introduction to peer-assisted learning. In K. Topping & S. Ehly (Eds.), *Peer-assisted learning* (pp. 1–23). Mahwah, NJ: Lawrence Erlbaum Associates.

Tsouroufli, M., Rees, C. E., Monrouxe, L. V., & Sundaram, V. (2011). Gender, identities and intersectionality in medical education research. *Medical Education*, *45*, 213–216. doi:10.1111/j.1365-2923.2010.03908.x

Verdonk, P., Räntzsch, V., de Vries, R., & Houkes, I. (2014). Show what you know and deal with stress yourself: A qualitative interview study of medical interns' perceptions of stress and gender. *BMC Medical Education*, *14*(1), 96. doi:10.1186/1472-6920-14-96

Vnuk, A. K., Wearn, A., & Rees, C. E. (2016). The influence of students' gender on equity in peer physical examination: A qualitative study. *Advances in Health Sciences Education*. doi:10.1007/s10459-016-9699-0

Watling, C., Driessen, E., van der Vleuten, C. P. M., & Lingard, L. (2014). Learning culture and feedback: An international study of medical athletes and musicians. *Medical Education*, *48*(7), 713–723. doi:org/10.1111/medu.12407

Wayne, N. L., Vermillion, M., & Uijtdehaage, S. (2010). Gender differences in leadership amongst first-year medical students in the small-group setting. *Academic Medicine*, *85*(8), 1276–1281. doi:org/10.1097/ACM.0b013e3181e5f2ce

Weyrich, P., Schrauth, M., Kraus, B., Habermehl, D., Netzhammer, N., Zipfel, S., . . . Jünger, J. (2008). Undergraduate technical skills training guided by student tutors: Analysis of tutors' attitudes, tutees' acceptance and learning progress in an innovative teaching model. *BMC Medical Education*, *8*, 18. doi:10.1186/1472-6920-8-18

Yu, T., Wilson, N., & Singh, P. (2011). Medical students-as-teachers: A systematic review of peer-assisted teaching during medical school. *Advances in Medical Education and Practice*, *2*, 157–172.

ISSN 1442-1100