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Title:

Does medical student willingness to practice peer physical examination translate into action?

Short title:

Peer physical examination

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ABSTRACT

Background

Peer physical examination (PPE) is commonly used in clinical skills teaching to allow students to practice physical examination techniques on each other. Previous studies have demonstrated medical students' generally positive attitudes towards PPE but the correlation between student attitude and actual practice of PPE has yet to be examined.

Aim

To determine if a positive student attitude towards PPE leads to subsequent action

Method

The target population were MBBS I students (2006-07 cohort) admitted to the Li Ka Shing Faculty of Medicine, the University of Hong Kong. Student attitude towards PPE and subsequent practise of PPE, were assessed through self-completed written questionnaires before and after the compulsory Clinical Skills Programme (CSP).

Results

A total of 100/128 (78%) students completed both questionnaires of which 83 (65%) could be linked to demographic data. All study participants were ethnically Chinese. A high level of willingness to conduct PPE persisted before and after the CSP for both male and female students. However, more than half of the students did not subsequently *examine* various non- intimate body regions of a fellow student during the CSP. Female students were more likely to exhibit attitude-behaviour inconsistency.

Conclusion

The existing positive attitudes towards PPE need to be harnessed so that more students are encouraged to follow through and actually practise PPE, thus realizing the educational benefits of this activity. This may be done by ensuring PPE is conducted in a safe setting while being conscientious of gender differences. Scheduled time and the use of a logbook may be useful to facilitate students practising PPE.

Introduction

The use of student partners to practise conducting physical examination, or peer physical examination (PPE), is a common learning method in medical schools which offers certain practical as well as educational benefits (Outram and Nair, 2008). Classmates are a readily available option on whom to learn normal anatomy and to practice clinical skills, before encountering a real patient. This spares patients the discomfort of being examined by inexperienced early learners. Students can also give each other (and receive) immediate feedback on their skills. By personally experiencing this activity, students gain greater empathy for their patients (O'Neill et al., 1998, Rees et al., 2005). From a financial standpoint, PPE incurs no cost as compared with simulated patients and high fidelity simulators.

It has been shown that students understand and appreciate the value of PPE, are very willing to engage in PPE of non-intimate body regions (Chang and Power, 2000), and that this willingness generally persists over time (Rees et al., 2009b). What has not been documented is whether, and how often, this positive attitude is actually converted into action. The attitude-behaviour relationship has been extensively examined in the social sciences literature and a meta-analysis of 83 attitude-behaviour studies (Kraus, 1995) suggests that the intention to behave in a certain way serves as a significant *predictor* of that behaviour. Nonetheless, it is noted that evaluation of intention remains a proxy for *actual* behaviour.

Student willingness to participate in PPE, however, is affected by concerns about inadvertently causing physical pain to a classmate, discovering an abnormal physical finding, inappropriate behaviour by peers or tutors (Power and Center, 2005, Rees et al., 2005), as well as the ethical acceptability of using students as surrogate patients (Braunack-Mayer, 2001). Anxieties may also arise in association with students' age, gender, or religiosity (Das and Townsend, 1998, Rees et al., 2009a). Students who were older (Rees et al., 2005), female (Das and Townsend, 1998, Rees et al., 2004), and had a religious faith (Rees et al., 2005) were less comfortable with PPE.

Culture and ethnicity may also play a role as there appears to be less willingness to engage in PPE among students from a non-Western background such as Middle Eastern students (Das and Townsend, 1998), Malaysian students (Outram and Nair, 2008), and Muslim students in a multicultural cohort (O'Neill et al., 1998), although the issues relating to culture, ethnicity and religion tend to overlap significantly. Similarly, an unpublished study presented at St George's University London observed that in a setting of mixed ethnicity, non-white students were less comfortable than white students in PPE of certain body areas (Botley, 2009).

This study provides the opportunity to further explore both the attitude and subsequent behaviour of medical students in relation to PPE in an ethnically homogeneous setting.

Methods

Study design

A combined cross-sectional and longitudinal design was used to examine medical students' attitudes towards PPE and their subsequent practice of PPE. All MBBS undergraduate students admitted to the University of Hong Kong, Li Ka Shing Faculty of Medicine in September 2006 (n=128) were invited to participate in the study which would take place over the first two years of the medical curriculum. Those who agreed to participate were asked to complete a survey before (January 2007) and after completing the CSP (April 2008). Ethics approval was obtained from the Institutional Review Board of the University of Hong Kong/ Hospital Authority Hong Kong West Cluster as part of an international, multicentre study.

Clinical Skills Programme (CSP)

The first two years of the medical curriculum are comprised of system blocks, in which the students study the various organ systems through didactic lectures, problem-based learning tutorials, and laboratory sessions in conjunction with a parallel Clinical Skills Programme (CSP). The CSP consists of practical instruction in basic physical examination or procedural skills related to the system under study (e.g. respiratory, cardiovascular, gastrointestinal, etc.) in which all students are encouraged to practise the skills being taught on a fellow student. However, the role of "surrogate patient" is voluntary with only male students asked to volunteer for examinations that require "exposure" (e.g. chest or abdomen). PPE involving the genital region is practised on a model, and that of the female breast is not part of the CSP curriculum. The sessions are conducted in the clinical skills lab which is equipped with proper examination tables and privacy curtains. During the session, students are free to form their own groups composed of not more than 10 students, depending on the skill being taught.

Pre-programme questionnaire

The pre-intervention questionnaire was provided by Dr Charlotte Rees who led the multicentre study whose published results included the Hong Kong data collected on this questionnaire (Rees et al., 2009b). It was based on the "examining fellow students" (EFS) questionnaire originally developed by O'Neill et al (O'Neill et al., 1998). Students were asked to indicate which of 12 body parts they would not be willing to examine, or be examined on, by a peer of the same and opposite gender. Their general views and concerns about PPE were also explored through three open-ended questions. Demographic questions included age, gender, ethnicity and religiosity.

Post-programme questionnaire

The follow up survey was modified from the pre-questionnaire to also include questions on the actual practice of PPE during the CSP. Respondents were asked to indicate which body regions they actually examined on their peers of the same and opposite gender. They were also asked to indicate if they have conducted PPE before the programme, have practised PPE outside of the classroom, volunteered to be examined during the CSP and what factors were perceived to optimize the practice of PPE. Students were asked to record their student number to allow for linkage to the pre-programme questionnaire which contained the basic demographic information.

A copy of the questionnaires may be found in Appendix A and B.

Data analysis

All quantitative data were analysed using the Statistical Package for Social Sciences (SPSS) version 18. Qualitative data were coded independently by two researchers and analysed for recurrent themes. The demographic characteristics of participants and their willingness to conduct PPE were obtained from the pre-programme questionnaire. Chi-square test was employed to evaluate the associations between student attitude towards PPE and background characteristics.

Students who had examined on or had been examined by a fellow student of either gender were considered to have practised PPE. Only completed post-programme questionnaires which could be linked to demographic information were included in the evaluation of changes in attitude towards PPE and the comparison of attitude and practice of PPE. These differences were compared using the McNemar test. The chi-square test was employed to evaluate the associations between background variables and the mentioned changes. A p-value less than 0.05 was considered to be statistically significant.

Results

Response rate and participant characteristics

Of the 128 students surveyed, 124 responded to the first questionnaire survey for a response rate of 97%. The follow-up survey had 100 respondents giving a response rate of 78%. Of these, 83 could be matched to the first survey. The background characteristics of the matched population were found to be very similar to the overall subject population and was thus used for the data analysis. Background characteristics of respondents are summarized in Table 1.

Student Attitude

Willingness to examine a fellow student and to be examined by a fellow student (pre- and post-CSP)

Table 2 demonstrated the proportion of students willing to participate in PPE activities before and after the CSP. Most (>90%) indicated they were willing to practise PPE on peers for most body parts, except intimate regions, i.e. breast, groin region and genitals, and hips. More students were willing to practise PPE on peers of the same gender rather than opposite gender, even on non-intimate body parts. More students were willing to examine rather than be examined for each body part.

For the most part students' willingness *to examine* their peers did not change after the CSP with similar proportions of students remaining willing to perform PPE on their peers of either gender. Only for the examination of same gender groin was there a statistically significant difference in willingness before and after the CSP.

In terms of willingness *to be examined* by their peers, after the CSP, *more* students became willing to be examined by peers of the opposite gender on their upper body, abdomen, breast and hips with the change in willingness for the latter two body regions being statistically significant. For same gender pairs, the statistically significant change in willingness was limited to the back with *fewer* students being willing to be examined on their back.

A comparison of student attitudes towards PPE by gender found that before the CSP there was no statistically significant difference in willingness between genders as both female and male students were equally willing *to examine* peers of either gender, except for groin and hips. For these two body regions, a greater proportion of students were willing to examine peers of the same gender as themselves.

On the other hand, there was a significant difference in willingness *to be examined* by a peer of the same gender versus the opposite gender for a more diverse range of body regions including upper body, breast, abdomen, back, groin and hips. For these body regions, gender was found to be significantly associated with willingness ($p < 0.05$, chi square test). More male students were willing to be examined by peers of either gender. More female students had a gender preference when being examined; i.e. preferred another female student. More female students were reluctant to be examined on their breasts and hips by any student.

Following the CSP, student willingness to participate in PPE remained the same for all body regions regardless of the gender of the student examining or being examined.

Free text entries made by students also supported the positive perception of PPE. All respondents wrote at least one open ended comment and of the 95 comments addressing their views on PPE, 87 (92%) were positive, mostly addressing the educational value and practicality of PPE.

'I think it can enhance students' knowledge about human body, as well as having a chance to examine different types of people (e.g. muscular, skinny)' (Pre23, aged 19, male)

It is a good alternative of carrying out examination of real patients as it is more convenient to practise on fellow students (Pre74, aged 18, male)

Factors associated with student willingness to examine or to be examined by a fellow student

The effect of factors such as age, gender, religiosity, and previous experience in practising PPE on willingness to perform PPE was examined. Results from Chi-square analysis showed that only student gender was significantly associated with their willingness to practise PPE on same gender peers for certain body parts. Male students were more willing to examine intimate regions of same gender peers. There was no statistically significant gender association with willingness *to examine* peers of the opposite gender for any of the body regions.

Gender was also associated with willingness *to be examined* for body regions with more male students being willing to be examined than their female counterparts.

Age, religiosity, previous experience in practising PPE, and whether a student volunteered to be examined during the CSP, were all not significant factors in predicting willingness to examine or to be examined on any of the body regions. As all students were of uniform ethnicity, this could not be examined as a variable. However, some students implied that culture was somehow intertwined with gender and does affect willingness to engage in PPE:

It is somehow embarrassing to carry out examinations on a student of opposite sex, especially on the sensitive region. This would be partly due to the influence of Chinese culture. (Pre56, aged 19, male)

Of course as a girl, one would be more concerned in crossing the boundaries of acceptable "touching". My parents expressed concern on this matter. (Pre107, aged 21, female)

Student Behaviour

Actual practice of peer physical examination

Table 3 shows the proportion of students willing to practise PPE before CSP compared with the proportion who actually participated in PPE during the CSP. The "actual practice" data considered students to have practised PPE if they have done so on either gender. The "willingness" data considered students to be willing to practise PPE if they indicated they were willing to do so with a peer of either gender. Since students were not asked to examine intimate body regions (breast, genitals) as part of the CSP, these were not included in the "actual practice" data. Students were expected to examine of all the other body regions listed in the questionnaire and had the opportunity to do so during at least one session of the CSP.

The results showed that fewer students actually *examined* a fellow student even though they said they would, across all body regions. All of the differences were statistically significant except for abdomen. Even fewer students were actually *examined by* their peers for all body regions with the difference between willingness and actual practice also being statistically significant for all body regions.

From the post-CSP questionnaire, 52% (39/75) of the participants who responded to this question indicated they had volunteered to take the role of 'patient' at least once, and among these 39 students, only 9 of them felt pressured to volunteer. A higher number of male students (74%) volunteered to take the 'patient' role.

Factors associated with the actual practice of PPE

The only significant characteristic associated with students who actually practiced PPE during the CSP was gender. A greater proportion of male students examined the abdomen of a peer. A greater proportion of male students also were examined by peers for certain body regions, namely the upper body, abdomen, back and hips. Other background factors such as age, religiosity, and having previous experience with PPE were not associated with the actual practice of PPE during the CSP.

Impact of CSP on the practice of PPE

The majority of post-programme sentiments about the impact of the CSP were categorized as having a positive impact 39% (16/41) or no impact 56% (23/41). Interestingly, all the students who felt the CSP had a positive impact still did not examine a fellow student in at least one body region. Yet, their free text comments indicated that they felt having done PPE helped them gain a greater sense of empathy for the person being examined, and made them feel more comfortable with the process of PPE:

'...more sensitive to the needs of the person being examined on.' (Post52, aged 19, male)

'More receptive towards exposure.' (Post4, aged 19, female)

'More comfortable with examining others and gain confidence in it.' (Post70, aged 18, female)

'Not as embarrassing as before but still felt embarrassed some time.' (Post66, aged 18, male).

Most students in our study (83.6%) were of the view that all students should take the 'examiner' role and a majority (63.0%) indicated all should take the 'patient' role during the CSP. Of note, 80% of students indicated that they practised PPE outside of the classroom, concurrently with the course, which

suggested that the direct experience of the CSP had a positive impact on the practice of PPE.

Students who exhibited attitude-behaviour inconsistency

The proportions of students who indicated they were willing to participate in PPE of non-intimate regions but ultimately did not follow through are shown in Table 4. For students *examining*, the hips of a fellow student was the body area in which there was the highest frequency of inconsistency with more than half of students initially willing to examine but eventually not doing so. In comparison, for students *being examined*, the frequency of inconsistency was higher across all body regions but most notably for back (60%) and hips (48.2%).

In total 87% (72/83) of students were willing but did not examine a fellow student on at least 1 body region. Of these, 17% (12/72) did not examine on only one body region, 21% (15/72) did not examine on 2 body regions, and 63% (45/72) did not examine on 3 or more body regions. Following the CSP, some described concerns they had about examining a fellow student which related to embarrassment, fear of hurting their classmate and peer pressure:

'Sometimes exposing some body parts are embarrassing.' (Post13, aged 19, female)

'Afraid of hurting him/her [through] repetitive actions such as deep palpation, percussion, reflex jerk testing.' (Post94, aged 17, female)

'It may cause discomfort to our colleagues.' (Post17, aged 19, male)

'Might be forcing others in a way because some are not willing...' (Post61, aged 18, female)

The characteristics of students who exhibited attitude-behaviour inconsistency were further explored to determine if there were any factors associated with this inconsistency. Age, religiosity, previous experience with PPE and having volunteered as subjects during the CSP were not associated with inconsistency. Gender was the only factor found to be associated with attitude-behaviour inconsistency for any of the body areas. Compared with male students, more female students were willing *to examine* the abdomen but ultimately did not do it. More female students were also willing *to be examined* on the upper body (no breast exposure), abdomen and back but did not end up following through.

Discussion

Student attitude

The positive views towards PPE found in this study were not a surprise as they echo the findings in the literature. While willingness to examine intimate regions is low, (Metcalf et al., 1982) for non-intimate body regions, students were highly willing to participate in PPE (Chang and Power, 2000). In general, more students were willing to *examine on* rather than to *be examined by* peers, as was found in previous studies (O'Neill et al., 1998, Rees et al., 2004).

Though comfortable on an absolute basis as shown by our data, relatively speaking, this cohort of Hong Kong medical students was found to be somewhat less comfortable with PPE than students from most of the other medical schools involved in a multicentre study (Rees et al., 2009b). This is despite the fact that PPE was conducted in an ethnically homogeneous setting rather than a multicultural environment where Chinese students were a minority.

Insight into the relatively lower comfort level might be found in the earlier quoted open text comments. Some students implied that Chinese culture, with its views on gender norms and parental influence contributed towards their concerns about PPE. The social-cultural context of Hong Kong is seen to be quite Westernized but Chinese families remain fairly traditional in terms of their values and behaviours (i.e. respect and deference to parents, defined social gender roles in which females are characterised by shyness and modesty) (Yau and Smetana, 1996). The influence of Chinese culture is also reflected in the local education system, with its roots in Confucianism (teacher-centred, didactic and modesty) (Nguyen et al., 2006). Most of our study participants were admitted to medical school with education grounded in the local system rather than from local international schools or from overseas institutions which may further explain the findings.

In our study population, positive attitudes towards PPE were generally retained after participating in PPE as has been reported in Western settings of mixed ethnicity. (Rees et al., 2009b) Most concerns relating to PPE expressed by students reflected non-ethnic biases and relate to generic student concerns such as embarrassment, insufficient skill, peer pressure, having a serious attitude towards PPE and ensuring there are ground rules.

The relationship between gender and student willingness (attitude) to engage in PPE has been widely reported with students being more willing to engage in PPE with those of the same gender rather than across genders and with male students being more comfortable with PPE than females

The effect of age on the willingness towards PPE remains unclear. Some studies suggested age alone did not influence students' response whereas the effect of age and gender interactions did so (Chang and Power, 2000, Power and Center, 2005). Other studies reported age alone influenced students' attitude (Rees et al., 2009b, Rees et al., 2005). For the present study there was

no association between students' age and their willingness as the demographic profile of our study population, reflective of the medical student body for this cohort, was uniformly young.

Student behaviour

For students who expressed a willingness to practise PPE, a notable proportion of them did not transform this willingness into practice, across virtually all body regions. This inconsistency was more marked when the student was the one being examined (as opposed to examining) which mirrors the findings with pre/post-intervention willingness. In our study, *attitude-behaviour inconsistency* was significantly associated with gender in the examination of the abdomen. Compared with male students, more female students were willing to examine the abdomen but not actually do it. Rees et al (Rees et al., 2009b) suggested that *attitude inconsistencies* were consistently predicted by gender with female attitudes being more changeable.

In the social science literature, influences on attitude-behaviour inconsistency in which a desirable attitude does not manifest as the desired behaviour has been discussed by Kraus (Kraus, 1995). He suggests that an increased likelihood of consistency may be obtained in three ways: strengthening the attitude [toward PPE], developing more knowledge [about PPE], and allowing for direct experience [in PPE].

Strengthening the attitude, or enhancing student willingness to engage in PPE, was examined by McLachlan et al (McLachlan et al., 2010). They examined students whose attitude towards PPE changed and proposed initiatives to increase willingness based on their findings including customising the composition of the group, increased intervention from the tutor and privacy measures. From the written entries of students who had a positive attitude but did not engage in PPE, our study found that most preferred the existing format of: mixed gender groups (65%), small group of 4-6 students (71%), have curtains or other privacy measures (83%).

Wearn and Vnuk (Wearn and Vnuk, 2005) suggested PPE could be made more acceptable to students by developing more knowledge about PPE through a structured approach that explicitly addresses the ethical and practical issues encountered in PPE. Their case studies made a strong argument for informed student consent, open discussion and reflection as part of the PPE process. In our study, a large minority (44%) felt that consent should be obtained from students before participation in PPE.

Surprisingly, there was not a single body region which all students *examined on* – including such seemingly uncontroversial parts as the hands or feet. A possible explanation for this could simply be logistical – not having sufficient time or opportunity to do so. Allowing more opportunity for direct experience by providing more scheduled time and tracking the experience to include out of class practice, using a logbook may further encourage students to practise PPE.

Limitations

The small sample size may limit the generalisability of our results as our study included data from the 65% of the study population for which we were able to match pre- and post- data. Demographic data for the remainder of the study population was not retrievable as students did not record their student ID number on the post-intervention survey. However, the key background characteristics of the subgroup of students included in the data analysis were comparable to those of the study population which may support extrapolation of our findings to the whole group.

Some questionnaires may not have been completed truthfully (or carefully) as some responses to the survey were clearly suspect. The survey explicitly asked for information based on experience “during the CSP” but some students indicated that they had conducted genital exams when this was not part of the curriculum. Self-report of behaviour has inherent biases and may have to be combined with direct observation to support the validity of the data.

Lastly, though PPE was a required part of the CSP, we assumed that all students had the opportunity to examine a peer during the course but we are uncertain whether or not this was actually the case.

Conclusion

Ethnically Chinese Hong Kong medical students demonstrated a high degree and stable level of willingness to engage in PPE but a notable proportion did not actually do it. The existing positive attitudes towards PPE could be nurtured through practical initiatives so that more students are encouraged to follow through and practise PPE. This may be done by ensuring PPE is conducted in a safe setting while being conscientious of gender differences. Scheduled time and the use of a logbook may be useful to facilitate students practising PPE.

Practice Points

- Though willing to practise peer physical examination, a notable proportion of students do not transform this willingness into action in a clinical skills programme, even for non-intimate body regions
- Female students are more likely to exhibit attitude-behaviour inconsistency for PPE
- Students are positive about the use of PPE as a learning tool and many supplement their classroom instruction by informally practising PPE on their own time.
- The use of a logbook is suggested as a means to facilitate and document students’ actual practice of PPE.

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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Table 1
Background characteristics of respondents

		Pre-CSP (n=124)	Post-CSP (matched questionnaires n=83)
Gender	Male	56%	60%
	Female	44%	40%
Median age		19 years	19 years
Chinese ethnicity		100%	100%
Considers self religious		32%	32%

Table 2
 Frequencies of students willing to engage in PPE before and after the CSP
 (n=83).

Body regions	Student examining (%)				Student being examined (%)			
	Same gender		Opposite gender		Same gender		Opposite gender	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Head & Neck	100.0	95.2	100.0	96.4	100.0	96.4	100.0	97.6
Hands	100.0	96.4	100.0	97.6	100.0	97.6	100.0	97.6
Arm & shoulder	100.0	96.4	100.0	97.6	100.0	97.6	98.8	97.6
Upper body*	92.8	91.6	90.4	86.7	84.3	84.3	74.7	81.9
Breast	69.9	66.3	69.9	63.9	56.6	63.9	49.4	63.9
Abdomen	95.2	92.8	91.6	90.4	89.2	89.2	78.3	86.7
Back	98.8	94.0	96.4	90.4	98.8	90.4	90.4	86.7
Groin region#	75.9	62.7	56.6	55.4	54.2	48.2	41.0	38.6
Genitals	31.3	36.1	25.3	33.7	12.0	20.5	9.6	18.1
Feet	100.0	95.2	100.0	96.4	98.8	96.4	98.8	97.6
Legs	100.0	96.4	97.6	97.6	100.0	97.6	97.6	97.6
Hips	84.3	77.1	71.1	72.3	100.0	75.9	50.6	68.7

Numbers in **bold** indicate a statistically significant pre/post difference (p<0.05, McNemar test),

* no breast exposure

no genital exposure

Table 3
Frequencies of student willingness and actual participation in PPE (n=83).

Body regions	Frequencies (%)		p value (McNemar Test)	Frequencies (%)		p value (McNemar Test)
	Student examining willingness	action		Student being examined willingness	action	
Head & Neck	100.0	86.7	0.001	100.0	77.1	<.001
Hands	100.0	91.6	0.016	100.0	84.3	<.001
Arm & shoulder	100.0	92.8	0.031	100.0	85.5	<.001
Upper body *	95.2	83.1	0.031	85.5	53.0	<.001
Abdomen	96.4	86.7	0.057	89.2	53.0	<.001
Back	98.8	74.7	<.001	98.8	38.6	<.001
Groin region#	75.9	20.5	<.001	54.2	7.2	<.001
Feet	100.0	89.2	0.004	98.8	68.7	<.001
Legs	100.0	90.4	0.008	100.0	77.1	<.001
Hips	84.3	28.9	<.001	68.7	22.9	<.001

* no breast exposure
 # no genital exposure

Table 4

Frequency of students whose willingness to practise PPE did not translate into action and gender association with this attitude-behaviour inconsistency (n=83)

Body regions	Student examining n (%)	Gender association	Student being examined n (%)	Gender association
Head & Neck	11 (13)	NS	19 (23)	NS
Hands	7 (8)	NS	13 (16)	NS
Arm & shoulder	6 (7)	NS	12 (15)	NS
Upper body	14 (17)	NS	31 (37)	F>M
Abdomen	11 (13)	F>M	32 (39)	F>M
Back	21 (25)	NS	50 (60)	F>M
Groin region	49 (59)	NS	39 (47)	NS
Feet	9 (11)	NS	26 (31)	NS
Legs	8 (10)	NS	19 (23)	NS
Hips	48 (58)	NS	40 (48)	NS

[bold] indicates gender was significantly associated with attitude-behaviour inconsistency (p<0.05,Chi-square test)

F>M indicates more female students demonstrated attitude-behaviour inconsistency than male students

NS: association of gender with attitude-behaviour inconsistency was not statistically significant