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Sexism and Anatomy, as discerned in textbooks and as perceived by medical students at Cardiff University and University of Paris Descartes

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Abstract

Contemporary textbooks of anatomy and surface anatomy were evaluated to ascertain whether they were gender neutral. The evidence of this, and previous studies, suggests that, both in terms of imagery and text, many textbooks lack neutrality. To further investigate such matters, we provided second year medical students studying at Cardiff University (n=293) and at the Paris Descartes University (n= 142) during the 2011-12 academic year with a questionnaire inviting them to address the possibility that social/gender factors hinder the dispassionate representation of anatomy. Ethical approval was obtained from both Cardiff and Paris universities. Eighty-six percent of the students at Cardiff and thirty-nine percent at Paris Descartes responded and provided data for analysis. The hypothesis tested is that medical students perceive a gender bias that is reflected in the books they read and the tuition they receive. Our findings suggest that, while students recognise the importance of gender issues and do not wish to associate with sexism, most are unaware of the possible negative aspects of sexism within anatomy. In this respect, the findings do not support our hypothesis. Nevertheless, we recommended that teachers of anatomy and authors of anatomy textbooks should be aware of the possibility of adverse effects on professional matters relating to equality and diversity issues.

Keywords: Anatomy, Textbooks, Student Attitudes, Gender, Sexism

Introduction

Equality and diversity are becoming increasingly important issues. In the UK, for example, recent acts of parliament not only define those who would benefit from the legislation but also champion the cause. As a consequence, many universities require all members of staff to undergo training in equality and diversity matters. Furthermore, because medical practitioners are often thought of as 'opinion makers' belonging to a caring profession that is held in high regard in society, emphasis on equality and diversity within the medical profession is not only a legal imperative but may also be considered a moral imperative. Newly recruited medical students represent the medical profession of the future and consequently there is a need to understand the extent of student awareness of equality and diversity matters, including gender issues, in order to foster appropriate attitudes and to ensure fitness for practice. Presently, however, although there is an extensive literature concerning gender issues and the sociology of medicine, there is relatively little information available specifically concerning anatomy.

In terms of definitions, 'sexism' is considered to be 'all those attitudes and actions which relegate women to a secondary and inferior status in society' (Goodman Zimet, 1976). 'Sex' is defined as 'the classification ... as male or female according to reproductive organs and functions assigned by the chromosomal complement' whereas 'gender' is considered to be 'a person's self-representation as male or female, or how that person is responded to by social institutions on the basis of the individual's gender presentation' (Wizemann and Pardue, 2001).

What information already exists relating to anatomy and sexism comes primarily from analyses of textbooks, in particular the types of images included in the books. For example, Giacomini *et al.* (2001) reported that, for 8 textbooks that they investigated, only 11% of the images in chapters not concerned with the urogenital system were discernibly female (64% male; 25% neutral). In 1994, Mendelsohn *et al.* evaluated over 4000 images in 12 commonly used anatomy textbooks and again only 11% of the images not representing the urogenital

system were female (range approx 5% to 24%). Lawrence and Bendixen (1992) reported that it was not only that equality of representation was only achieved in sections of textbooks concerned with urogenital anatomy but that this was also true for the vocabulary and syntax in many textbooks, concluding that “Western culture is far from creating a non-gendered anatomy”..

For this investigation, by means of questionnaires given to medical students and by an evaluation of contemporary anatomical textbooks, the hypothesis is tested that today's medical students perceive a gender bias that is reflected in the books they read and the tuition they receive.

Methods

Two approaches were employed in order to test our hypothesis. Firstly, we evaluated contemporary textbooks of anatomy to ascertain whether they are gender-neutral. This involved scrutiny of the most common textbooks presently used to teach gross anatomy through the medium of English and to instruct on surface anatomy. The books used were:

Gray's Anatomy (39th and 40th editions), Elsevier/Churchill Livingstone 2005 and 2008

Gray's Anatomy for Students (2nd edition), Elsevier/Churchill Livingstone 2010

Davey and Snell's *Clinical Anatomy* (9th edition), Wolters Kluwer 2011

Moore and Dalley's *Clinically Orientated Anatomy* (6th edition), Lippincott Williams and Wilkins 2009

Backhouse and Hutchings *A Colour Atlas of Surface Anatomy* (2nd edition), Mosby 1997

Lumley's *Surface Anatomy* (4th edition), Elsevier/Churchill Livingstone 2008

Tunstall and Shah's *Surface Anatomy – pocket tutor* (1st edition), JP Medical 2012

Additionally, we scrutinised the most commonly used anatomy textbooks used in France, *Anatomie* by Chevallier and co-authors that is available in three volumes covering gross anatomy (Volume 1 – Tronc; Volume 2 – Appareil Locomoteur; Volume 3 - ORL). It should be noted that *Gray's Anatomy for Students* is also often recommended in France in a translation coordinated by Jacques and Fabrice Duparc.

Specifically, we looked at all the images and counted the proportion of those that depicted female anatomy and we also read sections of the breast and the perineal regions to evaluate the language used and whether there was evidence of sexism.

Secondly, we provided 2nd year medical students at Cardiff University (n=293; 2011-12 academic year) and at Paris Descartes (n= 404; 2011-12 academic year) with a questionnaire inviting them to address the possibility that social/gender factors continue to hinder the dispassionate representation of anatomy. The two cohorts of students in Europe were

employed in order to compare culturally different groups where, although anatomy teaching involves quite different pedagogic approaches, the students nevertheless demonstrate high regard for the clinical importance of anatomy (see Moxham and Plaisant, 2007).

The questionnaire was approved by the ethical committee at the Cardiff School of Biosciences in accordance with procedures laid down by Cardiff University and by the regulating authorities at Paris Descartes. Thus, the survey was conducted anonymously, the data was strictly confidential, no vulnerable groups were included and participation in the survey was voluntary and required written consent. The questionnaire consisted of 20 questions. Questions 1 to 7 elicited personal information (age, sex etc) and asked (using Likert scales) the respondents to rate their sympathy with gender politics and their reactions to the anatomy dissecting room. Questions 8 and 9 were related to anatomical mnemonics. Questions 10 and 11 asked the students to provide evidence of sexism in textbooks and from their tuition. Questions 12 and 17 provided anatomical statements seen in textbooks for students to evaluate in terms of their perceived sexism. Questions 13 to 15 dealt with issues relating to the perception of male domination of medicine. Two remaining questions reported here asked the students the extent to which gender issues should be addressed formally in anatomy courses.

The data from the survey were entered in Excel spreadsheets. To compare statistically male and female student responses, and also to enable comparisons between the Cardiff and Paris data, t-tests (Student) were employed. To compare data across the groups of students with different attitudes to gender issues, ANOVA was used and a Least Square Difference (LSD) method was undertaken to enable post-hoc analysis. For questions where percentages were calculated, Chi Squared tests were undertaken.

Findings

Analyses of 10 contemporary anatomical textbooks

Of the three books on surface anatomy reviewed, two (Lumley 4th ed. and Tunstall and Shah 1st ed.) show very few images of female anatomy (excepting the breast and perineum and the chest for Tunstall and Shah) the other (Backhouse & Hutchings 2nd ed.) shows equal numbers of male and female images. *Gray's Anatomy* (40th ed.) mainly provides male anatomy (including most surface anatomy images). However, while illustrations of the female genitalia in the 39th edition were old-fashioned and lacked detail, images in the 40th edition are more comprehensive, make use of current imaging techniques and the female anatomy is not described only in relation to male anatomy. Texts by Moore (6th ed.) and Davey and Snell (9th ed.) also show preferences for male anatomy in the images and texts. *Gray's Anatomy for Students* (2nd ed.) has text and images selected to show equal weighting for the sexes. For their clinical cases, however, males predominate as patients and medical practitioners (34 to 25) and female cases tend to suggest conditions that, although affecting both sexes, society often associates with women (varicose veins, deep vein thrombosis, osteoporosis, goitre). The French textbook, *Anatomie*, also showed inconsistencies regarding the depiction of male and female bodies. Overall, excluding images that are non-specific for gender or relate specifically to sexual anatomy, 9 images were clearly male and 24 images female. In particular, the volume on the locomotor system displayed 17 images of females and only two of males that did not require gender designation. Attention to this bias was drawn by the students themselves within the questionnaire (for example, "Tous les dessins du Chevallier où on voit des personnes: toujours des femmes avec de belles poitrines dénudées"; in English translation: The drawings within the Chevallier textbook always display women with beautiful breasts).

Results of the student surveys

Our findings record the complexity of student perceptions and attitudes to sexism within anatomy. This complexity relates to some differences between the Cardiff and Paris students, to differences between females and males, to differences across attitudes relating to gender politics and, of course, to combinations of all these elements.

In order to assess whether students had positive or negative attitudes/views towards gender issues, we made use of a question in our survey that employed a 0-5 Likert scale where responses of 0 or 1 were regarded as showing no sympathy with gender issues, and thus negative attitudes, and where responses of 4 or 5 suggested positive attitudes. 250 medical students at Cardiff University responded (86% of the total cohort); 156 were female (62%); 95 were male (38%). Of these, 39 (16%) had negative attitudes relating to gender issues, 59 (24%) claimed to have positive attitudes and 153 (61%) were neutral/moderate. For the students at Paris Descartes, 142 provided data for the survey (33% of the total cohort); 85 were female (60%); 57 were male (40%). 42 (30%) students had negative attitudes, 27 (19%) had positive attitudes and 59 (42%) were neutral. Figure 1 shows the percentages (within their sex) of individuals who expressed positive, neutral or negative attitudes. Most students held neutral views; Cardiff females showed the greatest percentage of positive attitudes; Paris males showed the greatest percentage of negative attitudes. Those with positive views represented 19% of the females and 19% of the males at Paris compared with 29% of the females and 15% of the males at Cardiff. 55% of the females and 46% of males at Paris and 62% of females and 60% of males at Cardiff espoused neutral attitudes while 26% of females and 35% of males at Paris and 10% of females and 26% of males at Cardiff were negative in attitude. Therefore, those students with neutral attitudes predominated but negative attitudes featured strongly and the Cardiff students claimed greater positivity than the Paris students. Overall, it was the students at Paris that showed greater sensitivity to gender issues and were more ready to recognize sexism.

The findings can be summarised according to the five categories of questions used in the questionnaire.

First, in answer to the question of whether medicine is male dominated (Figure 2), no differences overall between the Cardiff and Paris students were discerned statistically and both cohorts expressed the view that the profession was moderately male dominated. However, significant differences were discernible when the data was analysed in more detail. Within the cohort of students from Cardiff, statistical differences between males and females were found ($t = 5.71$, $p = 0.00$ for a t-test) with the females perceiving more dominance (males with neutral or negative attitudes not believing that the profession was male dominated). This gender difference was not seen for the Paris students, where both genders recorded, as for the Cardiff females, that there was some male dominance in medicine. Within the Cardiff cohort, all females, regardless of their attitudes to gender politics, scored higher for male dominance than any male subgroup at Cardiff (even though the highest male score was for those with positive gender attitudes) and the highest score was for females with positive gender attitudes ($F(5.243) = 9.33$, $p = 0.01$ for the difference between females with positive attitudes and female with neutrality). Statistically, males with negative attitudes were significantly lower in their evaluation of male dominance than females who were negative ($F(5.242) = 9.33$, $p = 0.02$). Within the Paris cohort, however, there were no statistically significant differences between the groups based upon their appreciation of gender issues, all showing concern. The highest scores for all students studied (Cardiff or Paris) was recorded by Paris males with positive gender attitudes.

Thus, most categories of students at both Paris and Cardiff, excepting the males at Paris, recognised a moderate degree of male dominance of the medical profession (means of approx. 2.5 in a scale of 0 to 5). However, some students highlighted the fact that, because more females were entering the profession, this situation could change. When asked if there were branches of the medical profession more suited to females, while 58% of students at Paris and 40% at Cardiff said that both genders were equally suited for all medical specialties, “womanly” occupations such as gynecology, obstetrics, pediatrics and dermatology figured frequently. Furthermore, nursing was frequently recorded as a female branch of medicine.. When asked what personality traits make females more fitted for medicine, only 44% of Paris students and 36% of Cardiff students said that there were no special characteristics to distinguish female and male “appropriateness” for medicine. Among the female personality

traits that featured prominently were: compassion, empathy, maternal instinct, humaneness, ability to do hard work, multitasking abilities, better listening ability, patience, and calmness.

Second, although for both Cardiff and Paris students few mnemonics of a sexual nature were known (on average approx. 1.8) there was greater variation in the Paris sample. Within the Cardiff cohort, no differences were discerned between male and female students, or between groups with differing opinions regarding sexual politics, with respect to the numbers of mnemonics known. 26% of students had no knowledge of such mnemonics, 30-34% knew one, and only a small percentage (1-2%) claimed to know more than 10. In comparison, for the cohort of students from Paris, although males knew more mnemonics (mean 3.27 to 0.75), the variation did not enable statistical significance for the difference. However, over 60% had no knowledge of mnemonics, with approximately 15% knowing one. More Paris students, particularly male, claimed knowledge of more than 10 mnemonics (3% female, 8% male). In response to whether there was concern about the sexually explicit mnemonic provided in the questionnaire (Figure 3), most students, whether male or female, from Cardiff or Paris, and regardless of attitudes to gender politics, showed little concern (averages less than 1.4 for Cardiff and generally less than 2.3 for Paris). Nevertheless, there was statistically significantly more concern from the Paris students ($t = 2.16$; $p = 0.03$). In addition, although no statistical differences were discerned between the Paris male and female students, females with a neutral gender attitude statistically were more concerned than their male counterparts and also compared with males with negative attitudes ($F(5,13) = 2.01$, $p = 0.02$). Thus, for the male students at Paris, only those with a positive gender attitude showed some concern. Overall, the students were, in the main, unaware of many of the anatomical mnemonics with sexual connotations.

Third, in relation to a list of anatomical statements often used to describe female and male sexual organs in textbooks, there was little or no concern expressed from either the Cardiff or the Paris students. The statement "the mammary glands are primary organs of lactation" caused least concern across nationality, gender, or degree of sympathy for gender issues (Figure 4). However, there was a marked statistical difference between the students from Paris and Cardiff, the Cardiff students generally showing very low concern ($t = -6.15$, $p =$

0.00). Note that the graph suggests that the students expressing most concern were the Paris females with negative gender attitudes and the Paris males who expressed positive attitudes. For the complementary statement "The mammary glands are secondary sexual organs", overall the Paris students showed slightly less concern than the Cardiff students ($t = -2.08$, $p = 0.04$). Furthermore, although male and female Paris students did not differ statistically, students with neutral attitudes regarding gender politics were less perturbed than students with positive attitudes ($F(2,14) = 4.51$, $p = 0.00$) and, within the male sample, those with positive attitudes displayed more concern than the students with neutral attitudes and than their negative attitude colleagues ($F(5,13) = 2.42$, $p = 0.00$ and $p = 0.03$ respectively). However, as suggested in Figure 5, the most concerned group consisted of the Paris males with positive gender attitudes. Comparing the responses to the mammary glands as either organs of lactation or sexual organs, in general, while the Paris students became slightly less concerned about the mammary glands being sexual organs, the Cardiff students became slightly more concerned.

Comparing statements relating to the clitoris, the statement "the clitoris is a diminutive form of the penis", caused most concern of all the anatomical statements given in the questionnaire (Figure 6). More concern was expressed by the Paris students ($t = -5.4$, $p = 0.01$) and within this cohort, while generally males and females showed no statistical difference, the males with positive gender attitudes were most concerned ($F(5,13) = 1.68$, $p = 0.02$ comparing students with positive to neutral attitudes; $F(5,13) = 1.68$, $p = 0.01$ comparing students with neutral to negative attitudes). Amongst the females in Paris, no differences were seen between the groups with different attitudes to gender politics. Note that the females with negative gender attitudes were more concerned than the males who were negative ($F(5,13) = 1.68$, $p = 0.04$). Amongst the Cardiff students, females always showed more concern regardless of the level of sympathy ($t = 2.25$, $p = 0.03$) and females with positive attitudes were more concerned than those with neutral or negative attitudes ($F(5,243) = 2.801$, $p = 0.02$). Regardless of gender, overall those with positive gender attitudes were more concerned than those with neutrality ($F(2,246) = 5.267$, $p = 0.00$) or negative attitudes ($F(2,246) = 5.267$, $p = 0.02$). In comparison, for the complementary statement "the penis is an enlarged form of the clitoris" (Figure 7), concern similar to that seen for the first statement was

expressed only by the Paris students ($t = -5.4$, $p = 0.00$ for a statistical comparison between the Paris and Cardiff students overall), although even here the concern was less (compare Figures 6 and 7). Within the Paris cohort, no statistical differences were recorded between the male and female students nor, overall, when groups with different attitudes to gender politics were compared. Nevertheless, males with positive attitudes showed most concern of all groups with marked differences especially between these students and males with neutral or negative attitudes ($F(5.129) = 1.677$, $p = 0.04$ and $p = 0.01$ respectively). Within the Cardiff cohort, males and females collectively again did not differ but students with positive attitudes (males plus females) were more concerned than those students with neutral or negative attitudes ($F(2.246) = 4.092$, $p = 0.01$ and 0.02 respectively). The Cardiff males with positive gender attitudes were most concerned of all the Cardiff groups ($F(5.243) = 3.206$, $p < 0.02$). For the statement "the clitoris and penis are erectile sexual organs" (Figure 8), that in the opinion of the authors is the most gender neutral statement in the series, unsurprisingly there was very low concern and no differences overall between the Cardiff and Paris students. However, within the Paris cohort, females with negative gender attitudes were lowest in concern and significantly so compared with the males with positive attitudes, who displayed most concern ($F(5.132) = 1.271$, $p = 0.04$). The complementary statement "the clitoris is the analogue to the penis" (Figure 9) produced similar findings with, however, the Paris students expressing slightly more concern ($t = -2.08$, $p = 0.04$). For the Cardiff students, no differences were discerned between males and females or between groups with different attitudes to gender issues. However, for the Paris cohort, while again males and females overall did not differ, females and males with positive attitudes were slightly more concerned than students, particularly male, with neutral or negative attitudes ($F(5.132) = 1.635$, $p < 0.03$).

For statements relating to the penis, no statistical differences overall were discerned between the Cardiff and Paris cohorts (nor between female and male students) for the statement "the penis is a sexual organ" (Figure 10). Nevertheless, within the Cardiff group those with positive gender attitudes were most concerned ($F(2.246) = 2.684$, $p = 0.03$ when responses from positive attitude students are compared with those with neutrality and $p = 0.02$ when those with neutral attitudes are compared with those with negative gender attitudes). For the Paris sample also the students with positive attitudes were most concerned ($F(2.135) = 3.572$, $p =$

0.01). For the statement "the penis is a urogenital organ" (Figure 11), again the Cardiff and Paris students overall showed no differences and found no concern with this statement. Although, for the Cardiff students, there was no significant difference between males and females, males with neutral gender attitudes were most concerned and were statistically more concerned than the females with neutrality ($F(5.243) = 1.138, p = 0.03$). For the students at Paris, although not very concerned (as for the Cardiff students), there were statistical differences with the students with positive gender attitudes recording most concern ($F(2.134) = 2.906, p = 0.02$ for a comparison between students with positive and neutral attitudes).

Fourth, for the question aiming to elicit whether there was a problem relating to the derivation of an anatomical term (the pudendal nerve stemming from the Latin "to be ashamed") (Figure 12), for both groups, not much concern was expressed as regards this term, though there was slightly more concern from the students at Cardiff ($t = -2.03, p = 0.04$).

Fifth, the most marked differences between the Cardiff and Paris students related to questions at the end of the questionnaire where essentially opinions were being elicited regarding actions to be taken in an anatomy course in relation to gender issues. For the question asking whether students were aware of gender bias within the textbooks (Figure 13), although both groups would admit to only a little awareness of this matter, the Cardiff students were slightly more aware ($t = 2.07, p = 0.04$). Although neither the Cardiff nor the Paris students reported much evidence of sexism within their anatomy textbooks, in the case of Cardiff students this might be because they use a recommended text where the authors deliberately sought to avoid gender (and ethnic) imbalance in both the images and text.

Very significant differences ($t = -7.91$, and $t = -5.14, p \approx 0.00$) were seen for questions asking if gender issues should be addressed formally (Figures 14 and 15). In this regard, Paris students were much more in favour of gender issues being addressed formally within an anatomy course and of staff dealing with gender inequalities and signs of sexism in class. Further statistical analysis showed that the responses to the question concerning the need to have formal instruction about gender issues and to the question relating to staff dealing with gender inequalities in the classroom/laboratory were correlated ($R = 0.45; p \approx 0.00$). While

the female students from Paris were very positive about staff intervening to manage gender transgressions (e.g. males dominating dissection sessions), the male students at Paris and the female students at Cardiff were less positive in their views and the males at Cardiff clearly were lacking in support for such measures.

Discussion

Socially defined traits can stereotype men and women as having fixed, and opposite, characteristics such as males being active and rational and females passive and emotional. It could be argued that medical education as a social activity is underpinned by gender assumptions that correspond with prevailing norms, values and ideologies and this applies also to the teaching of gross (topographical) anatomy. Indeed, as Moore and Clark (1995) have stated, “Anatomy is one of the key sites for the production and maintenance of sex and gender as embodied dualities”. Anatomists would, of course, not wish to be accused of sexism but, in the absence of evidence, care must be taken not to assume that there are no issues to contend with or that we should regard this matter as taboo. Furthermore, given that equality and diversity issues are becoming increasingly important in Higher Education, it could be argued that medical curricula and teaching materials in anatomy are not being transformed to reflect these issues and, as a result, gaps exist in the basic medical curriculum regarding health-related sex and gender differences. These concerns led to our investigation of how anatomical textbooks relate to gender issues and whether medical students are sensitive to equality and diversity matters during their anatomy training.

That these are important educational issues is shown by the fact that, although there is a need to conduct much more research on matters relating to gender politics (whether generally in medicine or more specifically within disciplines and subjects), several universities are going ahead with the development of courses that feature strongly instruction and training relating to gender matters (Zelek et al., 1997, 2005, Phillips, 2002, Risberg et al., 2003, Nobelius & Wainer, 2004, Verdonk et al., 2007a & b, 2009, Wong YL, 2009, Andersson et al., 2012). For example, the need for gender perspectives in medical curricula is acknowledged at government level in some countries. Classes in Gender Medicine have been part of the mandatory curriculum for all students at Innsbruck Medical University since 2008 and the Dutch Ministry of Health initiated a nationwide project for implementing gender issues in medical schools. Gender perspectives in medical curricula have also been acknowledged at governmental level in Sweden, Canada, Australia, Pakistan and the Philippines. Pfeleiderer et al. (2012) found that there was “insufficient knowledge among students and lecturers” about

gender issues in German universities and proposed that courses to redress this deficiency should begin early in the medical course. Finally, WHO (Sen et al., 2006) have reported on the success of its 2002 directive to make gender considerations an integral part of the pre-service training curricula of health professionals. In comparison, while in the UK many universities require all members of staff to undergo training in equality and diversity matters, changes to the medical curricula are not mandatory and hardly feature. In the light of such developments, it is our view that there is a pressing need to introduce gender-specific medical curricula, in which students gain good insights into the meaning of gender in health and illness and learn to apply this insight to medical practice. This can be initiated easily within standard anatomical courses that are well-positioned to provide the resources for such considerations.

While the students at Paris and Cardiff responded similarly to the questions posed in the survey, some notable differences were discerned. Firstly, although the Cardiff students claimed to be more sympathetic to gender issues they were less responsive to questions and situations that could have sexist implications. Secondly, the Cardiff students were not inclined to have formal instruction/training on gender issues and were less keen on being managed in class where sexist attitudes or behaviours were known to the staff. Thirdly, the Paris males who were sympathetic to gender issues were the most sensitive to sexism of any group in the survey.

The reasons for the differences between the Cardiff and Paris students is not entirely clear but may be related to the findings of a recent paper (Andersson et al.; 2012) that compared 1st year Dutch and Swedish medical students' attitudes to gender and gender stereotyping in relation to patients and doctors in a medical setting. It was reported that Dutch students had greater gender sensitivity and held more gender stereotypical attitudes towards doctors and patients, with male students demonstrating more stereotypical attitudes than female students. Andersson et al. (2012) claimed that these results reflect national differences relating to the position of women in society. They proposed that, in the Netherlands, there is less gender equality legislation. Furthermore, childcare and household work are more the responsibilities of women in the Netherlands who, to a large extent, work part-time. Thus, our findings

support those of Andersson et al. (2012) in that they are clear gender, geopolitical and cultural differences between communities of medical students even within Europe.

We should also comment that students at both Cardiff and Paris claim awareness of gender matters but generally do not perceive, or show little concern for, matters in anatomy that might have sexist overtones. Indeed, after the survey it was clear from the reactions of our students that they had not realized that these matters could emerge from their education in anatomy. Thus, our findings are not consistent with our initial hypothesis that today's medical students perceive a gender bias that is reflected in the books they read and the tuition they receive.

Three questions emerge as a result of our findings. First, how should anatomy teachers raise awareness of these issues? Second, how are gender-specific health concerns identified? Third, if teachers wish to diminish the risks of sexism, how is the curriculum content made relevant to all students and how do they pay attention to the hidden curriculum?

Raising awareness of gender issues: Previous surveys indicate that, both in terms of text and diagrams, anatomical textbooks can lack neutrality, even if inadvertently (Mendelsohn *et al.*, 1994; Giacomini *et al.*, 2001), which our findings thus support. Male anatomy and physiology are often represented as the norm, with women being underrepresented in non-reproductive anatomy. The impression is gained that the human body is male and that the female body is presented only to show how it differs. Gender-specific information is scarce (or absent) and mainly applies to epidemiological data and reproductive items. Consequently, we conclude that most current anatomical textbooks are still gender-biased and lack somatic and psychosocial information relevant to good medical practice. As a consequence, future doctors will be poorly informed of relevant differences between men and women.

As a case study, the erratic descriptions of the development and the anatomy of the clitoris reveal the extent to which social factors affect scientific work. Modern anatomy texts too often reduce descriptions of female perineal anatomy, despite the fact that comprehensive accounts of clitoral anatomy are currently available, including results of gross anatomy

studies using histology, dissection and MRI. O'Connell and co-workers (1998, 2005) have written extensively concerning advertent or inadvertent sexism in the descriptions of female anatomy in otherwise authoritative texts. They concluded that typical textbook descriptions of the clitoris lack detail and include inaccuracies. Furthermore, they reported that, while the texts describe male anatomy fully, they only provide differences between male and female rather than a full description of female anatomy. Thus, they claim that a marked discrepancy is evident between the amount of coverage devoted to male and female sexual anatomy. In 1995, Moore and Clark assessed how anatomy textbooks have portrayed the clitoris. In 8 anatomy textbooks published between 1950 and 1971, either the clitoris was not represented or something that could be a clitoris was depicted but was not labelled.

In his monograph of 1935, Fleck explored the notion that modern concepts of natural science are historically developed products that would not be comprehensible without recourse to their development. He used images of female genital anatomy to illustrate the cultural conditioning of scientific knowledge. Presenting anatomy teaching as a social activity that initiates students into a scientific community, he contested any attempt to characterize the scientist as a 'detached' emotionless observer, finding meaningless the concept of absolutely emotionless thinking. According to Fleck, to see one must know what to look for. Thus, it is important during anatomical education to encourage the student not to take as authoritative the descriptions of gross anatomy found in the textbooks, to appreciate the historical and socio-cultural contexts, and to question the anatomy they see in practical classes in a critical manner. To do this effectively, the students might gain from a short course in the history of anatomy that includes an understanding of gender issues.

Our findings are pertinent to such matters in that the students were asked whether an anatomy course should address gender issues explicitly and whether anatomists should pay attention to inequity in classroom processes. Leaving aside legal requirements that nowadays necessitate the spreading of good practice for equality and diversity, the students at Paris were much more in favour than those at Cardiff. This finding itself suggests sociocultural differences between the Paris and Cardiff medical groups that reflect differences in cultural norms with possible implications for later professional medical practice. However, the

consideration should be given to how explicit should be the raising of gender issues in class. Zelek *et al.* (1997) state that a curriculum where students gain good insight into the meaning of sex and gender for health and illness can lead more readily to application to medical practice. Even if gender issues cannot be formally taught in class, the authors believe that such matters could be naturally embedded within the anatomy course without the need for formal tuition. This approach has been successful when considering matters relating to ethics and mortality in the anatomy course (Patel and Moxham, 2006). Anatomy teachers should be vigilant about the existence of sexism, should effectively control and discipline behaviour that suggests sexism in class, and should be alert to inadvertent sexism within teaching materials, including textbooks, e-learning packages, and anatomical models. From our findings, although generally the students were not particularly concerned about the use of mnemonics with sexual connotations, this does not obviate the need for teachers to avoid their use. A more complex reaction was discerned with respect to the list of anatomical statements describing female and male organs. The findings overall suggest that the students do not believe that the ways of describing female structures presently employed are sexist. To the authors, some of the statements carry sexist overtones and the most appropriate statements should be that “the clitoris and penis are erectile sexual organs” or better yet that “the penis and clitoris are homologous organs”. Indeed, the students also saw these statements as being less sexist.

Should the reader be in any doubt that there are equality and diversity (i.e. sexist) issues to contend with, a need for intervention/management is shown by some of the written comments made by students, a sample of which (designation confidential) is provided below:

A male colleague of mine told me that girls could only be GPs – so there’s no point bothering with anatomy

A girl in my dissection table answered a question wrong, and the demonstrator (a visiting clinician) said “No you stupid woman!”

A woman’s job is to open her thighs and to have big breasts

One of the retired surgeons who demonstrated in the DR made it clear he felt female students were less capable of dissection than male students and would address all his questions to the boys despite girls volunteering correct information on a regular basis.

A female's appropriate occupation is the making of sandwiches

Occasionally a member of staff either looked at me slightly inappropriately or mentioned slightly sexist comments.

I felt right at the start that the boys in my group thought that we'd be too "scared" to dissect

One of the surgeons made a joke about adductor muscles of the leg and women these days not closing their legs.

There was talk of prosthetic breast implants using some of the muscles from other parts of the trunk. Seemed irrelevant and uncomfortable. Added that it was "warm and comforting to have something there".

On several occasions one particular demonstrator (visiting clinician) would make sexist comments, implying that females didn't know as much or shouldn't be doctors!!

The preferred occupation for a female is making sandwiches.

Although comments of this nature were very infrequently expressed, those reported by the students are sufficiently shocking to show that overt sexism exists in even the best managed environments. Given that many of these comments come from, or relate to, non-anatomical sources (adverse comments were not recorded for full-time, core anatomical teachers), the authors believe that other disciplines are unlikely to be as free of transgressions against equality and diversity as is desirable. It would be instructive therefore to conduct a similar

study to the one we have undertaken in other institutions and countries, in other disciplines and at different stages in the training of medical practitioners and other health care professionals. Furthermore, future work should be undertaken to assess whether there are different attitudes amongst full-time, core anatomical teachers and part-time demonstrators and guest clinical teachers. In addition, it might be instructive to survey the balance between male and female academics in anatomy departments/groupings on an international scale.

Although we stated earlier that bias towards male anatomy as being “standard” might be construed as inadvertent, Petersen (1998) takes a less conciliatory position stating that “analysis of textual descriptions and graphic illustrations reveal that the male body has been the stable norm or standard against which the female body has been compared and implicitly judged as underdeveloped, weak or faulty”. Johnson (2005) has more recently reported that gender imbalance is found not just in textbooks but also in medical simulators, showing that the simulators present the male body as “male including female” rather than “male, not female”. That matters relating to gender imbalance can be of major concern is highlighted by a scandal that arose in 1971 when an anatomical textbook was published in the U.S.A (Halperin, 2009). Although containing 77% of images that were female, the book was withdrawn from the market by the publishers because much of the female imagery (and commentaries) was considered to be pornographic. Indeed, the female imagery consisted of posed pictures said to be typical of those seen in “pin-up girl” magazines while male imagery was cropped to hide the face and genitalia and thereby to concentrate on the anatomical region described in the text. The authors, however, did not consider the book to be scandalous and believed that they were the victims of a feminist witch-hunt, claiming that they had produced a “witty, engaging, and funny book”.

Identifying gender specific health concerns: It is now commonplace to devise anatomy courses in a context that emphasises its relevance to medical conditions. Indeed, “clinical anatomy” is the term frequently used to describe contemporary anatomical courses in medicine. This has led to the discipline changing its culture from a primary consideration of health to consideration of disease. Many courses now use clinical case scenarios, not just as a motivational device, but as a means of delivering anatomical information. The authors

suspect that the case scenarios are not chosen to reflect gender specific health concerns. This is important since anatomists need to be aware of potential stereotyping when thinking of health concerns as gender-specific. For example, women are not the only group that suffer from varicose veins or from goitres! This concern is amplified when considering reproductive anatomy and medicine. Omission of gender differences when describing sexual anatomy, and only presenting the female as a brief adjunct after a complete description of the male, leads to a lack of appreciation of the basic sciences underpinning clinical procedures. To quote O'Connell (1998): "of greater concern to the urologist and pelvic surgeon is whether tissues responsible for female sexual function are damaged during operations in the vicinity of the urethra. Examples of such surgery include partial and total urethrectomy, urethral and vaginal suspension procedures, and partial and total vaginectomy. An extensive review of the literature indicates how seldom sexual function and its preservation are considered in the outcomes of these operations". Furthermore, too frequently there are complications following hysterectomy and other surgical procedures that relate to poor understanding of anatomy and reproductive cycle (including menopause) (O'Connell et al., 1998; Hayes et al., 2006). More generally, discriminatory bias in medical research involving generalisation from male physiology has been identified in many studies. For example, in 2005 the NHS and Medical Research Council assessed the causes and effects of socio-demographic exclusions of women from clinical trials (Bartlett et al., 2005). It is to our minds a hopeful sign that an anatomical journal (*Clinical Anatomy*) has recently (2013) produced a special issue on anatomy of the female patient.

It remains our view that, if students are not taught awareness of gender issues, they will lack somatic and psychosocial information relevant to good medical practice. As a consequence, future doctors will be unaware of relevant differences between men and women. Since anatomy often remains the introduction to medical education, anatomists should be aware of these issues to ensure a proper foundation is laid for their understanding of three-dimensional relationships and variation in each human body and relevant clinical applications. Such an approach would help students to contextualize knowledge and would thus enhance their ability to retain and subsequently apply anatomical information and offer guidance based on gender specific evidence.

Paying attention to the hidden curriculum: The hidden curriculum implies outcomes that are learned but are not intended. It includes beliefs, values and norms taken from the classroom experience and applied beyond the classroom. The development of professionalism in the context of anatomy can, to some extent, be defined and incorporated into the learning outcomes but control of the hidden curriculum is more problematic. Thus, if the curriculum is “male-centred”, there is a need to develop alternative strategies where transforming the medical curriculum is seen to be a key measure of ensuring medicine remains an inclusive, compassionate and ethical profession. In this regard, while increasingly females are outnumbering males at medical school, it is pertinent to then ask: is curriculum content being made relevant to all students and is attention being paid to the hidden curriculum, do staff react sensitively issues relating to equality and diversity as pertaining to gender issues? It has been suggested that, although many medical schools have increased input from ethicists, sociologists and the public, most schools have failed to define desired attitudes, even though attitudes are often taught (both overtly and covertly) through role modelling (Phillips, 1995). It could be argued that, in the absence of high female educators in anatomy and/or medicine, the negative aspects of the hidden curriculum are encouraged. Presently, there is no information concerning the proportion of female anatomists teaching medical students or of the attitudes towards gender balance in medical education. To investigate this aspect, we are undertaking both qualitative and quantitative research to provide such information.

Evidence for a hidden curriculum in anatomy comes from transcripts of interviews conducted with anatomists in 2011-13 (work in progress) that suggest that the female pelvis is considered to be more difficult to teach than the male pelvis because resources are more limited, because its three-dimensional organization is so complex and because it is an area affected by cultural taboos. Indeed, a female anatomist stated in her interview that her 3rd year medical students never choose to do a “student selected component” on the female pelvis, preferring to “head for the head”. The anatomist further stated that she was aware of the belief that this approach looked better on the CV.

Finally, lest readers remain unaware of the stance taken by the authors, all of us take a strong position with regard to equality and diversity, believing that there has been a male dominance in the medical profession. Such dominance, although showing some change, no longer serves the wider interests of society and is not conducive to the esteem of a caring profession. We cannot dismiss the embarrassment that arises from some of the comments made by staff and students that are discriminatory but we hope that, by raising such issues, we are helping to challenge the gender bias that still pervades some aspects of medicine.

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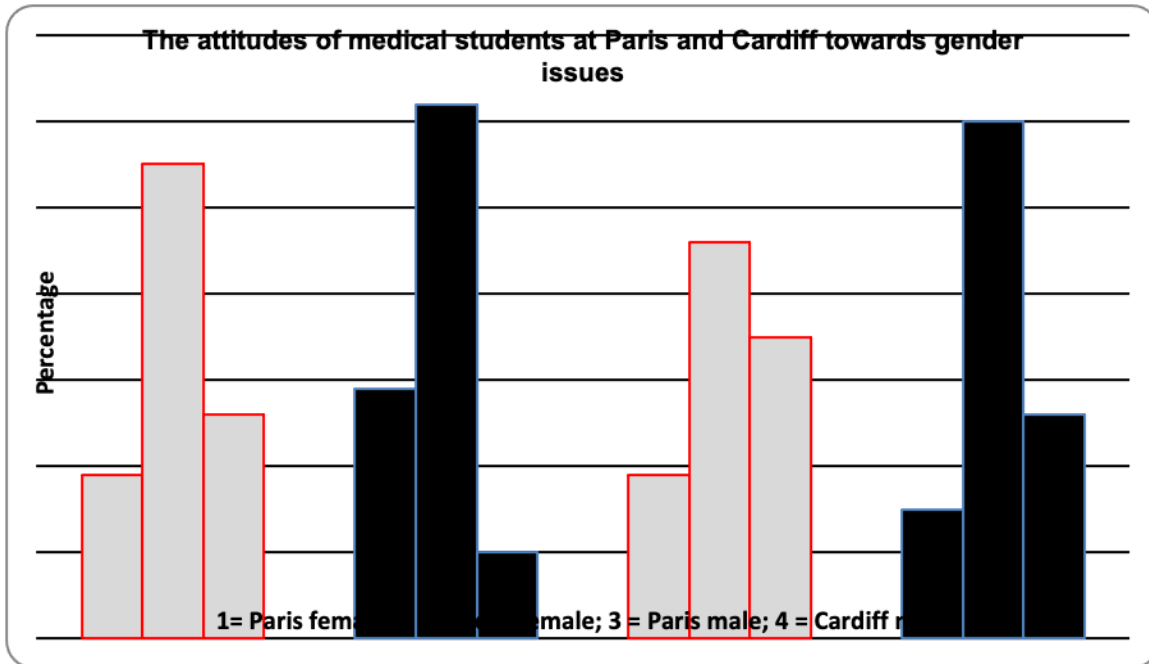
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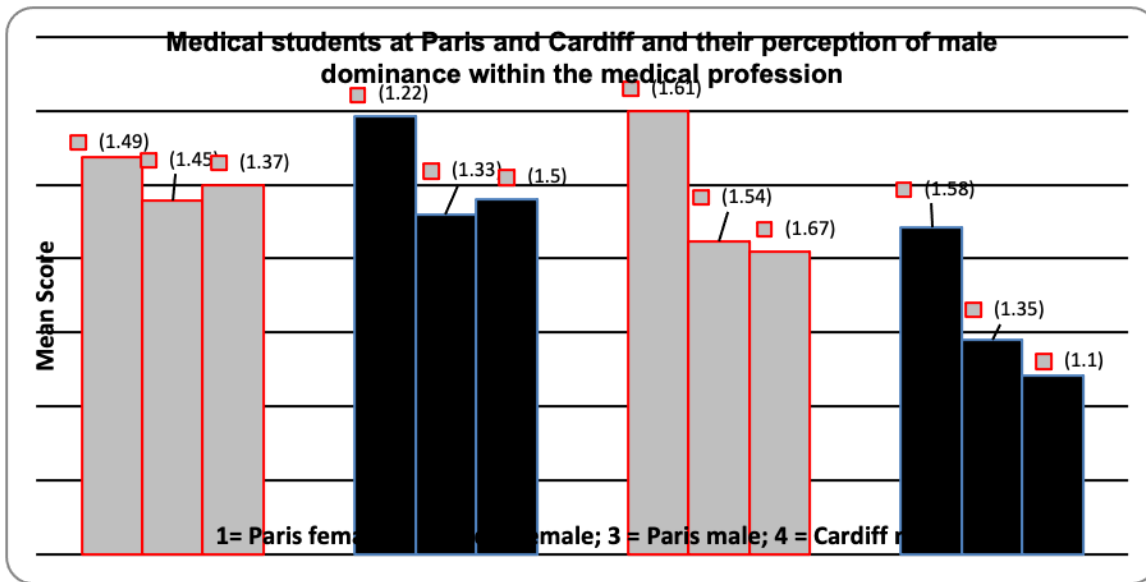
Figures

Figure 1



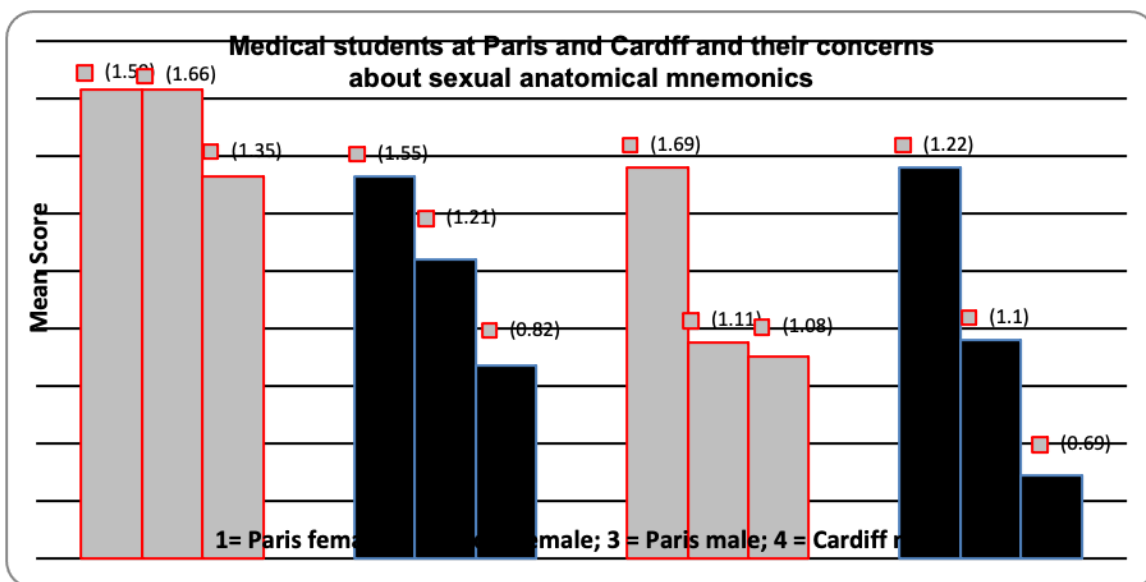
For each set of data, the first (left) column relates to students with positive attitudes to gender issues, the second (central) column relates to students with neutral attitudes, and the third (right) column relates to students with negative attitudes.

Figure 2



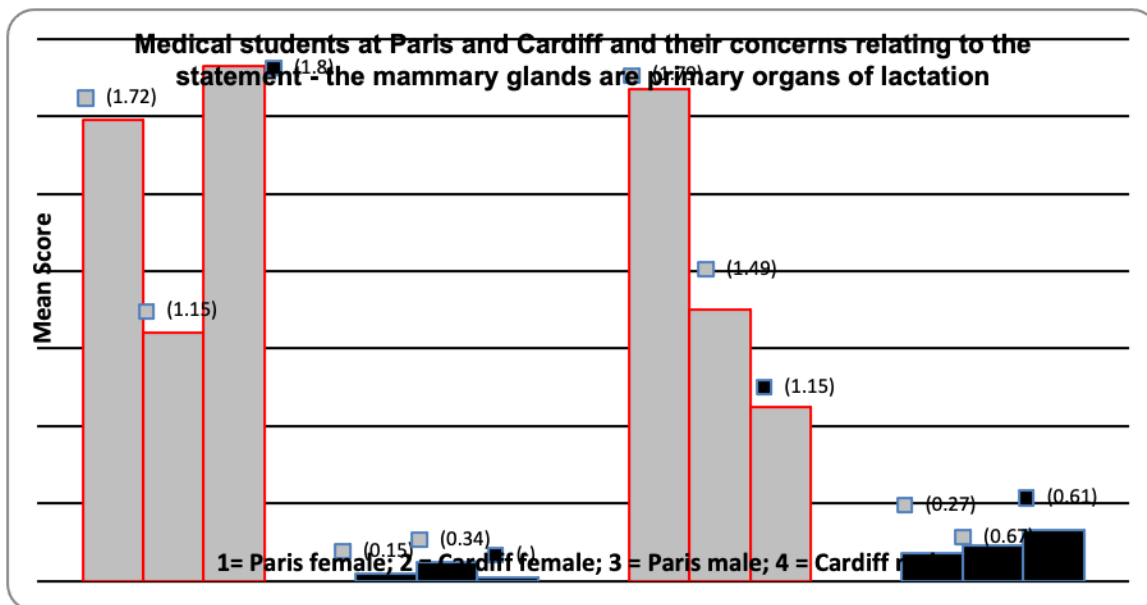
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Figure 3



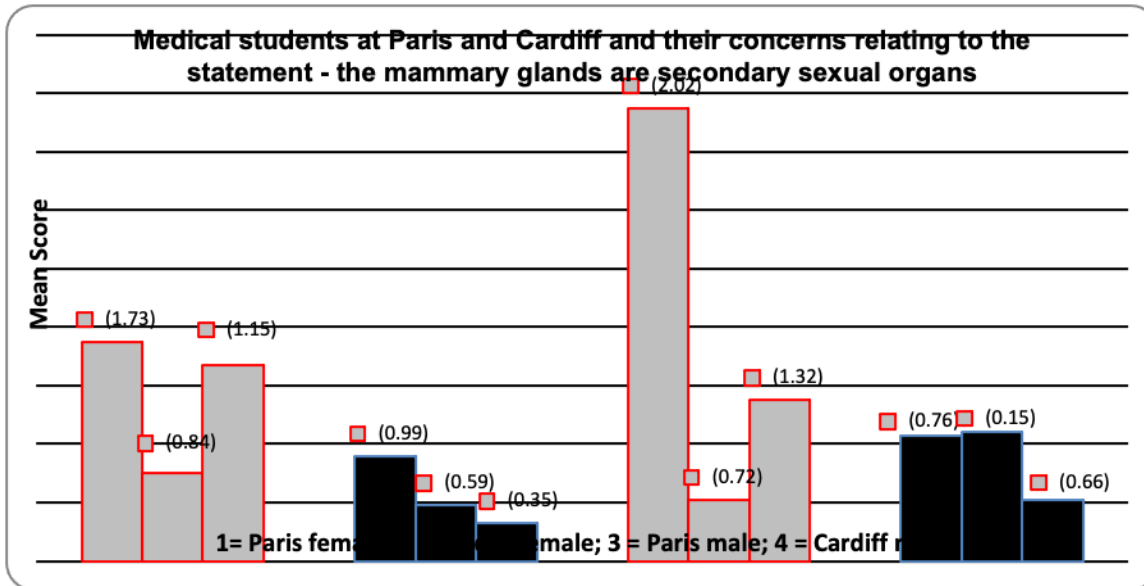
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Figure 4



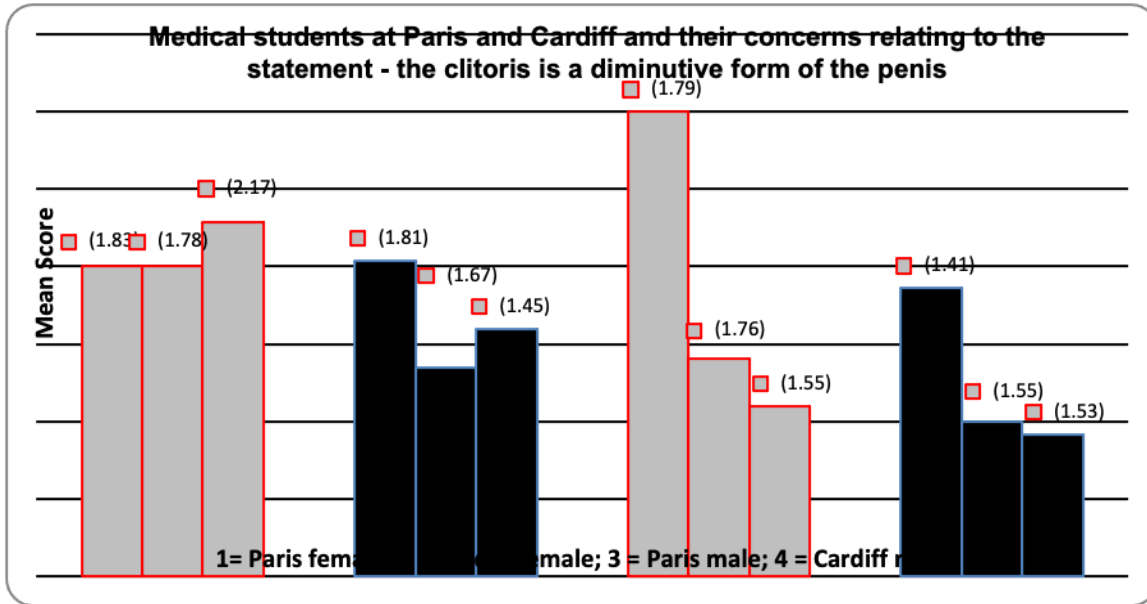
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Figure 5



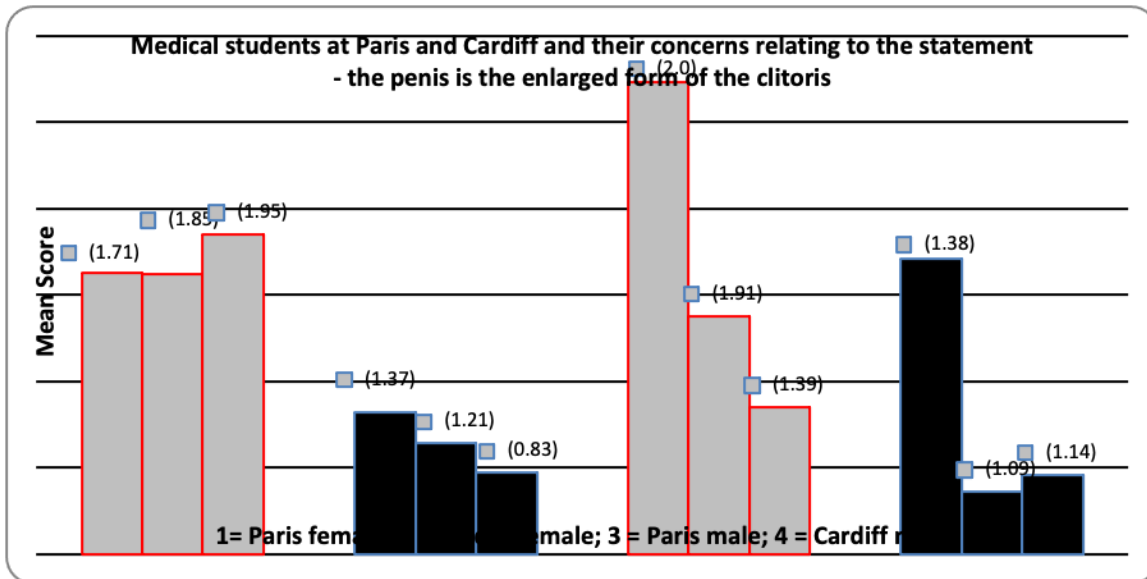
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Figure 6



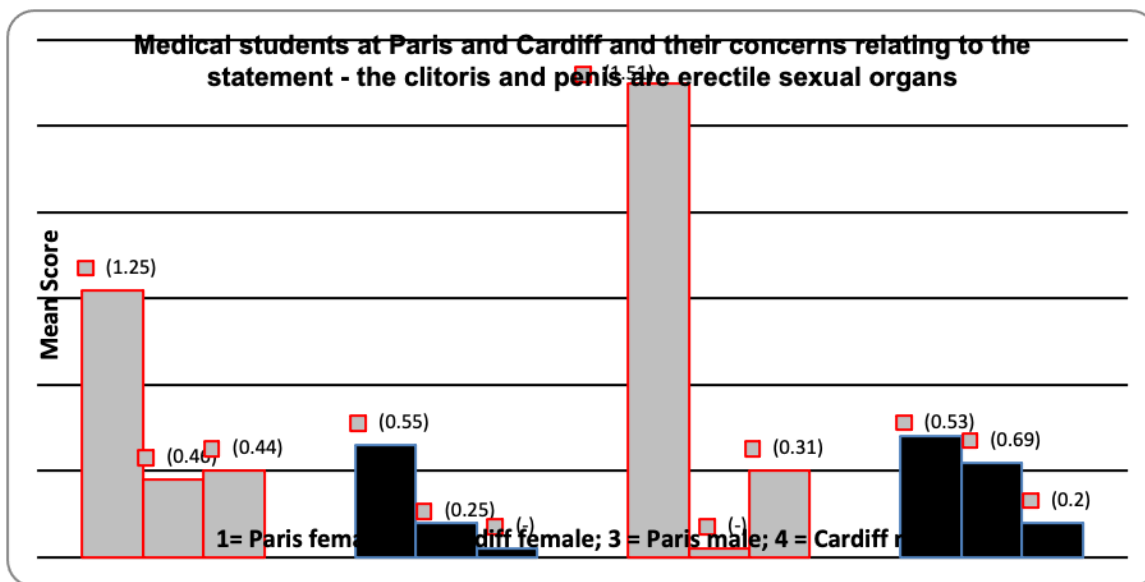
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Figure 7



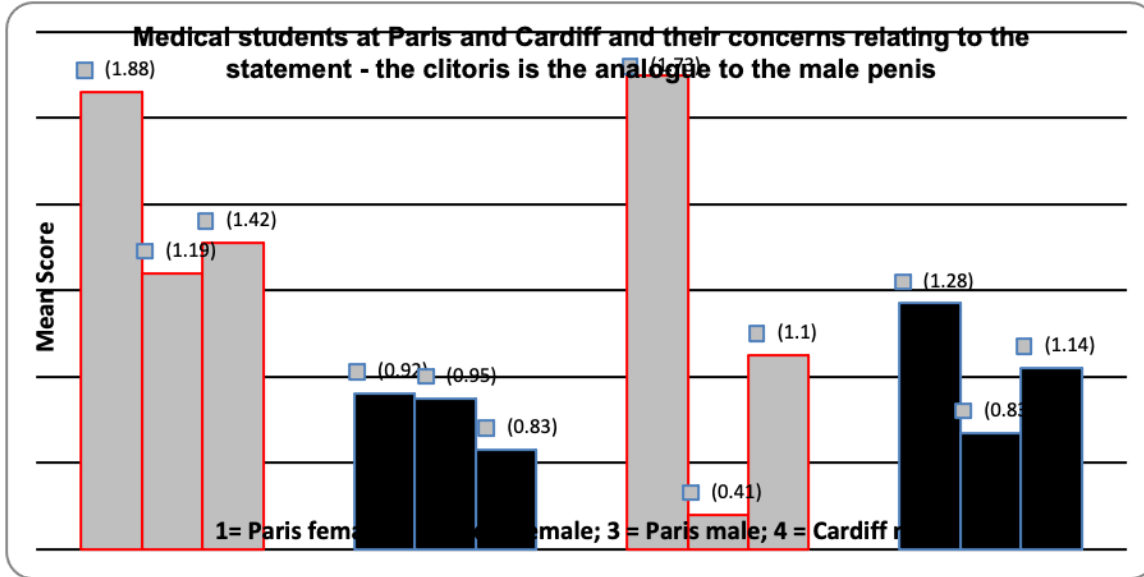
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Figure 8



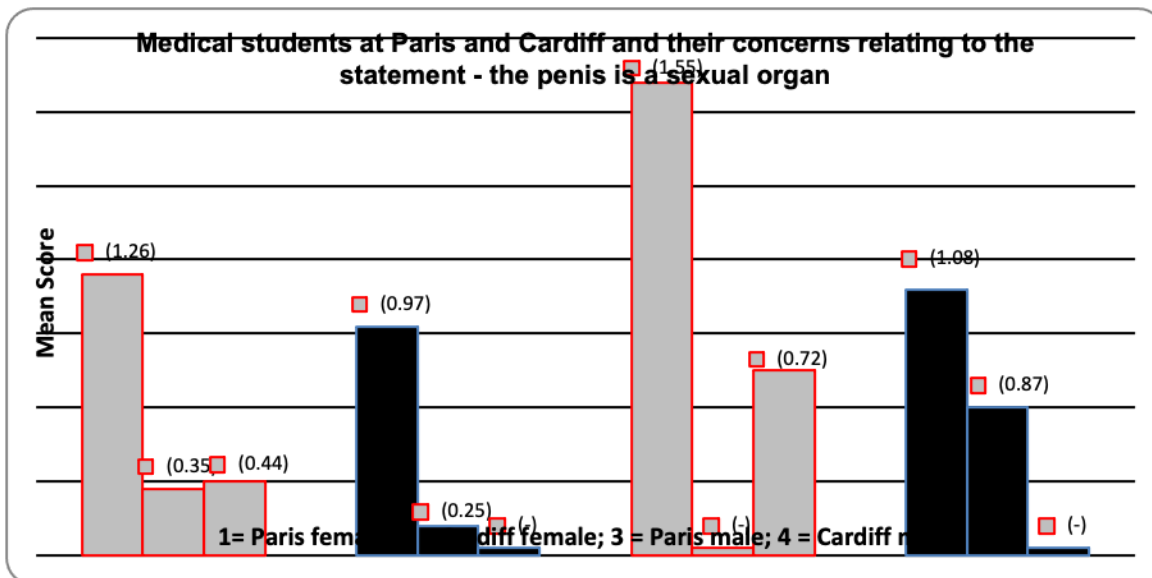
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Figure 9



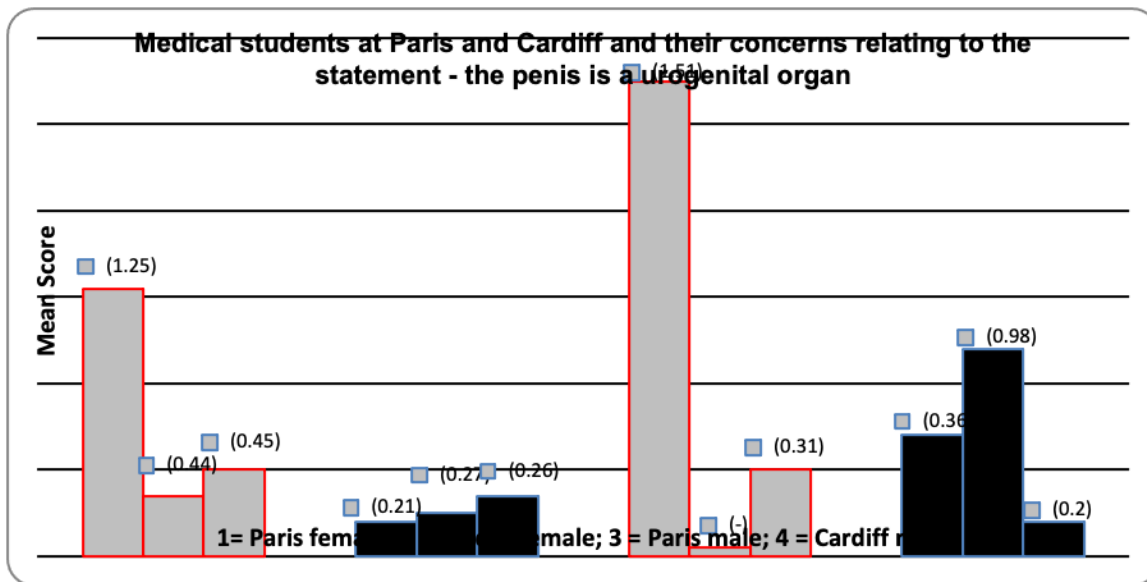
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Figure 10



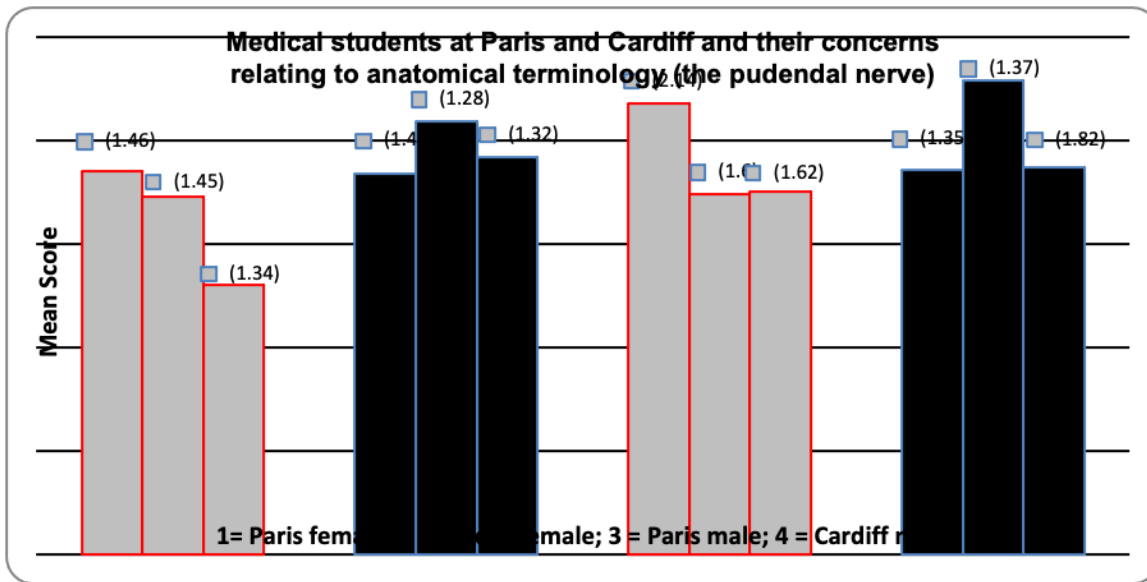
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Figure 11



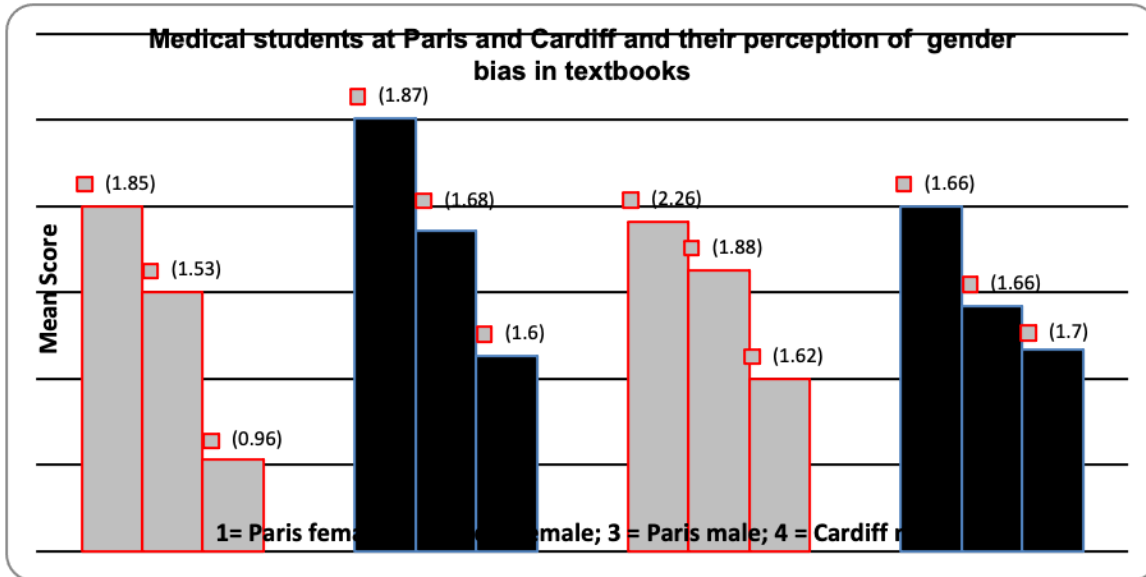
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Figure 12



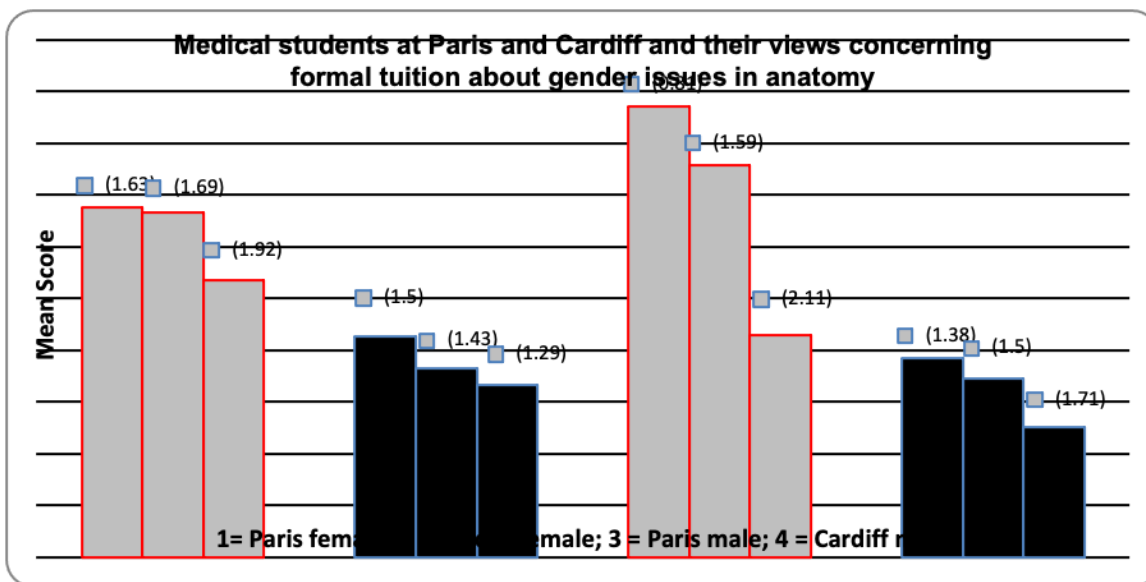
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Figure 13



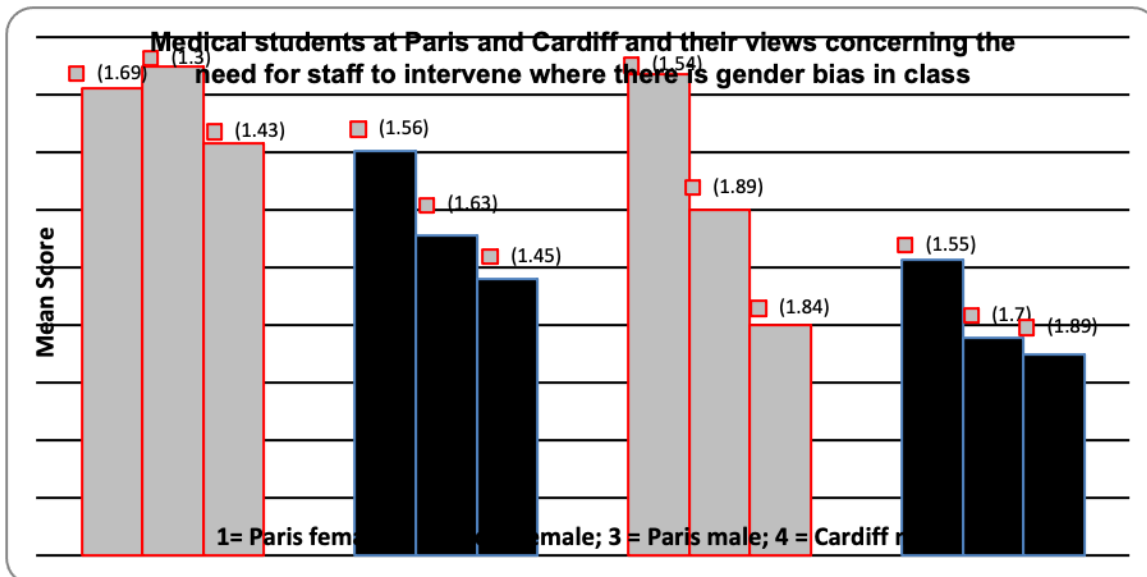
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Figure 14



For each set of data, the first (left) column relates to students with positive attitudes to gender issues, the second (central) column relates to students with neutral attitudes, and the third (right) column relates to students with negative attitudes. The figures in brackets provide standard deviations from the means. Note that the mean score is calculated from a Likert Scale where 0 = no need for formal tuition and 5 = perception of a considerable need for formal tuition about gender issues. marked concern

Figure 15



For each set of data, the first (left) column relates to students with positive attitudes to gender issues, the second (central) column relates to students with neutral attitudes, and the third (right) column relates to students with negative attitudes. The figures in brackets provide standard deviations from the means. Note that the mean score is calculated from a Likert Scale where 0 = no need for staff intervention and 5 = considerable need for staff intervention where there is gender bias.