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## ORIGINAL COMMUNICATION

# Sexism Within Anatomy as Perceived by Professional Anatomists and in Comparison With the Perceptions of Medical Students

AQ7

SUSAN MORGAN,<sup>1</sup> ODILE PLAISANT,<sup>2</sup> BAPTISTE LIGNIER,<sup>3</sup> AND BERNARD J. MOXHAM<sup>1\*</sup>

<sup>1</sup>Cardiff School of Biosciences, Cardiff University, Museum Avenue, Cardiff CF10 3AX, United Kingdom

<sup>2</sup>Sorbonne Paris Cité, URDIA, EA, University of Paris Descartes, Paris 4465, France

<sup>3</sup>Pole AAFE, Esplanade Erasme, Laboratoire de Psychopathologie et Psychologie Médicale (LPPM-EA 4452), Université Bourgogne-Franche Comté, Dijon 21000, France

Two hundred and eight professional anatomists responded to a questionnaire inviting them to address the possibility that social/gender factors hinder the dispassionate representation of anatomy. Ethical approval for the study was obtained from Cardiff University. The results of the survey provided comparisons with the attitudes of medical students that have previously been reported (Morgan et al., 2014). Although a few differences were discerned between females and males in our surveys and between anatomists and medical students, overall our findings suggest that, while both professional anatomists and medical students recognize 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. We recommend that teachers of anatomy should become more aware of the possibility of adverse effects on professional matters relating to equality and diversity issues. Clin. Anat. 00:000–000, 2016. © 2016 Wiley Periodicals, Inc.

**Key words:** anatomy; attitudes; anatomists; medical students; gender issues; sexism

## INTRODUCTION

Matters relating to equality and diversity are becoming increasingly important in all aspects of society and there is much comment about gender issues within the medical profession (e.g., Dielissen et al., 2014). Indeed, although there is an extensive literature concerning gender issues and the sociology of medicine, there is relatively little information available specifically concerning anatomy. In a previous report (Morgan et al., 2014), we assessed the extent to which there is sexism in anatomy by evaluating whether contemporary textbooks of anatomy and surface anatomy were gender neutral and by providing second-year medical students at Cardiff University and at the Sorbonne in Paris with a questionnaire inviting them to address the possibility that social/gender factors hinder the dispassionate representation of anatomy. We concluded that, in terms of both imagery and text, many textbooks lack neutrality. This

finding supports previous reports by Lawrence and Bendixen (1992), Mendelsohn et al. (1994), and Giacomini et al. (2001). In addition, we found that while there were some differences in attitudes between the medical students at Cardiff and Paris, overall while students recognized the importance of gender issues and did not wish to associate with sexism, most were unaware of the possible negative aspects of sexism within anatomy. In this report, we now record the attitudes and perceptions of professional anatomists (primarily from Europe) and compare them with the results obtained from the medical students.

\*Correspondence to: Professor B.J. Moxham; Cardiff School of Biosciences, Cardiff University, Museum Avenue, Cardiff CF10 3AX, United Kingdom. E-mail: moxham@cardiff.ac.uk

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We consider it important to assess gender issues among anatomists for three reasons. First, as they are often the first teachers that students meet when they start their medical education anatomists can be thought of as “opinion makers” influencing some of the early attitudes and behavior of the students. Indeed, many papers are available in the literature commending anatomists and anatomy course for introducing professional skills and attitudes alongside imparting important medical and scientific information (e.g., Patel and Moxham, 2006; Moxham and Moxham, 2007; Youdas, 2013; Wittich, 2013). Second, the subject of anatomy, being directly concerned visually and tangibly with the human body, lends itself readily to appreciation of gender issues, particularly of course when primary and secondary sexual organs are considered. Third, where there are cadaveric studies in anatomy, there are general issues pertaining to ethics (e.g., body donation) that can lead on to questions concerned with equality and diversity.

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) and “sex” is defined as “the classification ... as male or female according to reproductive organs and functions assigned by the chromosomal complement.” For this article, the term “gender” is used synonymously with “sex” (i.e., male or female) although we are aware that in recent times “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). This might include challenges to the male/female binary, such as trans-sexual and intersex.

For this investigation, by means of questionnaires given to professional anatomists and in relation to matters relating to male and female sexes in medicine, six hypotheses were tested that assumed high awareness of equality and diversity matters.

#### Compared with medical students,

- professional anatomists are more sympathetic to gender issues than medical students;
- professional anatomists more readily perceive male dominance within the medical profession and do not believe that personality characteristics for females should influence career;
- professional anatomists are more aware of the lack of gender neutrality within anatomical textbooks and for descriptions of sexual organs;
- professional anatomists are more appreciative of gender issues being taught formally within their anatomy courses; and
- professional anatomists are more willing to intervene in class where sexism is evident.

#### Additionally,

- professional anatomists consider that gender is important when in consultation with students and with colleagues and is of importance in clinical education.

## METHODS

Two hundred and eight professional anatomists mainly from Europe (particularly from the United Kingdom, France, Italy, and Spain) completed a questionnaire, either electronically (Bristol Online Survey, BOS) or by hardcopy, that addressed the possibility that social/gender factors continue to hinder the dispassionate representation of anatomy. The questionnaire was approved by the ethical committee at the School of English, Communication and Philosophy at Cardiff University in accordance with procedures laid down by Cardiff University and was thus conducted anonymously. Furthermore, 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 1–6 elicited personal information (age, gender, and schooling) and asked (using Likert scales) the respondents to rate their sympathy with gender politics and feminism. Questions 7 and 8 were related to anatomical mnemonics. Questions 9 and 10 asked respondents to provide evidence of sexism in textbooks of anatomy and from their teaching. Question 11 provided anatomical statements seen in textbooks for anatomists to evaluate in terms of their perceived sexism. Questions 12–14 dealt with issues relating to the perception of male domination of medicine. The remaining questions asked anatomists to assess the extent to which gender issues should be addressed formally in anatomy courses and also whether anatomists believe that gender is a factor when they consult with students and other professionals in their working lives.

The survey of anatomists’ attitudes also enabled comparisons to be made with the attitudes of medical students at Cardiff and Paris that have previously been reported (Morgan et al., 2014) and that involved 435 respondents.

The data from the surveys of anatomists and medical students were entered in Excel spreadsheets. To compare statistically male and female responses and also students and anatomists, *t*-tests (Student) were employed. To compare data across the groups of anatomists and students with different attitudes to gender issues, ANOVA was used.

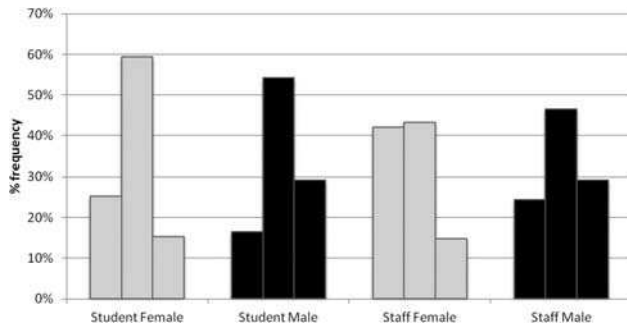
In addition to the quantitative survey, structured interviews with 21 anatomists were conducted. The anatomists’ responses during the interviews were recorded on tape and interviewees were subsequently enabled to check the transcripts for accuracy and to follow up any issues that they felt required elaboration. In addition to comments written within the survey’s questionnaire, comments from the interviews provided extra contexts for the quantitative findings.

## FINDINGS

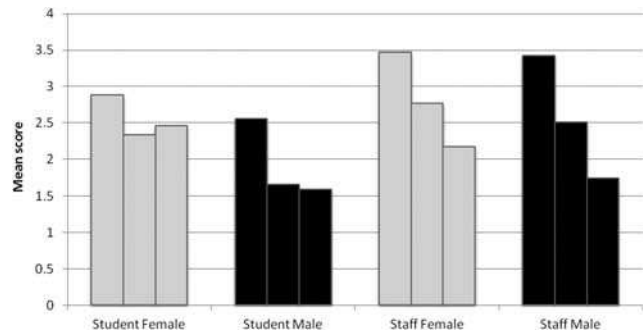
### The Quantitative Survey

As for the findings of the survey of medical students’ attitudes toward gender issues (Morgan et al.,

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**Fig. 1.** Attitudes of medical students and anatomists toward gender issues. For each set of data, the first (left) column relates to the percentage of respondents with positive attitudes to gender issues, the second (central) column relates to the percentage of respondents with neutral attitudes, and the third (right) column relates to the percentage of respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]



**Fig. 2.** Medical students' and anatomists' perceptions of male dominance within the medical profession (mean scores). For each set of data (obtained using Likert scales where 0 = no gender domination; 5 = male dominated), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

AQ6

2014), the findings for anatomists' attitudes also record the complexity of perceptions and attitudes to sexism within anatomy. This complexity relates to some differences between students and anatomists, differences between females and males, differences across attitudes relating to gender politics and, of course, combinations of all these elements.

For the survey of anatomists, 81 were female (39%) and 127 were male (61%); no transgender or intersex respondents were reported. Of these, 29% of males and 15% of females had negative attitudes relating to gender issues; 25% of males and 42% of females claimed to have positive attitudes; and 46% of males and 43% of females were neutral. For the survey of the medical students, 29% of males and 16% of females had negative attitudes relating to gender issues; 17% of males and 25% of females claimed to have positive attitudes; and 54% of males and 59% of females were neutral (Fig. 1). Thus, male students showed the smallest percentage for positive attitudes toward gender issues, whereas female anatomists showed the highest percentage of positive attitudes. The lowest percentage for negative attitudes toward gender issues was found for female students and female anatomists, whereas the highest percentage for negative attitudes was shown by male students and male anatomists. Most medical students and anatomists held neutral views. Table 1 shows that, combining data for students and anatomists, females showed a higher (positive) mean score that was statistically significant. However, no significant

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difference was found when students and anatomists were compared.

Further findings can be summarized according to the five categories of questions used in the questionnaire.

**First**, in answer to the question of whether medicine is male dominated (Fig. 2), the female medical students, regardless of their level of sympathy with gender issues, were "middle-of-the-road" in response (means of approx. 2.5 taken from data in a scale of 0–5). Similar responses were expressed by male students with positive attitudes to gender issues and by both female and male anatomists with neutral attitudes. Those seeing more male dominance were female and male staff who expressed positive attitudes toward gender issues. Least dominance was perceived by male students with moderate/neutral or negative attitudes toward gender issues and also male anatomists with negative attitudes. Table 2 shows that there are statistically significant differences between females and males and between students and anatomists, such that females overall perceive more male dominance in the medical profession, as do anatomists compared with students. Using ANOVA statistical tests, analyzing all data combining students and anatomists, no statistically significant difference were found between those individual holding negative or neutral views concerning gender issues. However, differences were seen when comparing those with positive attitudes and those with

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**TABLE 1.** Attitudes to Gender Issues Assessed Using Likert Scales Where 0 (No Sympathy With Gender Issues) to 5 (Great Sympathy With Gender Issues)

Females vs males	$n_f = 322$	$2.82 \pm 1.18$ S.D.	$P < 0.0000$ ( <i>t</i> -test)
	$n_m = 277$	$2.35 \pm 1.41$ S.D.	
Students vs staff	$n$ (students) = 391 $n$ (staff) = 208	$2.58 \pm 1.23$ S.D. $2.66 \pm 1.45$ S.D.	N.S. ( <i>t</i> -test)

**TABLE 2. Assessment of Male Dominance in Medicine**

Females vs males	$n_f = 320$	$2.61 \pm 1.41$ S.D.	$P < 0.0000$ (t-test)
Students vs staff	$n_s = 275$	$2.12 \pm 1.58$ S.D.	$P < 0.0000$ (t-test)
	$n$ (students) = 389 $n$ (staff) = 206	$2.22 \pm 1.45$ S.D. $2.69 \pm 1.56$ S.D.	

negative or neutral attitudes ( $P < 0.0000$ ). Within the female population (both students and anatomists), there were also no statistical differences between those holding negative or neutral opinions but all other comparisons were statistically significant ( $P < 0.01$ ). Within the male population, again, there were no differences between those with negative or neutral attitudes but all other comparisons were statistically significant ( $P < 0.0000$ ). Within the student population, no differences were discerned between those with negative and neutral opinions, whereas difference was found between those with negative and positive attitudes ( $P < 0.001$ ) and those with neutral vs positive views ( $P < 0.0000$ ). For the anatomist population, statistically significant differences were seen between all groups (negative vs neutral,  $P < 0.012$ ; neutral vs positive,  $P < 0.001$ ; negative vs positive,  $P < 0.0000$ ).

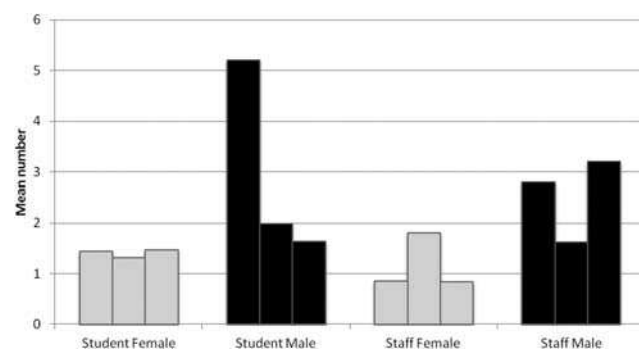
From the responses to the questionnaire, some students and anatomists highlighted the fact that because more females were entering the profession, this situation could change. When asked if there were branches of the medical profession more suited to females, while 49% of students and 68% of anatomists said that both genders were equally suited for all medical specialties, "womanly" occupations such as gynecology, obstetrics, pediatrics, and dermatology figured frequently. Furthermore, nursing and dentistry were recorded as female branches of medicine. When asked what personality traits make females more fitted for medicine, 40% of students and 52% of anatomists 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.

**F3** **Second**, as shown in Figure 3, few mnemonics of a sexual nature were known by the students (on average approx. 1.8) or indeed by anatomists (on average approx. 2.1). Exceptionally, male students with positive attitudes toward gender issues claimed to know most mnemonics (average 5.1) while female students and female anatomists knew least. Overall, comparing females and males in both the student and anatomist populations, it was found that males knew more mnemonics than females ( $P < 0.017$ ), whereas in general, there were no statistical differences between students and staff. Furthermore, using ANOVA tests, we did not discern any statistical differences between groups that showed positive, neutral, or negative attitudes toward gender issues (Table 3).

**T3 AQ2** In response to whether there was concern about the sexually explicit mnemonic provided in the questionnaire (Fig. 4), overall there was low concern; most

medical students and anatomists showed average scores  $< 1.5$ . Exceptionally, more concern (mean value 2.2) was shown by male anatomists who expressed sympathy with gender issues. Table 4 indicates that statistically there was no difference between females and males when data for students and anatomists were combined although anatomists overall were slightly more concerned than students. ANOVA tests suggest that overall, while there are no differences between students and anatomists who held negative or neutral opinions on gender issues, statistical differences were seen when negative vs positive views and neutral vs positive views were compared ( $P < 0.0000$  and  $< 0.003$  respectively). Within the female population (students and anatomists combined), there were no statistical differences between individuals with differing opinions on gender issues. Within the male population (students and anatomists combined) differences were discerned when comparing negative vs positive and neutral vs positive groups ( $P < 0.0000$  and  $< 0.003$  respectively). For the medical student population, the only difference observed was when negative vs positive groups were compared ( $P = 0.004$ ). On the other hand, no statistical differences between groups with differing attitudes to gender issues emerged.

**Third**, in relation to a list of anatomical statements often used to describe female and male sexual organs in textbooks (Figs. 5–12), there was generally little or no concern expressed from either the medical students or the anatomists. Indeed, many of the statements had average scores below 0.5 on the scale 0–5. Dealing with exceptions to this finding, for the



**Fig. 3.** Number of known anatomical mnemonics with sexual connotations. For each set of data, the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

T4

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F5-F12

F4

**TABLE 3. Number of Mnemonics Known That Have Sexual/Sexist Content**

Females vs males	$n_{\text{f}} = 300$	1.34 ± 2.08 S.D.	$P < 0.017$ ( <i>t</i> -test)
Students vs staff	$n_{\text{s}} = 265$	2.39 ± 7.31 S.D.	N.S. ( <i>t</i> -test)
	$n$ (students) = 361	1.79 ± 5.65 S.D.	
	$n$ (staff) = 204	1.92 ± 4.48 S.D.	

statement "The mammary glands are primary organs of lactation," average scores of between 0.5 and 1 were recorded for male students and female and male anatomists with positive views and, somewhat surprisingly, for female students with negative attitudes toward gender issues. For the statement "The mammary glands are secondary sexual organs," only male students and male anatomists with positive attitudes toward gender issues showed scores between 0.5 and 1.4. For the statement "The clitoris is a diminutive form of the penis," the scores across all groups lay approximately between 1 and 3.5, scores that show the most concern for any of the statements. The greatest concern (mean score 3.1) was seen for male anatomists with positive opinions on gender issues. Paradoxically, there was much less concern for the statement "The penis is the enlarged form of the clitoris" (mean scores most frequently <1.5). Most concern was shown by female anatomists with positive attitudes toward gender issues. A further paradox relates to the fact that while male anatomists with sympathy to gender issues showed concern when faced with the statement that "the clitoris is a diminutive form of the penis," they failed to show concern with the complementary statement that "the penis is an enlarged form of the clitoris." Low mean scores below 0.3 were found for the statement "The clitoris and the penis are erectile sexual organs." Indeed, this statement elicited the lowest levels of concern with some groups having mean scores below 0.1. The greatest concern (mean score approx. 0.7) was shown by male anatomists with positive attitudes toward gender issues. Low scores (many mean scores below 0.5) were also seen for the statement "The clitoris is

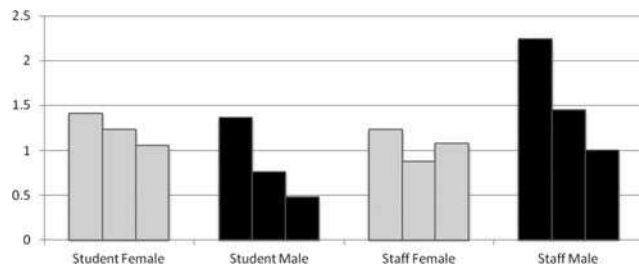
the analogue to the male penis." Again, the male anatomists with positive views on gender issues showed most concern. For the statement "The penis is a sexual organ," again low scores (most below 0.3) were recorded. Once more, the highest score expressing concern came from the male anatomists with positive attitudes toward gender issues. Little concern was also shown for the statement "The penis is a urogenital organ" but most concern was shown by male students and anatomists who had positive attitudes to gender issues. Tables (5–12) provide statistical analyses. Few differences were discerned when comparing females vs males across the entire data set or between medical students vs anatomists. Table 13 provides the statistical comparisons by means of ANOVA when groups with differing attitudes toward gender issues are compared and shows that male respondents with positive attitudes toward gender issues have most concern across most of the statements.

The statement "the mammary glands are primary organs of lactation" caused least concern across nationality, gender, or degree of sympathy for gender issues (Fig. 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 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 (Fig. 6). More concern was expressed by the Paris students ( $t = -5.4, P = 0.01$ ) and within this cohort, while

T5-T12

T13



**Fig. 4. Medical students' and anatomists' concerns about sexual anatomical mnemonics.** For each set of data (obtained using Likert scales where 0=no concern; 5=very concerned, the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

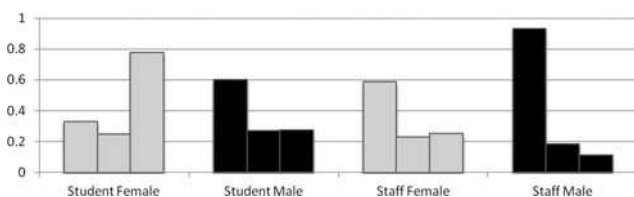
**TABLE 4. Concern Expressed for Mnemonic Describing Superior Orbital Fissure**

Females vs males	$n_{\text{f}} = 314$	1.20 ± 1.40 S.D.	N.S. ( <i>t</i> -test)
Students vs staff	$n_{\text{s}} = 271$	1.11 ± 1.53 S.D.	$P < 0.039$ ( <i>t</i> -test)
	$n$ (students) = 361 $n$ (staff) = 198	1.07 ± 1.33 S.D. 1.33 ± 1.68 S.D.	

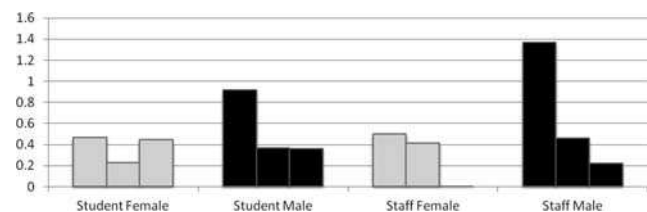
generally males and females showed no statistical difference, the males with positive gender attitudes were most concerned ( $F(5.13) = 1.68, P = 0.02$  comparing students with positive to neutral attitudes;  $F(5.13) = 1.68, P = 0.01$  comparing students with neutral to negative attitudes). Among the 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 ( $F(5.13) = 1.68, P = 0.04$ ). Among 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” (Fig. 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 Figs. 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” (Fig. 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” (Fig. 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 ( $F(5.132) = 1.635, P < 0.03$ ).

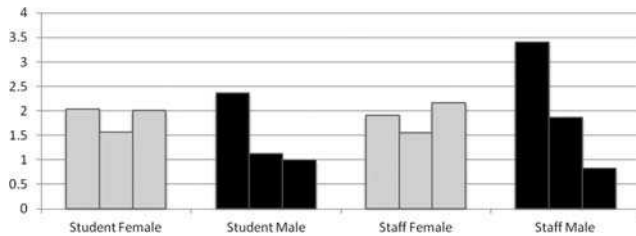
For statements relating to the penis, no statistical differences overall were discerned between the Cardiff and Paris cohorts (nor between female and male students) for the statement “the penis is a sexual organ” (Fig. 10). Nevertheless, within the Cardiff group those with positive gender attitudes were most concerned ( $F(2.246) = 2.684, P = 0.03$  when responses from positive attitude students are compared with those with



**Fig. 5.** Medical students' and anatomists' concerns relating to the anatomical statement that “The mammary glands are primarily organs of lactation.” For each set of data (obtained using Likert scales where 0 = not concerned; 5 = very concerned), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]



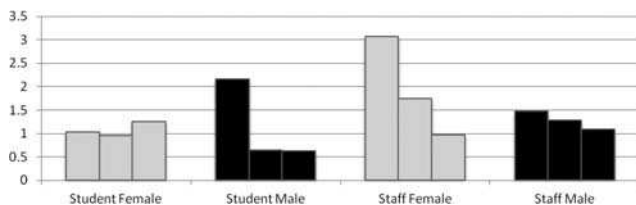
**Fig. 6.** Medical students' and anatomists' concerns relating to the anatomical statement that “The mammary glands are secondary sexual organs.” For each set of data (obtained using Likert scales where 0 = not concerned; 5 = very concerned), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]



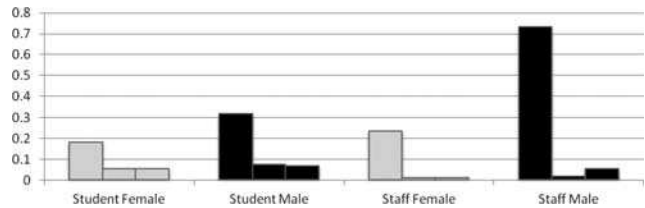
**Fig. 7.** Medical students' and anatomists' concerns relating to the anatomical statement that "The clitoris is a diminutive form of the penis." For each set of data (obtained using Likert scales where 0 = not concerned; 5 = very concerned), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

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" (Fig. 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



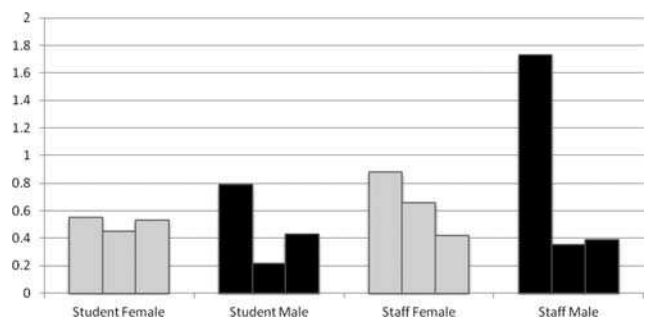
**Fig. 8.** Medical students' and anatomists' concerns relating to the anatomical statement that "The penis is the enlarged form of the clitoris." For each set of data (obtained using Likert scales where 0 = not concerned; 5 = very concerned), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]



**Fig. 9.** Medical students' and anatomists' concerns relating to the anatomical statement that "The clitoris and the penis are erectile sexual organs." For each set of data (obtained using Likert scales where 0 = not concerned; 5 = very concerned), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

anatomical term (the pudendal nerve stemming from the Latin "to be ashamed") (Fig. 13), for both groups, not much concern was expressed as regards this term since the mean scores were  $<2.5$  and there was little difference apparent between medical students and anatomists and between females and males and groups with different attitudes toward gender issues. Table 14 shows that there is no statistical difference overall between medical students and anatomists. However, a statistical difference was discerned across the entire population when females and males were compared ( $P < 0.035$ ). When data was compared with ANOVA, no statistical differences were seen between groups with different attitudes toward gender issues.

**Fifth**, questions at the end of the questionnaire were included to elicit opinions regarding actions to be taken in an anatomy course in relation to gender issues. For the question asking whether students and

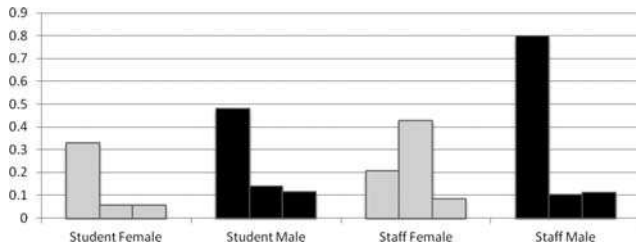


**Fig. 10.** Medical students' and anatomists' concerns relating to the anatomical statement that "The clitoris is the analogue to the male penis." For each set of data (obtained using Likert scales where 0 = not concerned; 5 = very concerned), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

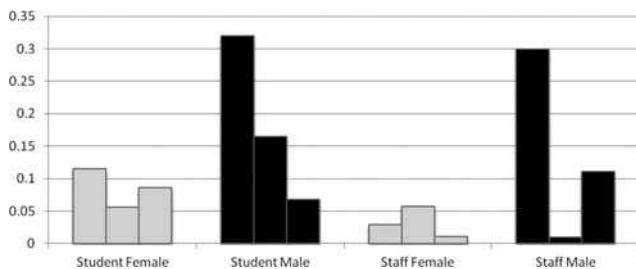
F13

T14





**Fig. 11.** Medical students' and anatomists' concerns relating to the anatomical statement that "The penis is a sexual organ". For each set of data (obtained using Likert scales where 0 = not concerned; 5 = very concerned), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]



**Fig. 12.** Medical students' and anatomists' concerns relating to the anatomical statement that "The penis is a urogenital organ". For each set of data (obtained using Likert scales where 0 = not concerned; 5 = very concerned), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

males but anatomists show statistically more concern than students ( $P < 0.009$ ). ANOVA analyses showed many differences, however, between groups with different attitudes toward gender issues. Across the entire population studied, statistical differences were seen when comparing persons with negative vs neutral attitudes, neutral vs positive attitudes, and negative vs positive attitudes ( $P < 0.004$ ,  $< 0.0000$ , and  $< 0.0000$ , respectively). For the females within the surveys, similar differences were seen for all groups ( $P < 0.023$ ,  $< 0.013$ , and  $< 0.0000$ , respectively). Similarly, differences for all groups were discerned for the student population ( $P < 0.007$ ,  $< 0.013$ , and  $< 0.0000$ , respectively). For the males within the surveys, no statistical difference was found when comparing negative vs neutral attitudes but were found when comparing neutral vs positive and negative vs positive attitudes ( $P < 0.001$  and  $< 0.0000$ , respectively). For the anatomists, no differences were also found for negative vs neutral attitudes but were seen for neutral vs positive and negative vs positive attitudes ( $P < 0.004$  and  $< 0.0000$ , respectively).

For questions asking if gender issues should be addressed formally by tuition within the anatomy course (Fig. 15), there was essentially common agreement across all groups (mean score being between 1.5 for male student with negative views concerning gender issues and 3.5 for male anatomists with positive views). Table 16 shows that there are no statistical differences between females and males across the surveys but anatomists showing greater acceptance of the need for addressing issues explicitly within the anatomy course ( $P < 0.005$ ). Across the entire set of data, for males within the surveys and for the medical students, ANOVA tests showed that statistical differences lay between those who held negative attitudes and those with positive attitudes to gender issues ( $P < 0.02$ ,  $< 0.005$ , and  $0.003$ , respectively). For females within the surveys and for the anatomists, no statistical differences were recorded regardless of their attitudes toward gender issues.

There were mainly positive views about staff intervening to manage gender transgressions (e.g., males dominating dissection sessions) during class. As shown in Figure 16, many of the mean scores were greater than 2.5, but particularly for all female medical students and female anatomists. Less enthusiastic for intervention were the male students with neutral or negative attitudes or male anatomists with negative attitudes. Table 17 shows that while there are no statistical differences between medical students and anatomists, females across the surveys were more in favor of intervention than the males ( $P < 0.0000$ ). ANOVA tests show that, in general, there is a statistical difference between negative vs neutral attitudes ( $9P < 0.027$ ), neutral vs positive attitudes ( $P < 0.001$ )

F15

T16

F16

T17

F14 anatomists were aware of gender bias within the textbooks (Fig. 14), most respondents did not report such awareness since mean score were below 2.5. The lowest groups showing concern were students and anatomists who had negative attitudes toward gender issues. The greatest concern (mean score 3.3) was shown by the male anatomists with positive attitudes, although all students and anatomist with positive attitudes showed higher levels of concern compared with their fellows with neutral or negative attitudes. Table 15 indicates that statistically, across the entire database, there is no difference between females and

T15

**TABLE 5. Attitude to Statement That "Mammary Glands are Primary Organs of Lactation"**

Females vs males	$n_{\text{f}} = 321$	$0.36 \pm 1.00$ S.D.	N.S. (t-test)
Students vs staff	$n_{\text{s}} = 271$	$0.34 \pm 1.03$ S.D.	N.S. (t-test)
	$n$ (students) = 387	$0.34 \pm 1.01$ S.D.	
	$n$ (staff) = 205	$0.36 \pm 1.03$ S.D.	

**TABLE 6. Attitude to Statement That “Mammary Glands are Secondary Sexual Organs”**

Females vs males	$n_{\text{♀}} = 318$	0.34 ± 0.92 S.D.	$P < 0.029$ (t-test)
Students vs staff	$n_{\text{♂}} = 273$ $n$ (students) = 386 $n$ (staff) = 205	0.53 ± 1.20 S.D. 0.37 ± 0.99 S.D. 0.52 ± 1.17 S.D.	N.S. (t-test)

**TABLE 7. Attitude to Statement That “The Clitoris is a Diminutive Form of the Penis”**

Females vs males	$n_{\text{♀}} = 320$	1.76 ± 1.87 S.D.	N.S. (t-test)
Students vs staff	$n_{\text{♂}} = 271$ $n$ (students) = 386 $n$ (staff) = 205	1.59 ± 1.84 S.D. 1.58 ± 1.75 S.D. 1.88 ± 2.04 S.D.	N.S. (t-test)

**TABLE 8. Attitude to Statement That “The Penis is an Enlarged Clitoris”**

Females vs males	$n_{\text{♀}} = 320$	1.10 ± 1.63 S.D.	N.S. (t-test)
Students vs staff	$n_{\text{♂}} = 270$ $n$ (students) = 384 $n$ (staff) = 206	1.34 ± 1.80 S.D. 0.98 ± 1.54 S.D. 1.64 ± 1.93 S.D.	$P < 0.0000$ (t-test)

**TABLE 9. Attitude to Statement That “The Clitoris and Penis are Erectile Sexual Organs”**

Females vs males	$n_{\text{♀}} = 320$	0.09 ± 0.52 S.D.	N.S. (t-test)
Students vs staff	$n_{\text{♂}} = 273$ $n$ (students) = 387 $n$ (staff) = 206	0.15 ± 0.74 S.D. 0.09 ± 0.54 S.D. 0.16 ± 0.77 S.D.	N.S. (t-test)

**TABLE 10. Attitude to Statement That “The Clitoris is the Analogue to the Penis”**

Females vs males	$n_{\text{♀}} = 318$	0.54 ± 1.24 S.D.	N.S. (t-test)
Students vs staff	$n_{\text{♂}} = 272$ $n$ (students) = 384 $n$ (staff) = 206	0.52 ± 1.21 S.D. 0.44 ± 1.08 S.D. 0.70 ± 1.45 S.D.	$P < 0.014$ (t-test)

**TABLE 11. Attitude to Statement That “The Penis is a Sexual Organ”**

Females vs males	$n_{\text{♀}} = 320$	0.17 ± 0.67 S.D.	N.S. (t-test)
Students vs staff	$n_{\text{♂}} = 273$ $n$ (students) = 387 $n$ (staff) = 206	0.23 ± 0.82 S.D. 0.15 ± 0.67 S.D. 0.28 ± 0.85 S.D.	$P < 0.05$ (t-test)

and negative vs positive attitudes toward gender issues ( $P < 0.0000$ ). No differences could be discerned between groups with different attitudes to gender issues among the female population of the surveys. For the male population, no differences were seen when comparing data for negative vs neutral attitudes

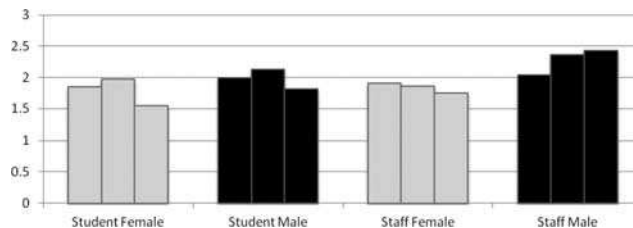
but were found when comparing neutral vs positive attitudes and negative vs positive attitudes ( $P < 0.004$  and  $< 0.0000$ , respectively). For the students, again there was no statistical difference between those holding negative and neutral attitudes but differences were discerned for neutral vs positive views and

**TABLE 12. Attitude to Statement That “The Penis is a Urogenital Organ”**

Females vs males	$n_{\text{♀}} = 319$	0.07 ± 0.39 S.D.	N.S. (t-test)
Students vs staff	$n_{\text{♂}} = 273$ $n$ (students) = 386 $n$ (staff) = 206	0.14 ± 0.68 S.D. 0.11 ± 0.58 S.D. 0.08 ± 0.48 S.D.	N.S. (t-test)

**TABLE 13. ANOVA Statistical Analyses Comparing Data From Groups With Differing Attitudes Toward Gender Issues in Relation to Anatomical Statements Concerning Genital Organs**

Anatomical statement	Negative attitude vs neutral attitude	Neutral attitude vs positive attitude	Negative attitude vs positive attitude
The clitoris is a diminutive form of the penis	Female: $P = 0.81$ Male: $P = 0.42$	Female: $P = 0.53$ Male: $P = 0.00$	Female: $P = 1.00$ Male: $P = 0.00$
The clitoris and the penis are erectile sexual organs	Female: $P = 1.00$ Male: $P = 0.99$	Female: $P = 0.35$ Male: $P = 0.00$	Female: $P = 0.73$ Male: $P = 0.00$
The penis is the enlarged form of the clitoris	Female: $P = 0.99$ Male: $P = 0.46$	Female: $P = 0.96$ Male: $P = 0.00$	Female: $P = 0.99$ Male: $P = 0.00$
The clitoris is the analogue to the male penis	Female: $P = 1.00$ Male: $P = 0.93$	Female: $P = 1.00$ Male: $P = 0.00$	Female: $P = 0.94$ Male: $P = 0.00$
The mammary glands are primarily organs of lactation	Female: $P = 0.14$ Male: $P = 1.00$	Female: $P = 0.61$ Male: $P = 0.01$	Female: $P = 0.86$ Male: $P = 0.03$
The mammary glands are secondary sexual organs	Female: $P = 0.99$ Male: $P = 0.99$	Female: $P = 0.60$ Male: $P = 0.00$	Female: $P = 0.96$ Male: $P = 0.00$
The penis is a sexual organ	Female: $P = 0.99$ Male: $P = 0.99$	Female: $P = 0.49$ Male: $P = 0.00$	Female: $P = 0.56$ Male: $P = 0.00$
The penis is a urogenital organ	Female: $P = 0.99$ Male: $P = 0.99$	Female: $P = 0.99$ Male: $P = 0.14$	Female: $P = 0.99$ Male: $P = 0.18$



**Fig. 13.** Assessment by medical students and anatomists of the appropriateness of the anatomical term "the pudendal nerve" (derived from Latin meaning "to be ashamed"). For each set of data (obtained using Likert scales where 0 = not appropriate; 5 = very appropriate), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]

negative vs positive opinions ( $P < 0.007$  and  $< 0.0000$ ). For the anatomists, the only difference found was between those with negative attitudes and positive attitudes toward gender issues ( $P < 0.006$ ).

Figures 17–24 provide histograms that relate to whether anatomists believe that gender is a factor when consulting with students and other professionals in their working lives.

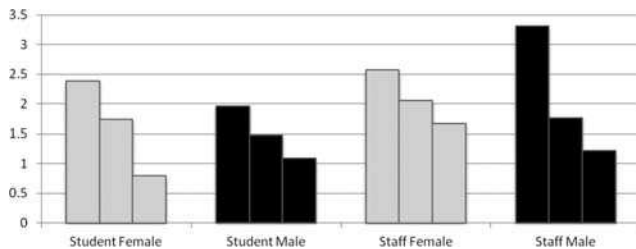
## DISCUSSION

Given that equality and diversity matters are increasingly important in Higher Education, it is our belief that medical curricula (including anatomy teaching) should be transformed to reflect these issues so that gender differences are properly considered. The aim is to work toward developing a gender neutral, nonsexist learning environment for the doctors of tomorrow. It is in this context that we decided to investigate whether professional anatomists are more sympathetic to gender issues than medical students. Assuming professional anatomists would reveal higher levels of awareness of equality and diversity matters than students, as explained earlier we set out to test six hypotheses, by means of questionnaires:

1. professional anatomists are more sympathetic to gender issues than medical students;
2. professional anatomists more readily perceive male dominance within the medical profession and do not believe that personality characteristics for females should influence career;
3. professional anatomists are more aware of the lack of gender neutrality within anatomical textbooks and for descriptions of sexual organs;
4. professional anatomists are more appreciative of gender issues being taught formally within their anatomy courses;
5. professional anatomists are more willing to intervene in class where sexism is evident; and
6. professional anatomists consider that gender is important when in consultation with students

**TABLE 14. Attitude Toward the Use of the Anatomical Term "Pudendal"**

Females vs males	$n_{\text{♀}} = 307$	$1.87 \pm 1.45$ S.D.	$P < 0.035$ (t-test)
Students vs staff	$n_{\text{♂}} = 268$ $n$ (students) = 374 $n$ (staff) = 201	$2.15 \pm 1.65$ S.D. $1.93 \pm 1.45$ S.D. $2.13 \pm 1.72$ S.D.	N.S. (t-test)



**Fig. 14.** Medical students' and anatomists' perceptions of gender bias in textbooks. For each set of data (obtained using Likert scales where 0 = no bias; 5 = very biased), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]

and with colleagues and is of importance in clinical education.

In general terms, similar findings emerged when males and females were compared and also when students' and anatomists' perceptions were considered. Indeed, we found that professional anatomists are not more sympathetic to gender issues as compared with the medical students, although more female anatomists showed sympathy with feminist politics than female students (41% compared with 25%). Thus, our results are not consistent with our first hypothesis that "professional anatomists are more sympathetic to gender issues than medical students."

To illustrate our findings, during an interview, a male anatomist stated,

*If I make any form of joke... that has a sexual word in it or a concept with a sexual connotation... there is a feminist lobby that will clamp down in every way and take you to the Dean. And it has a negative effect even if you say she was beautiful. I can tell a male 'humorous' not sexy joke - I can show a cartoon with a male thing and I get no problems but if I do it with a female comment on it I will have quite a lot of students coming up to complain. Amongst*

*the female audience there are some very rabid feminists and they are doing themselves and society a disservice because you can't be as free talking about anything sexual. For most of society, sexuality is slightly off limits - medicine has cornered the market in the human body apart from pornography, so effectively you are either a serious doctor or you are in the pornography trade.*

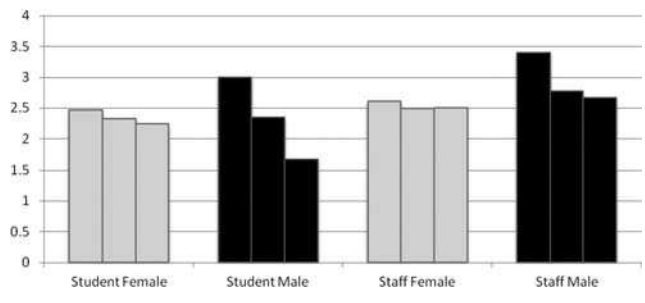
Further support is available from the findings relating to anatomical mnemonics. Although few anatomical mnemonics with sexual content were known by both students and anatomists, male students who claimed to be sympathetic to gender issues believed that they knew more. In addition, across the board, there was a similar low-level concern about the sexual mnemonic given in the questionnaire that related to structures passing through the superior orbital fissure. Most concern was expressed by male anatomists who claimed to have sympathy with gender issues and this proved to be a general finding for many of the questions in the questionnaire and will be commented upon later in this discussion. A typical response of anatomists toward the use of mnemonics is shown by a male anatomist's comment, which is given here:

*A female student objected to a mnemonic with sexual content and this annoyed me as it carries no menace and has been used for two centuries.*

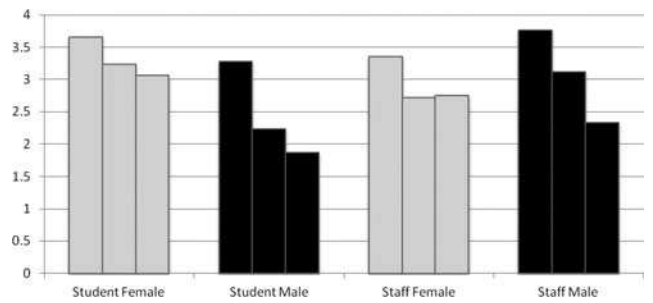
In our opinion, it is concerning if, contrary to our expectations, anatomists do not show greater liberality with respect to gender, since they are expected to incorporate "professionalism" within their courses. On the other hand, we found support for our second hypothesis, that "professional anatomists more readily perceive male dominance within the medical profession." This is perhaps because of their greater experience of events or because they have a different understanding of feminism and gender issues than the younger generation of students. Females more readily perceive a male dominance, perhaps because they are the receivers of such dominance. It is more likely that female anatomists, being older than their students, will have experienced higher levels of

**TABLE 15. Perception of Gender Bias in Anatomical Textbooks**

Females vs males	$n_{\text{♀}} = 312$	$1.88 \pm 1.83$ S.D.	N.S. (t-test)
Students vs staff	$n_{\text{♂}} = 271$ $n$ (students) = 379 $n$ (staff) = 204	$1.69 \pm 1.90$ S.D. $1.64 \pm 1.73$ S.D. $2.06 \pm 2.06$ S.D.	$P < 0.009$ (t-test)



**Fig. 15.** Attitudes of medical students and anatomists as to whether gender issues should be addressed explicitly by formal tuition within the anatomy course. For each set of data (obtained using Likert scales where 0 = not important to address issues; 5 = very important to address issues), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]



**Fig. 16.** Attitudes of medical and anatomists as to whether staff should intervene when they observe gender inequalities in class. For each set of data (obtained using Likert scales where 0 = not important; 5 = very important), the first (left) column relates to respondents with positive attitudes to gender issues, the second (central) column relates to respondents with neutral attitudes, and the third (right) column relates to respondents with negative attitudes. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

gender discrimination while rising up the career ladder, at a time when the number of women entering the field of medicine was significantly lower than it is now. As an illustration of these findings, in an interview when asked about the culture of medicine a female professor of anatomy stated,

*When I was rising up the ranks and going to committee meetings, certainly to start with it was assumed I would make the tea, even if it was I who was chairing the meeting. And on one or two occasions you'd ring someone up or they would ring me and they would assume I was my own PA - no I want to speak to Professor...I'm Professor...you'd get that all the time*

Finally, with regard to the perception of male dominance within medicine, it was the male medical students who seemed least able to perceive such dominance.

Our hypothesis goes on to state that "anatomists do not believe that personality characteristics for females should influence career." From our data, 67% of female anatomists and 69% of male anatomists did not wish to state that there are career options in medicine for which females are best suited. This finding supports the hypothesis. However, 47% of female anatomists and 48% of male anatomists listed personality characteristics that they deemed favored females in pursuit of their careers (e.g., empathy, patience, sensitivity, and intuition). Thus, some ambivalence persists and perhaps this relates to a vestige of gender stereotyping.

Comments from anatomists in interview related to these matters include the following:

- Girls can only be GPs so there is no point bothering with anatomy.
- Women need not study but should marry.
- If females are less likely to be reported for disciplinary proceeding... this might be evidence that females are better fitted for medicine but I cannot prove that this is a personality trait rather than a cultural phenomenon.
- Women may need to exceed the aggressiveness expressed by males to succeed.
- Many people trust more if answers come from a male.
- There are more successful male medical scientists in our present time.

It has been pointed out that gender stereotyping can also work against males. In a study by Zahid et al. (2014), a gender bias was shown to exist in the clinical setting so that male students gained significantly less experience than female students in pelvic examination skills. Nicholson (2002) conducted 12 in-depth interviews with self-selecting Year-5 students who described situations where they felt their learning had been jeopardized by sexism. Male students, for example, reported frequent difficulties while attached to obstetrics and gynecology firms. Both male and female students commented that their gender did sometimes affect their relationships with teaching staff and that affirmation from their teachers was

**TABLE 16. Attitudes Toward Gender Issues Being Addressed Explicitly Within the Anatomy Course**

Females vs males	$n_{\text{f}} = 312$	2.39 ± 1.71 S.D.	N.S. (t-test)
Students vs staff	$n_{\text{s}} = 272$	2.56 ± 1.98 S.D.	$P < 0.005$ (t-test)
	$n$ (students) = 379 $n$ (staff) = 205	2.31 ± 1.74 S.D. 2.76 ± 1.98 S.D.	

**TABLE 17. Attitude Toward Staff Intervening When Sexism Seen During Class**

Females vs males	$n_{\text{f}} = 308$	$3.23 \pm 1.72$ S.D.	$P < 0.0000$ (t-test)
Students vs staff	$n_{\text{s}} = 269$	$2.64 \pm 1.87$ S.D.	N.S. (t-test)
	$n$ (students) = 377 $n$ (staff) = 200	$2.92 \pm 1.79$ S.D. $3.02 \pm 1.85$ S.D.	

important. Female students seemed to cope well with their experiences of sexism by supporting each other. Male students, on the other hand, sometimes felt resigned to being excluded from certain learning opportunities, though this could result in unresolved frustration.

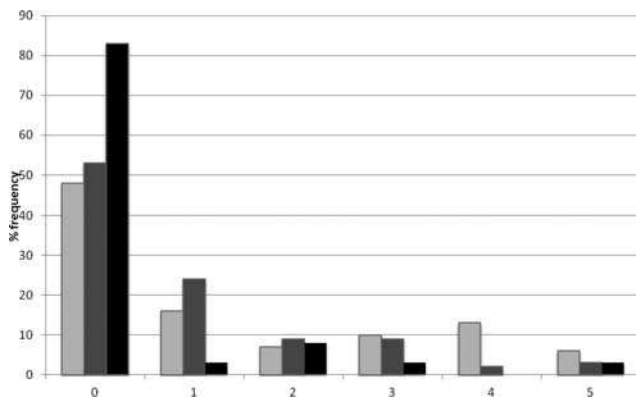
With respect to our hypothesis that “professional anatomists are more aware of the lack of gender neutrality within anatomical textbooks and for descriptions of sexual organs,” few recognized gender bias in the depiction of anatomy within textbooks, despite there being ample evidence from previous studies that contemporary textbooks of gross anatomy and surface anatomy most often lack gender neutrality. (Lawrence and Bendixen, 1992; Mendelsohn et al., 1994; Giacomini et al., 2001; Morgan et al., 2014). Lawrence and Bendixen (1992) in particular emphasize the importance of this issue, when they suggest that anatomy has a key role in producing a “powerful and authoritative science of the human structure that is vital to advanced work in various areas of medical research and medical practice.” Their survey of 31 texts published in the United States of America found that contemporary textbooks of anatomy “perpetuate the conventions setting the male as the central model of anatomy” that helps to “maintain an anatomical hierarchy: male, then female; male as norm, female as different.” They concluded that Western culture is far from “creating from a nongendered human

anatomy, one from which both male and female emerge as equally significant and intriguing variations.”

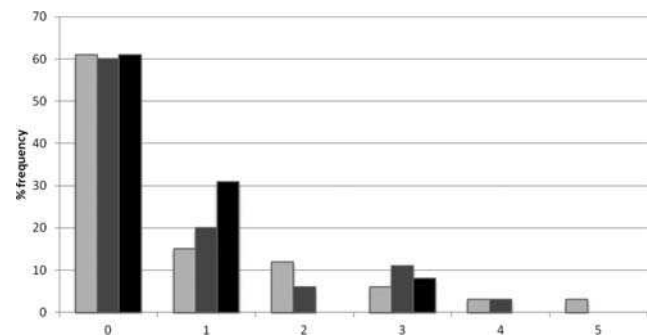
That a statistical difference was seen between anatomists and students relates to the greater perception of gender bias in textbooks recognized by male anatomists who have sympathy with gender issues. Furthermore, for all groups studied, there was a gradual shift from awareness to unawareness as one moves from positive attitudes to gender issues through to neutral attitudes and then negative attitudes. Comments from anatomists include the following:

Depictions of female external sexual organs and their variants used to be incomplete in anatomical books, or at least not as detailed as they should be. Depictions of male sexual organs are easier to depict, yet I’ve found that many students of both genders say they obtain more information of female organs on porn websites. Times are changing.

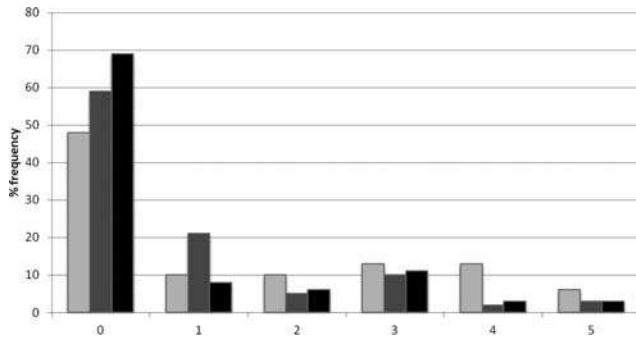
Yes, for example... The online course ‘GSM-IMC’ Basic Clinical skills (Cardiovascular and Pulmonary Examination) has drawings 16 male 0 female, photographs 4 male 0 female, videos 15 male 0 female. My own copy of Surface Anatomy (3<sup>rd</sup> edition) Lumley (2002) has 5 female images (breast and vagina) out of in excess of 200 identifiable gendered photographs.



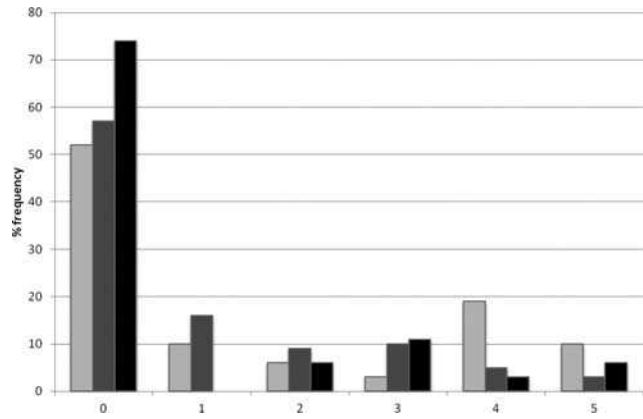
**Fig. 17. Male anatomists’ responses as to whether a student’s gender is of importance when consulting with the student.** On the Likert scale 0 = of no importance; 5 = of great importance. In each of the cluster of responses, the first column relates to those who hold views sympathetic to gender issues; the second column relates to those who have some sympathy; the third column relates to those with little or sympathy. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]



**Fig. 18. Female anatomists’ responses as to whether a student’s gender is of importance when consulting with the student.** On the Likert scale 0 = of no importance; 5 = of great importance. In each of the cluster of responses, the first column relates to those who hold views sympathetic to gender issues; the second column relates to those who have some sympathy; the third column relates to those with little or sympathy. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]



**Fig. 19.** Male anatomists' responses as to whether their gender is of importance when consulting with the student. On the Likert scale 0 = of no importance; 5 = of great importance. In each of the cluster of responses, the first column relates to those who hold views sympathetic to gender issues; the second column relates to those who have some sympathy; the third column relates to those with little or sympathy. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]



**Fig. 21.** Male anatomists' responses as to whether the student's gender is of importance in clinical education. On the Likert scale 0 = of no importance; 5 = of great importance. In each of the cluster of responses, the first column relates to those who hold views sympathetic to gender issues; the second column relates to those who have some sympathy; the third column relates to those with little or sympathy. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]

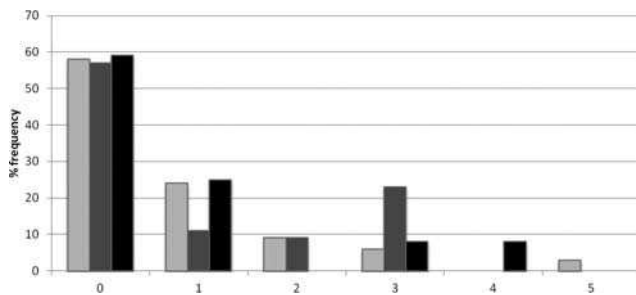
Not many textbooks are accurate about female anatomy. Historically, there has been accurate data – Kobelt in the 1840s also the wax models of Susini in the eighteenth century; he found everything. In the 18<sup>th</sup> century anatomical knowledge was accurate; what was not was understanding of function. In 2003, it was noticed by those involved in anatomical terminology that there was as much in the female as in male sexual apparatus, so there were inaccuracies in textbooks as new data appeared. So, the Terminologia Histologica changed some terms, e.g. term for female prostate, which did not exist in 1998.

As regards the anatomical statements describing sexual organs that are frequently found in anatomical texts, although there was generally little concern expressed from both students and anatomists, the

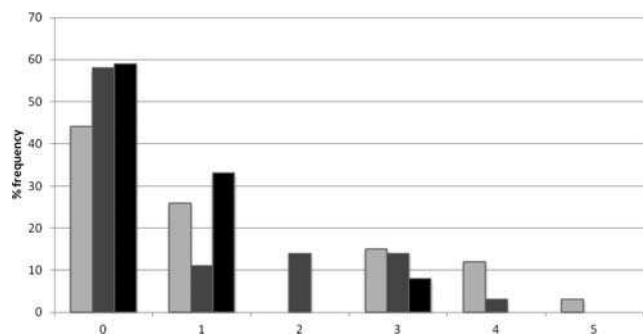
statements that caused least "offense" (mean scores of approximately 0.8 from a Likert scale between 0 and 5) were

- the clitoris and penis are erectile sexual organs;
- mammary glands are primarily organs of lactation;
- the penis is a sexual organ.

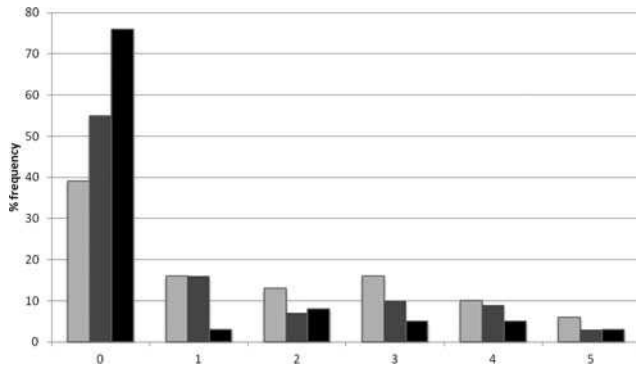
On the other hand, the statements that caused most "offense" (mean scores of approximately 3.4 from a Likert scale between 0 and 5) were



**Fig. 20.** Female anatomists' responses as to whether their gender is of importance when consulting with the student. On the Likert scale 0 = of no importance; 5 = of great importance. In each of the cluster of responses, the first column relates to those who hold views sympathetic to gender issues; the second column relates to those who have some sympathy; the third column relates to those with little or sympathy. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]



**Fig. 22.** Female anatomists' responses as to whether the student's gender is of importance in clinical education. On the Likert scale 0 = of no importance; 5 = of great importance. In each of the cluster of responses, the first column relates to those who hold views sympathetic to gender issues; the second column relates to those who have some sympathy; the third column relates to those with little or sympathy. [Color figure can be viewed in the online issue, which is available at wileyonlinelibrary.com.]



**Fig. 23.** Male anatomists' responses as to whether their gender is of importance in their professional relations with colleagues. On the Likert scale 0 = of no importance; 5 = of great importance. In each of the cluster of responses, the first column relates to those who hold views sympathetic to gender issues; the second column relates to those who have some sympathy; the third column relates to those with little or sympathy. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]

the clitoris is a diminutive form of the penis; the penis is an enlarged form of the clitoris.

That such matters are issues of concern to anatomists and other medical professionals can be seen in Volume 28 of *Clinical Anatomy, a Special Issue on the Clinical Anatomy of Sex* (2015), where in a review article sexologists V. and G. Puppo discuss the terminology of the female genital region. In their view, the "correct and simple term to describe the cluster of erectile tissues (i.e., clitoris, vestibular bulbs and pars intermedia, and corpus spongiosa of the female urethra) responsible for female orgasm is 'female penis'." The term "female penis" most closely corresponds to the statement in our questionnaire, "the clitoris is a diminutive form of the penis." This statement caused most concern among our respondents (Fig. 7) and perhaps therefore it is not surprising that the term also caused concern during interviews with anatomists. It seems relevant here that in interviews with anatomists the Puppos' suggestion elicited very strongly felt comments, including the following:

This is completely out of the question, in my view.

To make masculine all the terminology for the reproductive system, I personally find this absolutely ridiculous.

I don't think you would ever have to say male penis, so why would you qualify it only for the female?

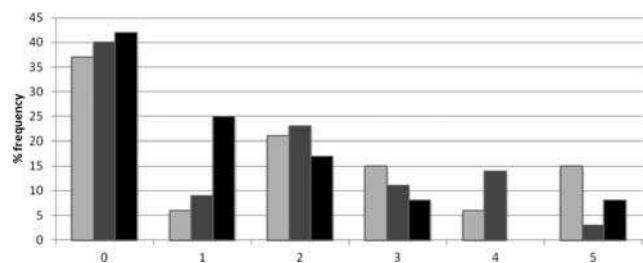
I object to that, hugely. Not only as an anatomist, but as a female. I am very proud that I have a clitoris, I don't want a penis. It is male-centred. I am an embryologist more than an anatomist and as an embryologist I know that we start off in an indifferent phase, and the

default is female, it's not male, you have to have that extra chromosome to develop as a male.

'Female penis' invites comparisons which are not helpful. You want to look at each sex as the facts are, rather than making comparisons. We've been stuck in this ridiculous comparative mode which I don't think serves anyone. There are commonalities but that's not really the point. You really need to look at what's so, objectively, faithfully observe what you see and then describe it and image it. That would help people to truly understand where comparisons sit – that they just haven't served us. Maybe it's because medicine's had a male agenda, maybe if the boot was on the other foot and you had female as the standard and you were making minor comparisons and adding this or subtracting this to get the male people would understand why it doesn't work so well!

It's not just a gender issue. It's an issue of actually providing clear criteria for the terminology that naturally needs adapting, considering the heritage that we have of the terminology that is used and considering it is very difficult to change, but still it is important. It is not just saying I want the clitoris to be called the penis, why do we call it the penis? You do have to have criteria and do have certainly to consider variety in all aspects when you are teaching medical students.

One surprising and inexplicable finding was that among all the groups studied, there was more concern with the statement that "the clitoris is the diminutive form of the penis" than with the statement that "the penis is the enlarged form of the clitoris." Another unexpected finding concerns male students and anatomists with sympathy for gender issues, who expressed the most concern across all the statements describing sexual organs. Female students (regardless of their degree of sympathy with gender issues) expressed the least concern across all statements.



**Fig. 24.** Female anatomists' responses as to whether their gender is of importance in their professional relations with colleagues. On the Likert scale 0 = of no importance; 5 = of great importance. In each of the cluster of responses, the first column relates to those who hold views sympathetic to gender issues; the second column relates to those who have some sympathy; the third column relates to those with little or sympathy. [Color figure can be viewed in the online issue, which is available at [wileyonlinelibrary.com](http://wileyonlinelibrary.com).]



The reason for this finding is not yet clear but perhaps female students entering medical training believe that holding feminist-orientated views would show them to be ill-suited to a medical profession where there is male dominance. Indeed, during an interview, an anatomist and practicing clinician spoke about her awareness of the difficulties faced by those who are trying to raise awareness of gender issues in the profession:

*It's easier for them to toe the line rather than buck against it. I heard an amazing talk last year about a woman who was incensed at the way breast anatomy was being taught. So she fought it vigorously and she really suffered, she was vilified, the medical students didn't get behind her, this is a long time ago, maybe 20 years ago. It was a tough journey. So if you see the wrong thing happening a common response is to do nothing. It takes a certain bravery, because it goes against the prevailing culture and medical culture is very powerful. These are young people who want to pass exams, they're used to ticking boxes, that's really where they want to be, they don't want to be challenging authorities, running a feminist agenda. They don't see sexism, they're almost selected out for not seeing it.*

The complexity of attitudes held by female professional anatomists is noted by Hull (2009) when she points out that female academics of her generation, having entered medicine in increased numbers "feel they cannot speak up and *remain* in the profession." She goes on to suggest that perhaps this group of female academics "have become complacent in the face of the many advances that have been made, both in support of women in medicine and in the diminished tolerance for outright sexist behavior. It is important to remember, though, that the threat of retaliation is *not* gone and that the price of speaking up remains high."

When we proposed the hypothesis that "professional anatomists are more appreciative of gender issues being taught formally within their anatomy courses," we presupposed that the staff would express more liberality with respect to equality and diversity issues. In this context, an art historian who has taught medical humanities courses to medical students said during an interview:

*The more that doctors, who after all are in one of the most intricate and fraught social interfaces in any profession, can be alert to the assumptions they have and develop an awareness of gender, of age, of disability and try not to categorize the person you are speaking to, the better.*

Our survey does not suggest that there is great sympathy with gender issues, regardless of the group studied. Nevertheless, professional anatomists are more willing to intervene in class where sexism is evident and females (both anatomists and students) are

more aware of the need for intervention. Comments received from anatomists included the following:

*Formal courses are not required for all since only some students might be interested.*

*I think they should be offered a much wider insight in the whole of their practice to all sorts of biases, age biases, gender biases and so on. The more that doctors, who after all are in one of the most intricate and fraught social interfaces in any profession, the more they can be alert to the assumptions they have, we all have, I have, you have to pull yourself back and say don't do that. . . at least you can develop an antennae that starts twitching, and says don't do this, this is not good it doesn't mean to say that you don't do it, but you can develop an awareness of gender, of age, of disability and try not to categorize the person you are speaking to but giving everyone a reasonable belief and sense no matter how they are addressed. (Art historian who has taught medical humanities courses)*

*In my forty years of teaching, one of the aims was to teach them (medical students) to think in ways that would make them question what they were doing, to make them aware of how much uncertainty there is. . . and our view was that this was a way of getting around the bias – we did have Roy Porter, he used to give a course that included one on gender so that we felt it was important that that notion of the fixity of science is to be interrogated.*

A pertinent question remains as to whether gender is a factor when anatomists consult with students and other professionals in their working lives. Figures 17–20 suggest that male and female anatomists pay little attention to students' gender (and to their own gender) during their consultations. Several explanations can be offered. It is possible that the anatomists are "gender-blind" and take a liberal view about the need to treat equally male and female students. On the other hand, the anatomists could be "blind to gender" showing little regard for diversity issues. The lack of concern for students' gender was also manifest in attitudes toward the importance of gender within clinical situations (Figs. 21 and 22). Nevertheless, while male anatomists also showed little or no concern about gender in relation to professional career matters (Fig. 23), there was a noticeable pattern for female anatomists that indicates greater concern or awareness (Fig. 24) that probably can be accounted for by their perception of career opportunities and gender biases in the workplace and by their experiences. Thus, overall our findings do not support our initial hypothesis that "professional anatomists consider that gender is important when in consultation with students and with colleagues and is of importance in clinical education." The relevant comments received from anatomists were as follows:

Clinical teachers often make gender-biased assumption which we know dismay female students.

It's easier for me to communicate with students of my gender.

I am more inclined as a male anatomist to aid a female student as she would often encounter obstacles because of her gender.

I am aware of possible Oleanna phenomenon. (author's note: David Mamet's play *Oleanna* (1992) explores power relations and the effect of imposing the language of political correctness in an academic setting, when a male university professor in his 40s is accused by his twenty year old female student of sexual harassment and failing in his duty to teach her after he puts his hand on her shoulder.)

While it appears that anatomists pay little attention to students' gender during their consultations, Nicholson (2002) reported that students found that their gender did affect their relations with teaching staff. This discrepancy between staff and students is an important issue that requires further investigation, possibly by discreet observation, as at the very least it shows that anatomists should be more aware of the possible vulnerability of students.

When our findings were assessed across the entirety of the questionnaire, it was clear that in many areas male anatomists with sympathy for gender issues showed most awareness and concern. This was particularly evident for all the anatomical statements relating to descriptions of the sexual organs, but also for the perception of gender bias within anatomical textbooks. More occasionally, the male medical students with sympathy for gender issues also showed greater awareness and/or concern. One matter that caused little concern across all the groups in the questionnaire survey was the use of the term "pudendal." In interviews with professional anatomists, however, some concern was expressed. Relevant comments included the following:

*In Portugal, terminology for the genital organs (and especially the nerves and arteries) is 'the pudendal' which comes from the French pudeur ...which has a lot of connotations with sexuality and has absolutely nothing to do with the structures themselves. Of all the possible names they chose the one that has a social connotation, this is the shameful one, the shameful artery and the shameful nerve.*

*If you ask me if it is appropriate to call pudendal artery and vein and nerve of course it is not appropriate. We might want to change that term to something that really relates to the perineum but this is difficult because then you have perineal arteries and veins and nerves and this is complicated! So, it always very difficult to change.*

Other comments made during interviews might help explain why so little concern was shown, for example:

*It's true, we still use pudenda, as shame - it's interesting where it comes from but it's established terminology now. I'm not sure if we should veto it because of the sins of the past...*

In terms of whether there should be intervention in class when gender inequalities were perceived, such intervention was approved particularly by both female medical students and anatomists, regardless of the degree of sympathy shown for gender issues. On the other hand, it was only male medical students with sympathy for gender issues and male anatomists with sympathy or moderate sympathy who would favor intervention. In this context, it is noteworthy that only male medical students and male anatomists with sympathy for gender issues would approve of formal tuition of gender issues within the anatomical course.

## RECOMMENDATIONS

We conclude that, for both professional anatomists and medical students, levels of awareness of gender issues and their relevance in medical education are lower than expected. The question should now be addressed: what would we recommend to increase the level of awareness within the medical course?

We reported in our previous study that students complained about the effects of sexism. In this study, we find that anatomists are also aware of and can recall incidents and examples of sexist bias. It therefore seems important to recommend that action is taken to ensure that all medical students and staff are treated with respect in a culture that promotes awareness of equality and diversity issues. Furthermore, it seems important to raise awareness of bias in textbooks and teaching as well as sensitivity to gender issues within medical education and clinical situations.

Our first recommendation, therefore, is that teaching staff should make use of appropriate training that raises awareness of these issues. Opportunities should be provided for staff to consider their own attitudes to gender and to reflect on their own teaching practice and their approaches to developing and teaching a nonsexist curriculum. Such measures would help to ensure that gender-based competencies become standard parts of undergraduate medical education. As reported previously (Morgan et al., 2014), several universities are developing courses that feature instruction and training relating to gender matters because of the perception that there is insufficient knowledge among students and lecturers regarding gender issues. Gender education in medicine is nowadays recommended as an integral part of primary care and postgraduate training and the need for gender perspectives in medical curricula is acknowledged at governmental level in some countries. The World Health Organisation supports a gender-based approach and has set out specific targets aimed at gender mainstreaming in medical education and health care. However, at present, there is little agreement on what strategies are effective when teaching gender medicine.

Following an assessment of the effect of specialty and gender on teachers at a Swedish medical school, Risberg et al. (2003) concluded that to improve working climate and reduce segregation, there was a need to make efforts to increase gender awareness among medical professionals through educational programs where continuous reflections about gender attitudes were encouraged. Pfeleiderer et al. (2012) also recommend "using meaningful examples on a regular basis—ideally in a longitudinal manner." They believe that it is important that "The content of teaching should be selected by the lecturers and full professors and be considered within students' exams" but emphasize that for this to be successful, the "absolute support of the respective medical faculties as well as the integration of these gender-specific learning objectives into the national competence-based learning catalogue for medical education is obligatory." Kaatz and Carne (2014) argue that, although there is a critical need to address stereotype-based gender bias for the future of academic medicine, policies alone will not achieve gender equity in the academic medicine workforce. They provide examples of "interventions that treat gender bias as a remediable habit" which they say "show promise in promoting gender equity and transforming institutional culture to achieve the full participation of women at all career stages." What is important, they add, is "to recognize when gender stereotyped assumptions are influencing judgments and decision making in ourselves and others, [to] challenge them as unjust, and deliberately practice replacing them with accurate and objective data." Wong Yut-Lin (2009) strongly advocates medical curricula change to address gender inequalities in health and gender bias in medicine.

We previously reported (Morgan et al., 2014) that, in comparison with other countries, changes to the medical curricula (such as undergoing training in equality and diversity matters) are not mandatory and hardly feature in the UK. It is our view that there is a pressing need to introduce gender-specific medical curricula, where students gain insights into gender in health and illness and learn to apply such knowledge to medical practice. It is our recommendation that this is instituted, not by a stand-alone course, but by naturally and informally embedding such matters within existing courses (e.g., the anatomical course). As reported earlier, that approach proved successful with regard to teaching awareness of ethics and morality into anatomical courses (Patel and Moxham, 2006). Such an approach is reliant on the vigilance of anatomy teachers who see the importance of controlling and disciplining behaviors that could be construed as sexist. Textbooks and other teaching resources such as e-learning packages also need to be checked for inadvertent sexism. Zelek et al. (1997) suggest that "language should be examined to determine whether the words used to convey information subtly promote and maintain stereotypes about either sex or are emancipatory."

Second, we would recommend highlighting the importance of role models. Research conducted by Seeman (2015) suggests that female surgeons working at university medical centers reported faced more gender discrimination as staff surgeons than they did

as medical students or residents. Gender discrimination in today's surgical world is subtle, according to Seeman. Female medical students are told much more often than male medical students to consider a career other than surgery because it is incompatible with family life. In Canada, although the number of women in surgery is steadily increasing, they still account for only 22% of full-time faculty and 1% of chairs of surgery. If female students do not see themselves as surgeons because they do not have opportunities to observe female surgeons, they cannot see for themselves that it might be possible to combine family life with such a career. Bruce et al. (2015) found that "Despite the strides that have been made in gender equality over the past century, more than half of our respondents reported experienced or observed gender-based discrimination." They also reported that "within the male-dominated world of surgery, where women are represented by low numbers, women discriminating against women may perpetuate the cycle of gender disparity. It has been proposed that there is a dynamic between the female nurses' nurturing characteristics, which are traditionally feminine, and the female surgeons' fight to attain agency as a leader, often requiring calculated cooperation in the workplace." Furthermore, they noted that because "mentorship and early exposure play a positive role in women's decisions to enter surgery" they believe that "a greater proportion of successful women in surgical departments should allow more female students to recognize surgery as a viable option." In their systematic literature review of databases relating to gender differences in surgical education at an undergraduate level, Burgos and Josephson (2014) conclude that there is "an underrepresentation of women in surgical academia, due to lack of role models and gender awareness."

Third, in order for us to improve understanding of gender issues and to enhance equality and diversity within medical education, there is a need to extend this study beyond the binary issues relating to male and female. Although numbers are presently small, contemporary society increasingly shows concern for matters relating to intersex, transsexual, and transgender identities. For a caring profession such as medicine, we recommend further investigation of attitudes toward "LGBTI" identities (as well as heterosexual identities) to satisfy an equality agenda.

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## AUTHOR CONTRIBUTIONS

Susan Morgan and Bernard Moxham were responsible for the concepts underpinning this project and for collecting the data. They also wrote the manuscript. Odile Plaisant and Baptiste Lignier conducted the


statistical analyses. All authors reviewed the manuscript. There are no conflicts of interest.

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AQ4


AQ5


AQ1: Please provide complete details for "Verdonk et al., 2014; Youdas, 2013; Wittich, 2013; Goodman Zimet, 1976; Wizemann and Pardue, 2001; Zahid et al., 2014; Sex 2015; Oleanna 1999; Wong Yut-Lin, 2009; Seeman, 2015" in the reference list or delete the citations from the text. 

AQ2: Please check the placement of Table 3 and correct if inappropriate. 

AQ3: Please check if the "," in "P 004" at the end of the sentence "For the medical student population..." needs to be changed. 

AQ4: There is no mention of "Celik et al., 2008; Lagro-Janssen et al., 2008; Puppo & Puppo, 2015; Seemann et al., 2016; Wittich et al., 2013; Wong, 2009; Youdis et al., 2013; Zahid et al., 2015" in the text. Please insert a citation in the text or delete the references as appropriate. 

AQ5: Please replace et al. with all the authors' names in the reference list. 

AQ6: Color query: Please confirm whether the color figures should be reproduced in color or black and white in the print version. If the color figures must be reproduced in color in the print version, please fill the color charge form immediately and return to Production Editor. Or else, the color figures for your article will appear in color in the online version only. 

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