Medical student gender and issues of confidence

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Received 21 February 2008; received in revised form 13 May 2008; accepted 28 May 2008

Abstract

Objective: To review the literature on gender differences and issues of self-confidence in medical students and to present original research on observers’ perceptions of medical student confidence.

Methods: One hundred forty-one 3rd year medical students at Indiana University School of Medicine were videotaped during their objective structured clinical examination (OSCE). Trained coders rated how confident the student appeared and coded a variety of nonverbal behaviors at the beginning, middle, and end of the interaction. Analysis focused on gender differences in coders’ ratings of perceived confidence.

Results: Female medical students were viewed as significantly less confident than male medical students ($F(1,133) = 4.45, p < 0.05$), especially at the beginning of the interaction.

Conclusion: Past research indicates that despite performing equally to their male peers, female medical students consistently report decreased self-confidence and increased anxiety, particularly over issues related to their competence. In a standardized patient interaction examination situation, female medical students also appeared significantly less confident than male medical students to independent observers.

Practice implications: Medical educators should focus on issues of female students’ confidence, increasing faculty sensitivity, and publicly recognizing and discussing perceptions of confidence.

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Keywords: Medical students; Confidence; Gender; Self-confidence; Anxiety; Stress; Communication; Competence

1. Introduction

The last decade has seen a significant change in the gender composition of medical schools. According to the Association of American Medical Colleges, since 2002, each year female students have made up over half of all first time applicants to medical school [1]. This is up from just under a third of the applications coming from female students in 1982–1983. These numbers carry through to the percentages of females matriculating and graduating from medical school.

In order to develop training and curricula that produce the best possible physicians, regardless of gender, medical educators must understand the gender differences that exist in the medical student population. A comprehensive understanding is difficult because gender differences in this population are often reported in the context of one particular medical school, training program, evaluation technique, or attitude scale. However, when brought together, these largely disjointed results form a remarkably coherent picture of the gender differences in confidence and anxiety that exist in the medical school population.

The effects of gender on medical student anxiety and self-confidence are particularly consistent. Despite performing at a level equivalent to male medical students in academic competence and even excelling in clinical communication and patient-centered care, female medical students consistently report more anxiety and less confidence in their abilities than their male counterparts. These confidence-related behaviors and beliefs can have a significant and often detrimental impact on both internal and external perceptions of ability and can undermine ability and performance.

In this article, we present a review of the research on gender differences in self-confidence and anxiety of medical students that led us to these conclusions and we present our current
research on perceptions of confidence in relation to medical student gender. We also examine the potential causes and effects of these gender differences, suggest several ways in which our findings can inform medical education, and propose possible directions for future research.

1.1. Literature review

1.1.1. General anxiety and stress

Well-being is an important element in medical school success and a large part of that success is in dealing with the stress and anxiety that the rigors of medical school often pose. In general, female medical students report a higher level of anxiety than male students [2–10]. Although the effect sizes are small in some cases [11,12] or no significant gender difference is observed [13,14], no studies showed males experiencing more overall anxiety than females. This gender difference in medical students’ anxiety has been examined mainly in the US, but occurs outside the US as well [9,10].

Hojat et al. in 1999 and 2003, analyzed gender differences in the psychosocial profiles of medical students [11,15]. Female medical students scored higher than their male counterparts on measures of general anxiety, test anxiety, and neuroticism. Females who experienced stressful life events also rated these events more negatively than males and were more likely to report that experiences of personal injury or illness had influenced them a great deal. In addition to reporting more stressful events than males in schoolwork and living conditions, female medical students were significantly less likely than males to report major personal achievements or completion of an educational program when asked to recall recent life changes [4].

1.1.2. Self-perceived confidence in ability

Studies have established a gender-specific link between anxiety and self-perceived competence [8]. A study of first year medical students in the United Kingdom found that although there were no significant gender differences on a measure of general health/psychological morbidity, female students reported that their ‘personal competence’ caused them significantly more stress than was reported by male students [4]. Females had also significantly higher stress related to ‘learning the new curriculum’ and ‘assessment’, stressors related to confidence in performance. Males only experienced more stress than females about their ‘accommodations/living away from home’.

There is some suggestion in the literature that the relationship between female gender and increased stress over competence strengthens as medical school progresses. In first year students, there were no gender differences in worries about competence, workload, or finances. Yet by the third year, females worried significantly more than males did about their future capacity and competence [2]. There is also evidence that female medical students are particularly vulnerable to anxiety over competence in the later years of their medical education [16]. A study of third year students found that women reported significantly more anxiety than men [3]. The questionnaire on which this study was based addressed issues of confidence and perceived competence as a source of anxiety (e.g. “I feel confident about performing physical examinations on real patients” and “my previous clinical skills teaching has prepared me adequately to start on the wards”). Interpreted as a measure of perceived confidence, these third year female medical students reported more anxiety about their abilities than did their male counterparts.

Even in areas where females typically excel, they may feel less competent. Female medical students reported more apprehension about communication than male medical students [17]. Female medical students were also significantly more likely to be neutral or disagree that their communication skills and clinical knowledge were competent [18]. At the end of medical school, males seemed to have achieved a greater level of identification with the role of doctor than female students who had been through the same medical school experience. An analysis of the factors attributed to this role identification revealed that while both genders took into account medical school variables like perceived recording/clinical skills, only female students thought about their confidence in their knowledge when asked to assess their identification with the role of doctor [19].

Female medical students feel unsure about their competence as doctors and this can manifest itself when they are asked to make estimates about their abilities. Self-assessment is often a component of medical education and many argue that it is crucial in establishing a physician’s professionalism [20]. In general, the literature shows that female medical students tend to underestimate their abilities, while males tend to overestimate their abilities [20–23], even in cases where female students scored objectively higher than males [24]. This seems to exist across specialties, although the effect size may be smaller in certain groups of female medical students like those who choose traditionally male-oriented specialties, such as surgery [22]. Greater accuracy in self-assessment in women who enter surgical fields may be due to a selection bias. Women who choose to specialize in surgery may be particularly confident and self-assured.

1.1.3. Academic and clinical performance

Although clear differences are seen in studies of self-confidence, stress, and anxiety, the question remains whether gender differences are evident in clinical and academic performance. Gender differences in a variety of observable behaviors have been studied and have been shown to exist in the practicing physician population [25–27]. Nevertheless, there appears to be no consistent gender difference in academic performance as defined by grades and test scores. A recent review of predictors of academic success in medical school found a small, but consistent, body of literature showing that women outperformed men in medical training and clinical assessments [28]. It is important to note that research in this area has not been consistent, with some researchers finding no gender difference [29,30], an advantage for female students [31], or an advantage for male students [32]. More research is needed to explore possible gender differences in academic
performance; however, it does not appear that female students’ decreased self-confidence and high anxiety over competence are justified by objective criteria showing poor performance.

1.1.4. Communication and interpersonal skills

Although there appear to be no systematic differences between male and female medical students in academic performance, the literature on communication and interpersonal skills does reveal differences. Consistent with the research on physicians, research on communication and interpersonal skills in medical students shows that females excel in measures of communication performance [33–38]. These assessments are usually global scores on communication skills or performance in objective structured clinical examination (OSCE) rated by a preceptor or standardized patient. This method of evaluation has been shown to be a reliable and valid way to measure medical student competence [39]. Gender differences that do exist are not attributable to evaluators’ gender biases [34]. Examinee gender, and not standardized patient, rater gender, or an interaction of these variables, affects ratings [40].

1.2. The present research

The literature is clear that despite equivalent or even advanced levels of performance in comparison to their male peers, female medical students self-report more stress and anxiety and are less confident in their own abilities. From a methodological perspective, self-reports are subject to a variety of biases. Female medical students may just be more willing to admit that they are feeling anxious, stressed, or that they lack confidence in their abilities. Male medical students might be feeling anxious or stressed to the same degree but are more reticent to admit these negative feelings. Gender differences in self-report response biases have been shown in other areas such as on scales of personality disorders [41,42], depression inventories [43], and mathematics anxiety measures [44]. Although the literature on self-reports of confidence is convincing, a question remains as to whether female medical students are actually perceived as less confident. Specifically, does their style of interacting with patients also suggest a lack of self-confidence? To test this question we asked independent raters to judge the confidence of a large sample of medical students during a clinical encounter with a standardized patient.

2. Methods

2.1. Participants

Third year medical students at Indiana University School of Medicine who agreed to participate were videotaped during their objective structured clinical examination. The students interacted with a standardized patient in one of four medical scenarios: smoking cessation counseling, discussion of patient’s father’s illness and code status, stress headache diagnosis, and cough diagnosis. Each encounter lasted approximately 10–15 min. The encounters were ended after 15 min, even if the student had not finished the visit. The four scenarios were distributed randomly among the students. We decided to focus the analysis on the first taped scenario for each student, thereby holding the level of student experience equivalent and ensuring a balanced representation of the scenarios.

2.2. Coding perceptions of confidence

Two independent coders, both female, recorded perceptions of medical student confidence by answering the question “How confident does this medical student seem?” on a scale from 1 (not at all confident) to 9 (extremely confident). They were not given detailed operational definitions of the construct and were not instructed what specific behaviors to look for when making ratings of confidence, as the goal was to obtain their global impressions.

Perceived confidence ratings were made for minutes one, five, and nine of the interactions (average correlation (r) between the three minutes = 0.760). Ratings on brief excerpts of behavior have been shown to be a valid form of measurement as compared to viewing longer segments of a video [45,46]. These particular three minutes were chosen because in a 10–15 min interaction they represent roughly the beginning, middle, and end of the visit. The mean over the three minutes was used as the overall perception of confidence for the interaction.

The coders demonstrated acceptable inter-rater reliability for overall perceptions of confidence and for minutes one, five, and nine individually (r = 0.80, 0.70, 0.69, and 0.91, respectively).

Although viewing the videotapes meant that they could not be blinded to the gender of the medical student, coders were blinded to the fact that we were interested in analyzing gender. We avoided making gender salient by never asking coders to record medical student or standardized patient gender and by referring to specific encounters by ID number only.

2.3. Coding of nonverbal behaviors

Another set of trained coders watched the same three minutes from each medical student and coded a variety of nonverbal behaviors for each minute. These coders were also female. For each nonverbal behavior, inter-rater reliability was established at r ≥ 0.70. The medical student’s speech rate was measured on a 9-point scale from 1 = “extremely slow pace” to 9 = “very rapid, quick pace”. Fluency of speech was measured from 1 = “not fluent, a lot of hesitation and other nonfluencies in speech” to 9 = “very fluent, no hesitation or other nonfluencies in speech”. Medical student fidgeting was assessed also as a rating over the minute from 1 = “no fidgeting” to 9 = “constant fidgeting”.

Additional behaviors were coded as a simple count over the minute. These included a count of the number of nods, verbal encouragements (e.g. “uh-huh”, “really”, “ah”, etc.), self-touches, and gestures.

Short excerpts have also been shown to be valid for this type of behavioral coding [47]. Like perceptions of confidence
ratings, behavioral ratings for the medical student for the entire interaction were scored as the average of ratings (or behavioral counts) across minutes one, five, and nine.

2.4. Data analysis

Results were analyzed using univariate analyses, repeated measures analysis of variance and partial correlations. All statistical analysis was done in SPSS v. 15.

3. Results

Perceptions of medical student confidence were assessed for 141 OSCE interactions. Of these, 76 (53.9%) were male students (Table 1). All four medical scenarios were represented approximately equally (smoking cessation n = 33, father’s code status n = 38, headache diagnosis n = 38 and cough diagnosis n = 32). Self-reported age and ethnicity were available for a subsample of the medical students (n = 114 (81%) for age and n = 108 (77%) for ethnic information). The students ranged in age from 22 to 39 years old, with a mean age of 25 years (S.D. = 2.16). Seventy-nine percent of the students were between the ages of 23 and 25. Age was not a significant predictor of perceptions of confidence (r = 0.02, ns). Therefore, age was not included in any further analyses. Eighty-four percent of the students whose ethnicity was reported were European or European American. Perception of confidence ratings also did not differ based on ethnicity (F(5,102) = 0.45, ns).

Perceptions of confidence ranged from 2.50 to 8.67 with a mean of 5.58 (S.D. = 1.35). Confidence ratings were approximately normally distributed across this sample.

As predicted, there was a significant gender difference in perceived level of confidence averaged for the whole interaction, with female medical students appearing significantly less confident than male medical students (female mean = 5.33, S.D. = 1.38, male mean = 5.80, S.D. = 1.30, F(1,133) = 4.45, p < 0.05) (Table 2).

Table 1

<table>
<thead>
<tr>
<th>Characteristics of medical student sample</th>
<th>N</th>
<th>141</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age [mean (S.D.)]</td>
<td></td>
<td>24.82 (2.16)</td>
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<tr>
<td>Gender [n (%)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>76</td>
<td>(54)</td>
</tr>
<tr>
<td>Female</td>
<td>65</td>
<td>(46)</td>
</tr>
<tr>
<td>Ethnicity [n (%)]</td>
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<td></td>
</tr>
<tr>
<td>European or European American</td>
<td>91</td>
<td>(65)</td>
</tr>
<tr>
<td>African or African American</td>
<td>3</td>
<td>(2)</td>
</tr>
<tr>
<td>Asian or Asian American</td>
<td>6</td>
<td>(4)</td>
</tr>
<tr>
<td>Arab or Arab American</td>
<td>2</td>
<td>(1)</td>
</tr>
<tr>
<td>Hispanic/Latino or Hispanic/Latino American</td>
<td>2</td>
<td>(1)</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>(3)</td>
</tr>
<tr>
<td>Unreported</td>
<td>33</td>
<td>(23)</td>
</tr>
<tr>
<td>OSCE scenario [n (%)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking cessation</td>
<td>33</td>
<td>(23)</td>
</tr>
<tr>
<td>Father’s code status</td>
<td>38</td>
<td>(27)</td>
</tr>
<tr>
<td>Headache diagnosis</td>
<td>38</td>
<td>(27)</td>
</tr>
<tr>
<td>Cough diagnosis</td>
<td>32</td>
<td>(23)</td>
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Table 2

<table>
<thead>
<tr>
<th>Perception of confidence ratingsa</th>
<th>Total mean (S.D.)</th>
<th>Female mean (S.D.)</th>
<th>Male mean (S.D.)</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall confidenceb</td>
<td>5.58 (1.35)</td>
<td>5.33 (1.38)</td>
<td>5.80 (1.30)</td>
<td>4.45*</td>
</tr>
<tr>
<td>Interaction minute</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minute 1</td>
<td>5.70 (1.42)</td>
<td>5.38 (1.34)</td>
<td>5.96 (1.44)</td>
<td>5.98*</td>
</tr>
<tr>
<td>Minute 5</td>
<td>5.60 (1.48)</td>
<td>5.31 (1.57)</td>
<td>5.84 (1.37)</td>
<td>4.48*</td>
</tr>
<tr>
<td>Minute 9</td>
<td>5.43 (1.40)</td>
<td>5.33 (1.45)</td>
<td>5.51 (1.56)</td>
<td>0.39</td>
</tr>
</tbody>
</table>

*p < 0.05.

a Coded as “How confident does this medical student seem?” (1 = not at all confident, 9 = extremely confident).
b Average of minute 1, 5 and 9 confidence rating.

There was a significant main effect for OSCE scenario (F(3,133) = 7.99, p < 0.001). We tested to see if medical students appeared more confident in the two conditions where they were primarily asking questions to obtain a diagnosis. A planned contrast revealed that students were indeed perceived as significantly more confident in the diagnosis scenarios (cough and headache diagnosis) than in the counseling situations (smoking cessation and father’s illness/code status) (t(137) = 2.69, p < 0.01). Students appeared most confident in the headache diagnosis condition (mean = 6.20, S.D. = 1.20) and least confident in the condition where they discussed the patient’s father’s illness and code status (mean = 4.81, S.D. = 1.31). However, there was no significant interaction between gender and OSCE scenario (F(3,133) = 1.71, ns), indicating that perceptions of confidence for male and female medical students varied in the same way across scenarios.

There was an interaction between gender and interaction minute (F(2,112) = 2.917, p = 0.058), such that female students were consistently rated low in perceived confidence, while males appeared decreasingly confident as the interaction progressed. An analysis of the perception of confidence ratings for minutes one, five, and nine separately showed that female medical students were rated as significantly less confident than male medical students in minutes one (5.38 vs. 5.96, F(1,139) = 5.98, p < 0.05) and five (5.31 vs. 5.84, F(1,137) = 4.48, p < 0.05). There was no significant difference in perceptions of confidence for male and female medical students in the ninth minute of the interaction (5.33 vs. 5.51, F(1,113) = 0.39, ns); however, males were never viewed as less confident than female medical students.

3.1. Behavioral correlates of perceived confidence

Controlling for gender, increased coder perceptions of confidence were associated with less fidgeting, increased speech rate, and more fluent speech (r = −0.16, 0.15, and 0.35, all p < 0.10) (Table 3). Perceptions of confidence were not significantly associated with nodding, using verbal encouragement, self-touching, or gesturing (r = −0.12, −0.13, −0.06, and −0.03, all ns). In a linear regression of these nonverbal behaviors and gender, fluency of speech emerged as the strongest predictor of increased overall perceptions of confidence (β = 0.29, p < 0.01).
There were no significant gender differences in any of these nonverbal behaviors, with one exception; female medical students had a significantly higher number of nods than male medical students (female mean = 5.24, S.D. = 3.69, male mean = 2.95, S.D. = 2.95, F(1,124) = 19.04, p < 0.001). This result is consistent with previous findings showing increased nodding for females in general [48] and for female practicing physicians [49].

4. Discussion and conclusion

4.1. Discussion

A review of the research on medical students’ self-confidence indicates that despite performing equally as well as, or even superior to, their male peers, female medical students consistently report more anxiety about their performance, greater stress over competency issues, and less confidence in their abilities in medical school. The present research indicates that female medical students are also viewed as significantly less confident than male medical students by independent observers. This difference in perceptions of confidence was particularly strong at the beginning of the interaction.

Although we purposefully did not tell raters what to look for when judging confidence, partial correlations, controlling for gender, indicate that greater perceptions of confidence were associated with less fidgeting, a marker of anxiety [50–52]. Medical students also appeared more confident to our coders when they had quicker and more fluent speech. Other behavioral ratings, such as gesturing and nodding, were not associated with perceptions of confidence.

It is unclear why female medical students might be more anxious or less confident than males about their abilities as they progress through medical school. Differing medical school experiences of male and female medical students could partially explain these results. Female medical students report greater exposure to gender discrimination and sexual harassment [53,54], possibly raising their anxiety and lowering their self-efficacy over time.

Richman and Flaherty attempted to disentangle whether the gender differences in reported distress were due to pre-existing personal factors such as socialization before medical school or the medical school environment itself [13]. They surveyed students entering medical school and at the end of the first year. Entering females appeared slightly healthier with regard to mental health than males and showed no greater anxiety. After the first year, however, females were significantly more anxious than their male peers. An analysis of this gender difference revealed that while female anxiety significantly increased, male anxiety significantly decreased over the first year. Interestingly, no support for gender differences in the perception of stress from the medical school environment was found and females actually reported significantly more social support at the end of their first year. They concluded that more research was needed to understand this complex phenomenon.

A limitation of much of the previous research on anxiety, stress and self-confidence is that it is based predominantly on self-reported measures. It may be that self-reports are accurate and that female medical students do indeed experience a greater degree of anxiety and stress than males. Studies in the general population, using implicit measures of anxiety that are less subject to response bias than explicit measures, have shown that females experience more anxiety than males [55]. That study also showed that the correlation between explicit and implicit measures of anxiety was stronger for women than for men, perhaps indicating greater accuracy of self-reports for women. One possibility is that females, in general, are taught that it is more acceptable to verbalize their feelings, portray vulnerability, express humility, or downplay their own competence. They may ultimately have confidence in their ability but value modesty and humility more than male students. Another possibility is that male medical students exaggerate their performance while females are more accurate, or that it is some combination of male over-estimation and female underestimation that accounts for the previously reported gender differences in self-reported confidence and anxiety.

This pattern exists outside of medical schools as well. Females, in general, report lower self-estimated intelligence than males, not only in self-reports of IQ and general intelligence [56,57], but also in musical, mathematical, spatial, and business intelligence [58–60]. In medical schools, where self-assessment accuracy is regarded as an important component of clinical competence, humility may not be advantageous. Many studies have shown self-assessment inaccuracy among physicians, but do not report any analysis by gender [61–64]. Studies that do report gender breakdowns of over- and underestimation suggest a lack of confidence among females [65]. Future research should examine the associations between impressions of confidence and actual self-confidence in a way that explores these potential over- and under-estimation effects.

Because the ratings in our sample are based purely on perceivers’ judgments of medical student confidence, it is also possible that the gender difference obtained is a result of a bias in perceivers’ cultural views of women as less confident than men rather than the result of actual behavioral differences between them. Our finding that there were no significant gender differences in the behaviors associated with decreased confidence (fidgeting, speech rate and fluency of speech) suggest that there may in fact be something else observers are picking up on when making ratings of confidence. The fact that
our coders were blinded to our focus on gender research, suggests that any such bias would also be evident in a patient population. It should be noted that there are many verbal cues and other nonverbal behaviors that were not coded for in these interactions and it is possible that they form the basis for observer judgments of confidence. Also, the raters of perceived confidence in our study were female. Although reliability was established and some studies have shown that rater characteristics do not affect ratings [66], future research with coders of both genders could be used to examine any differences in perceptions of confidence attributable to perceivers’ gender.

The extent to which lower self-reported or observed confidence has negative consequences for medical students is largely unstudied. Research in the general population indicates that less self-confidence in women can lead to self-destructive tendencies [67] and other negative outcomes. Feeling or appearing less confident could potentially impact students’ grades, advancement in medical school, or comparison rankings with peers. Indeed, one study manipulating response style on surgery oral examinations showed that a less confident style produced significantly lower overall ratings. Actors who delivered the same answers using less direct eye contact and a slower response rate were judged less positively and given lower scores by faculty evaluators [68].

Other research has shown that female medical students with less confidence in their own knowledge identify less with the role of doctor than those with more confidence [19]. Self-confidence is also thought to be a factor in female medical professionals’ decreased job negotiations [69]. These findings could have powerful implications for salary and benefits inequalities. In a post-graduate clinical setting, appearing less confident to a patient might impact patient satisfaction ratings or even adherence with treatment recommendations. A patient might have difficulty trusting or following the advice of a doctor who seems to lack confidence in his/her own abilities.

4.2. Conclusions

Regardless of whether self-reported gender differences in confidence represent a true difference in internal states, self-reporting more anxiety over performance may be associated with verbal and nonverbal displays of anxiety. The data from this study suggest that this is the case; female medical students were in fact perceived as significantly less confident than male students.

4.3. Practice implications

Continued study of issues surrounding confidence in medical school, focusing on gender differences, is important. Efforts should be made to publicly recognize and openly discuss the differences in how male and female medical students are perceived. Medical educators and researchers should invest time and resources in programs and interventions designed to improve confidence and reduce anxiety, particularly for female medical students. In light of the finding that there are gender differences in perceptions of confidence, medical educators could focus on training students how to appear more confident in their patient interactions. Again, this may be particularly relevant for female medical students.

Acknowledgements

The authors wish to thank Laura Bornstein, Margeaux Fischer, Lucas Frankel, Morgan Howard, Morgan Jensen, Ashley Smith, and Ashley Teixeira for their assistance in videotape preparation and coding.

Role of funding: This work was supported by a grant to the Relationship Centered Research Network from the Fetzer Institute, Kalamazoo, MI. The funding source had no involvement in data collection, analysis, or the preparation of this manuscript.

Conflict of interest

There are no conflicts of interest.

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