Gender comparisons of medical students’ psychosocial profiles

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Objectives  This study was designed to compare male and female medical students on selected personality attributes that could influence their academic attainment and personal success.

Design  Participants were 1157 medical students (743 men, 414 women) who completed a set of psychosocial questionnaires measuring intensity and chronicity of loneliness, general anxiety, test anxiety, neuroticism, depression, extraversion, self-esteem, locus of control, perceptions of parents, general health and appraisals of stressful life events. Data were analysed by employing multivariate and univariate analysis of variance and chi-square analysis.

Setting  Jefferson Medical College.

Subjects  Medical students.

Results  Men scored significantly higher on the intensity of loneliness, and women scored higher on general anxiety, test anxiety and neuroticism scales, but the magnitudes of the effect size estimates were not large. No significant gender difference was observed on measures of chronicity of loneliness, depression, extraversion, self-esteem, external locus of control, perception of general health and perceptions of the mother and the father. Women who experienced stressful life events, such as death in the family or personal illness, appraised these events more negatively than did their male counterparts.

Conclusions  Implications of the findings for medical education and practice are discussed.

Keywords  ANOVA; anxiety, psychology; chi-square test; clinical competence; depression; *lifestyle; loneliness, psychology; medical students, *psychology; *sex.

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Introduction

The first English-speaking woman doctor is said to have been Dr James Miranda Barry, who served as a medical officer and inspector-general of the British Army hospitals between 1813 and 1865. She dressed, behaved and lived as a man, and was found to have been a woman only after her death.¹ She disguised her gender, concealed her identity and obscured her real self throughout her highly praised medical career to obtain ‘the privileges of manhood, the greatest of which was a doctor of medicine degree’.¹ A woman with such determination, valour and tenacity should have had a constellation of strong personality attributes in the then exclusively male profession.

The route for women to become doctors is no longer as difficult as it was for Dr Barry, and medicine is no longer an exclusively male profession.² Encouraged to join the medical profession, women now constitute a substantial portion of the physician workforce in the United States and many other countries. The proportions of women applying to, entering and graduating from medical schools in the United States have been increasing rapidly in recent years. The Association of American Medical Colleges³ reported that in 1996, 43% of 46 968 applicants to medical schools were women and 43% of the 17 385 students accepted were women. Also, 41% of 15 907 of all 1996 graduates of medical schools in the United States were women.³

Drastic changes can be noticed by comparing the aforementioned figures with those of female applicants (9%), female entrants (9%) and female matriculates (7.5%) three decades ago. It is projected that, by the year 2003, women will constitute 50% of the United States medical school graduates.⁴

The issue of gender in medical education and practice gains a new momentum given the rapid increase of
women in medical schools and in medical professions, coupled with the findings that gender could contribute to academic performance, workload and research productivity,5 that gender is an important factor in the distribution of specialties4–8 and that gender can influence the type of care rendered to patients and to medical practice styles.9–13

Gender comparisons in academic performance prior to, during and after medical school, and on ratings in different areas of clinical competence after medical school, show that the performance gap between men and women in medical school becomes narrower as they advance in their medical training.14 Despite findings on gender similarities in cognitive and academic performance, significant gender differences have been reported on some non-cognitive measures such as physician's professional activities, number of hours worked per week, specialty choices, satisfaction with the profession, perceived problems and research productivity.4–8 Some of these gender differences have been attributed to lifestyle preferences (e.g. family responsibilities), and some to different gender socialization, value system and personality.10,15,16

It has been reported that female students are more likely than their male counterparts to pursue person-orientated specialties such as pediatrics and family medicine.17 In another study, women were found to be more interested than men in pediatrics, obstetrics/gynaecology and psychiatry specialties.5 Female physicians, compared to their male counterparts, were also found to communicate more positively with their patients13,18 and render more preventative care to their patients.9,11,12 The differences could be a reflection of gender differences in personality.

A few studies have reported about the personality of medical students.19–22 Gender comparisons on the personality of medical students have been made in some other studies.22,23 Also, comparisons have been made between male and female medical students on the pattern of personality changes over the years of medical study19–21 and the relationship between women students' family background and personality types24,25 have also been studied.

Despite the common belief that the competence of a physician reflects both cognitive (academic abilities) and non-cognitive qualities (personality and psychosocial attributes), medical education research has placed the emphasis on the former while the latter has not received sufficient attention.26,27 Therefore, gender studies in personality attributes, in particular, have been benignly neglected in medical education research. There are a few studies in which gender differences on some personality measures among medical students have been addressed. For example, in a study by Pharrell & Farmill,28 female medical students reported a higher level of anxiety in taking multiple-choice examinations. In another study, female students and residents were compared to their male counterparts and showed a higher level of anxiety and depression.29–31 In a recent study with a sample of physicians chosen as positive role models in medicine in the United States32 it was found that female physicians scored significantly higher than their male counterparts on the openness factor, but no other gender difference was observed on the other personality factors (extraversion, neuroticism, agreeableness and conscientiousness). Also, comparisons were made between male and female positive role models in medicine on 30 personality facets. Gender differences were observed in only three facets. Female physicians scored significantly higher than male physicians on the fantasy, aesthetics and feeling facets.32

It has been proposed that the personality profile of female medical students has become less stereotypical of women in the general population.17 This proposition was confirmed in a study of positive role models in medicine. In that study it was also found that female physicians scored well above their gender population norms on openness to new ideas and sociability, but such differences were not observed for male physicians.32

Although in some of these studies some significant gender differences have been reported, given the highly selective nature of medical school admission, particularly the recent emphasis in interviewing the qualified applicants for desirable personal and psychological characteristics, it is probable that the personality profile of male and female medical students resemble each other more than before, and more than that in the general population.2,32

The present study was designed to compare a large sample of the current generation of male and female medical students on a wide range of psychosocial measures to examine the similarities as well as differences in their personality and other psychosocial attributes.

Method

Participants

Participants were 1157 medical students who responded to a set of psychosocial questionnaires. This sample includes 85% of all students who entered Jefferson Medical College in 1987, and between 1992 and 1996 (the psychosocial questionnaire was not administered to entering classes of 1988–91). There were 743 (64%) men and 414 (36%) in the study sample.
Instruments

Thirteen psychosocial measures were chosen based on their satisfactory psychometric characteristics among college students and their relevance to either academic performance or interpersonal behaviour, which are important factors in the evaluation of physician competence. The specific rationale for selecting these particular measures has been described in previous studies.33,34 To avoid administering lengthy instruments in order to increase the response rate, the abbreviated versions were used by selecting five items from each of the first seven research instruments described below. In addition to content relevance for college students, every effort was made to select items with better psychometrics based on available data (e.g. a higher item total score correlations) and based on the psychometrics reported in previous studies with medical students.33–35 A four-point Likert-type scale was used in responding to each item of the personality measures.

(1) The revised UCLA Loneliness Scale36 is a global measure of the intensity of loneliness experiences. The psychometrics of the full scale has been found to be satisfactory in college students.37,38 Evidence is also available in support of the construct and concurrent validities of the abbreviated version used in this study with medical students.33 The alpha reliability coefficient was found to be 0.85 for the abbreviated version, and it increased to 0.95 when corrected for attenuation by the Spearman–Brown formula.33 The alpha reliability of this scale for the sample used in the present study was 0.80. Test–retest reliability with 2-week intervals with a group of allied health sciences students was 0.87.39

(2) Taylor Manifest-Anxiety Scale40 is a measure of trait anxiety. The psychometrics of this scale and its abridged version in college students41 and particularly the construct and concurrent validities in medical students33 have been established satisfactorily. The alpha = 0.77, alpha corrected for attenuation = 0.96 in medical students reported by Hojat and colleagues33 and alpha reliability for the present sample was 0.77. Test–retest reliability for allied health students was 0.72.39

(3) Test Anxiety Scale.42 Data in support of the construct and concurrent validities of the abridged version with medical students have been reported.33 Alpha = 0.81, alpha corrected for attenuation = 0.96 in medical students.33 Test–retest reliability for allied health students was not as high, r = 0.42.39

(4) Neuroticism Scale of the Eysenck Personality Questionnaire (EPQ)43 is a measure of emotional instability. Evidence for the construct and concurrent validities of the abridged version with medical students is available.33 Alpha = 0.72, alpha corrected for attenuation = 0.92 in medical students.33 Test–retest reliability was 0.92 for allied health students.39

(5) The Extraversion Scale of the EPQ43 is a measure of sociability. Data in support of the construct and concurrent validities of the full and the abbreviated scales have been reported.33,44 The alpha = 0.81, alpha corrected for attenuation = 0.95 in medical students,33 and the alpha was 0.80 in the present study. Test–retest reliability was 0.77 for allied health students.39

(6) The Rosenberg Self-Esteem Scale,35 which measures the self-acceptance aspect of self-esteem.46 This scale has been used frequently with high school and college students.45 The psychometrics in college students have been satisfactory.47 Measurement characteristics such as the construct and concurrent validities of the abridged version used in this study among medical students have been reported.33 The alpha = 0.85, alpha corrected for attenuation = 0.91 in medical students reported by Hojat and colleagues,33 and for the present sample the alpha was 0.79. Test–retest reliability was 0.72 for allied health students.39

(7) Locus of Control Scale:48 A higher score on this scale indicates more attribution of events to external sources. Evidence in support of concurrent validity is available.33 This scale was not found to be unidimensional among medical33 and allied health students.39 The magnitude of alpha reliability for this abridged scale among medical students is not as high as the other scales used in this study: alpha = 0.51, alpha corrected for attenuation = 0.67.33 Test–retest reliability was 0.90 for the allied health students.39

(8) Beck Depression Inventory, the abridged version (13 items),49 which has been developed for screening depressive experiences50 was used. Measurement characteristics such as construct and concurrent validities and alpha reliability (α = 0.80) among college51,52 and medical students have been established satisfactorily.33 The alpha reliability for the sample used in the present study was 0.80. Test–retest reliability in 2-week intervals was 0.90 for allied health students.39

(9) The Chronicity of Loneliness Scale that measures the duration of experiencing loneliness. Subjects were asked to answer on a five-point Likert-type scale how often they experienced loneliness (1 = never, 5 = always). Data in support of the measurement characteristics of this scale have been reported.33,54

(10) Perception of general health is a single item used as a global measure of perception of general health. The question: ‘How do you rate your health in general?’ was answered on a four-point Likert-type scale (1 = poor,
4 = excellent). Test–retest reliability for the allied health students was 0.96.39

(11) Appraisal of Stressful Life Events: To estimate subjects’ own cognitive evaluations of stressful life events, five stressors (death of a close family member, personal injury or illness, change of health of a family member, financial problems and academic problems) were given. Subjects were asked to indicate to what extent each event affected them if any had occurred (1 = affected a little, 5 = affected a lot, 0 = did not occur). Except for academic problems, other items of this scale were selected from the social readjustment rating scale developed by Holmes and Rahe.55

(12) Perception of early relationship with the mother: A total score based on participant’s responses to the following three items was considered as an indication of perceptions of the mother.
- To the best of your knowledge, as a child when you had personal problems you went to your mother.
- To the best of your memory, as a child your mother understood you.
- To the best of your knowledge, as a child your mother devoted sufficient time to you.

Each item was answered on a four-point Likert-type scale (1 = strongly disagree, 4 = strongly agree).

(13) Perceptions of early relationships with the father. In each of the three aforementioned items, the word father was replaced for mother, and the total score was calculated.

The alpha reliabilities for measure of perception of relationships with the mother was 0.89, and for relationships with the father was 0.85 in a previous study with medical students.55,56 Test–retest reliability coefficients in allied health students were 0.88 and 0.98 for perception of the mother and the father, respectively.39

These items were developed to give an estimate of perceived parental sensitivity.56 In particular, these items were intended to measure perceptions of parents as a secure base for the child in trouble (item 1); parents’ sympathetic attitudes and social–emotional closeness (item 2); and parents’ attention, involvement and devotion (item 3) as viewed by their children.56,58 A higher score indicates a more favourable view of the parent. Some studies suggest that such perception has relevance to academic achievement.27,34,39

Procedures

The instruments were administered to the first-year medical students at an orientation meeting prior to the beginning of their classes as part of the Longitudinal Study of Jefferson Medical College.60 The instruments had also been distributed to a sample of second-year students (who entered Jefferson in 1987) during a class session in place of a quiz.

A cover letter explained the purpose of the study as investigating the extent of the contribution of non-cognitive measures to academic performance. There was no deception in this description, because the original purpose was to investigate the validity of the psychosocial measures in predicting the clinical competence of students and graduates and their professional preferences and activities. The study is ongoing to accomplish that purpose.34,59 Participation was voluntary and the students were given sufficient time to complete the questionnaires and return them to the investigator or research assistants in the same session. The respondents were assured of the strict confidentiality of the individual responses.

Statistical analysis

The data for male and female students were compared on all psychosocial measures. Multivariate analysis of variance (MANOVA) was employed, followed by univariate analysis of variance (ANOVA) and the Duncan post-hoc multiple comparison test. Also, the chi-square test was used to examine the associations of gender and appraisals of the stressful life events. The probability of type I error (alpha) was set at 0.05 for all statistical analyses.

Determination of statistical significance of the differences, due to different scaling and variations, does not give useful information about the degree to which the phenomenon under investigation exists.61 Statistical power analysis and calculation of the standardized effect size introduced by Cohen61 and others provide useful information about the degree to which the differences are important on a scale-free index. Therefore, the effect size estimates for each comparison were also calculated. The practical significance of the differences can be judged based on Cohen’s suggestions.61

Results and discussion

A comparison of the final sample with complete data and the rest of their cohort on gender (37% women), age at entrance to medical school (mean = 23.5 years), and performance measures prior to medical school such as undergraduate grade point averages, and scores on verbal and science subtests of the Medical College Admission Test (MCAT) indicated that the final sample was representative of the total classes.
The means and standard deviations of 12 psychosocial measures for male and female students are reported in Table 1. Also, the effect size estimates for each variable are presented in the table. The results of multivariate analysis of variance indicated statistically significant gender differences (lambda = 0.91, multivariate $F_{(13,1198)} = 7.98, P < 0.01$). Univariate analyses and the Duncan test indicated that while male and female medical students were similar on eight of the 12 psychosocial measures, they differed on four scales. Men scored higher than women on the intensity of loneliness scale, but women scored higher on general anxiety, test anxiety and neuroticism scales. These findings are consistent with those reported previously.20,29,32 Although these gender differences were equally likely to report experiencing each of the events, they differed significantly in their negative appraisal of some of the events such as personal injury or illness, and death of a family member. Women who had experienced these events appraised them more negatively than their male counterparts (see Table 2). This could also indicate that female physicians might be more sensitive to their patients’ feelings about stressful life events, and that they might be better able to empathize with patients who have reacted strongly to such life events.

As shown in Table 2, 82% of women compared to 67% of men reported a very negative influence of their experience of a death in their family ($\chi^2_{(1)} = 4.94, P < 0.05$, effect size = 0.17). Also, a greater proportion of women (57%) than men (41%) reported that their experience of personal injury or illness in the past 12 months had influenced them a great deal (ratings of 3 or greater on a five-point scale; $\chi^2_{(1)} = 7.30, P < 0.01$, effect size = 0.16). No gender difference was found on the negative appraisal of other events such as academic problems, financial problems and change of health in a relative. These findings suggest that women

For example, 175 students (38% women) reported that a family member died in the past 12 months; 297 (39% women) experienced personal illness or injury; 420 (39% women) reported a change of health in a relative; 491 (39% women) had financial problems and 234 (40% women) experienced academic problems.

In gender comparisons on negative appraisal of stressful life events, data for students who experienced each event were examined. We noticed that the number of men and women who experienced each of the five stressful life events was proportional to their totals in the population. Therefore, men and women were equally likely to report experiencing each of the events. For example, 175 students (38% women) reported that a family member died in the past 12 months; 297 (39% women) experienced personal illness or injury; 420 (39% women) reported a change of health in a relative; 491 (39% women) had financial problems and 234 (40% women) experienced academic problems.

Despite the fact that men and women experienced the above-mentioned stressful life events similar to their proportions in the total sample, they differed significantly in their negative appraisal of some of the events such as personal injury or illness, and death of a family member. Women who had experienced these events appraised them more negatively than their male counterparts (see Table 2). This could also indicate that female physicians might be more sensitive to their patients’ feelings about stressful life events, and that they might be better able to empathize with patients who have reacted strongly to such life events.

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Table 1 Means and standard deviations of psychosocial variables for men and women and the effect size estimates

<table>
<thead>
<tr>
<th>Psychosocial variables</th>
<th>Men (n = 743)</th>
<th>Women (n = 414)</th>
<th>Effect size estimate(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensity of loneliness</td>
<td>10.9 (2.8)</td>
<td>10.2 (2.8)</td>
<td>0.25*</td>
</tr>
<tr>
<td>Chronicity of loneliness</td>
<td>2.0 (0.59)</td>
<td>2.1 (0.52)</td>
<td>0.17</td>
</tr>
<tr>
<td>General anxiety</td>
<td>12.8 (3.3)</td>
<td>13.8 (3.1)</td>
<td>-0.31*</td>
</tr>
<tr>
<td>Test anxiety</td>
<td>12.7 (3.3)</td>
<td>13.7 (3.5)</td>
<td>-0.29*</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>10.9 (2.6)</td>
<td>11.6 (2.6)</td>
<td>-0.27*</td>
</tr>
<tr>
<td>Depression</td>
<td>1.7 (2.6)</td>
<td>1.8 (2.3)</td>
<td>-0.04</td>
</tr>
<tr>
<td>Extraversion</td>
<td>14.3 (2.4)</td>
<td>14.3 (2.4)</td>
<td>-0.08</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>16.6 (2.9)</td>
<td>16.3 (2.4)</td>
<td>0.12</td>
</tr>
<tr>
<td>External locus of control</td>
<td>10.5 (2.0)</td>
<td>10.6 (1.9)</td>
<td>-0.05</td>
</tr>
<tr>
<td>Perception of general health</td>
<td>3.6 (0.59)</td>
<td>3.5 (0.59)</td>
<td>0.16</td>
</tr>
<tr>
<td>Perception of mother</td>
<td>10.1 (1.7)</td>
<td>10.1 (1.9)</td>
<td>0</td>
</tr>
<tr>
<td>Perception of father</td>
<td>8.7 (2.2)</td>
<td>8.6 (2.3)</td>
<td>0.05</td>
</tr>
</tbody>
</table>

\(^*\)Gender difference was statistically significant (P < 0.05), multivariate statistic (Wilks’ Lambda) = 0.91, related multivariate $F_{(13,1198)} = 7.98, P = < 0.01$. \(^1\)Effect size is the difference between the means of men and women divided by the pooled within-gender standard deviation. 0.61 A positive effect size indicates a higher mean for men and a negative effect size indicates a higher mean for women.
were at a higher risk of being negatively influenced by stressful life events.

Studies on stress in residency training support these findings. Archer and colleagues\(^6\) found that women reported higher levels of stress than men. These results are supported by Smith et al.,\(^6\) whose study on stress in residency suggests that relationships, emotional aspects of care-taking functions and perception of the overwhelming task of juggling personal and professional issues are significant stressors for women. These findings suggest that probably female students are less resilient in their experiences of some of the stressful events than their male counterparts. There are certainly possibilities for mediating some of the perceptions of stress for female medical students and residents.

**Concluding remarks**

The findings of this study showed some similarities as well as differences between male and female medical students on selected psychosocial measures. In a few of the statistically significant gender differences, the magnitude of the effect size estimates indicated that those differences were not large. As described before, the gender personality similarities among medical students could be due to the highly selective nature of a homogeneous population of students who apply to medical school, and furthermore to the process of admission interviews designed to choose those with unique personal characteristics desirable for competitive environment of medical school and for stressful milieu of medical practice.

Gender research on non-cognitive factors in academic performance and in the practice of medicine is important to be continued for the following reasons. First, it has been proposed in a paradigm of physician performance, that in addition to the acquired knowledge of factual information, environmental elements and psychosocial attributes are among the factors that contribute to professional success.\(^2\) This proposition has been supported in empirical studies.\(^2,3,5\) Furthermore, a recently publicized notion that it is not solely cognitive abilities, but also personality and personal attributes that can enhance professional success,\(^6,5\) provide conceptual support for the aforementioned paradigm of physician performance.\(^2\) With regard to the increasing number of women in medical schools and the physician workforce and their influences on medical practice,\(^4,7,8\) it seems important and timely to further examine gender influences on the outcome of medical education and medical practice.

Secondly, gender differences observed among medical students and physicians on academic and professional performances\(^27\) in speciality interests\(^4-8,6\) and in the practice of medicine\(^9,11-13,18\) deserve further empirical attention by examining gender-related factors, including personality attributes, that may contribute to those differences.

Thirdly, gender differences observed in personality attributes such as more loneliness experiences by men and more anxiety reported by women, or women’s greater sensitivity and negative appraisal of specific stressful life events can have important counselling implications for medical students and physicians.

Fourthly, in our previous studies we have shown the usefulness of adding psychosocial measures to the prediction model of performance in medical school.\(^3,5,6\) In our previous studies, we noticed that by including a set of personality measures (used in this study) to the traditional prediction models of academic performance, a significant increase was observed in the shared variance, beyond and above traditional cognitive predictors of academic performance.\(^3,5\) Those findings indicate that the accuracy of predictions of performance in medical school and beyond can increase by including personality measures to the predictions.

<table>
<thead>
<tr>
<th>Stressful events</th>
<th>Percentage reported serious negative impact*</th>
<th>(\chi^2 (1))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death of a family member</td>
<td>67%</td>
<td>82%</td>
</tr>
<tr>
<td>Personal injury or illness</td>
<td>41%</td>
<td>57%</td>
</tr>
<tr>
<td>Changes of health in a relative</td>
<td>66%</td>
<td>65%</td>
</tr>
<tr>
<td>Financial problems</td>
<td>60%</td>
<td>66%</td>
</tr>
<tr>
<td>Academic problems</td>
<td>54%</td>
<td>45%</td>
</tr>
</tbody>
</table>

*Indicates significant difference between men and women. *\(P < 0.05\). **\(P < 0.01\).
We believe that in this era of rapid changes in the demographic composition of medical students and the medical workforce, a broad research agenda on the possible link between gender, relevant psychosocial attributes and outcome measures (e.g. performance, specialty preference, work setting, type of practice, etc.) will produce a vibrant field of inquiry that may ultimately lead to discoveries with important implications in medical students’ counselling, and in medical education and medical practice.

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