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Gender-Based Differences in Medical Studies in Palestine: A Cross-Sectional Study of Clinical Students

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Abstract

Introduction: Gender discrepancies are often overlooked in medicine. These discrepancies influence academic, clinical and mental health domains; however, evidence remains inconsistent across different cultural settings. In Palestine, a conservative society, social norms may uniquely shape the clinical training experiences and opportunities among medical students. Our study aims to evaluate these differences among Palestinian clinical-year medical students and interns.

Methodology: A multicenter cross-sectional observational study was conducted among 400 clinical-year medical students and interns from the five major Palestinian universities in the West Bank. Participants completed a structured questionnaire assessing their demographics, academic performance, clinical exposure, specialty preferences, and mental health using the Depression Anxiety Stress Scale-21 (DASS-21). Statistical analyses were carried out with “R statistical software” using bivariate analysis, and multivariate regression modeling.

Results: The mean age of participants was 22.7 ± 1.5 years, with females making up 58.3% of the sample. The prevalence of depression, anxiety, and significant stress was 29.8%, 35.5%, and 10.8%, respectively, with no significant gender differences. Male students demonstrated significantly higher GPAs than female students (82.0 ± 4.47 vs. 80.57 ± 4.96, $p = 0.002$) and reported superior written examination performance ($p < 0.001$). Although male students reported higher OSCE confidence ($p = 0.010$), significantly better OSCE performance ($p = 0.009$), and more clinical exposure ($p < 0.001$). Female students were more likely to perceive clinical training opportunities as gender-fair ($p = 0.038$). Males were significantly more likely to pursue surgical specialties ($p = 0.002$), whereas females mainly favored pediatrics ($p = 0.037$), and obstetrics and gynecology ($p < 0.001$).

Conclusion: Income, prestige, and intellectual challenge were more frequently prioritized by male students when selecting specialties. Gender-based differences do exist in Palestinian medical education across several domains. These findings suggest that social, cultural, and curricular factors may differentially shape educational experiences by gender and emphasize the necessity of targeted interventions to promote fair clinical training and mentorship opportunities within Palestinian medical education.

Introduction

The clinical training phase in medical school marks a pivotal transition from preclinical theory to practical hospital training. This phase plays a key role in the development of students’ professional identity and their future career paths. Studies suggest gender-based differences commonly arise. Multiple studies demonstrate gender discrepancies among undergraduate medical students, with female students performing better than male students in cumulative Grade Point Average (GPA), written, and Objective Structured Clinical Examination (OSCE), in contrast to other studies that found no significant difference [1–5]. Beyond academic performance, the extent and quality of clinical exposure may also differ between genders, possibly impacting students’ professional identity [6–8]. Evidence further

suggests that gender is a major player in mental health for healthcare professionals, with females experiencing higher levels of stress [9, 10]. Gender-related differences extend to career choices as well, with females more frequently favoring pediatrics or obstetrics and gynecology, and males favoring surgical specialties [11, 12].

Despite the international literature, data on gender-related differences in medical education within the Palestinian context are still limited. A cross-sectional study from An-Najah National University examined gender-based disparities in health-promoting habits among Palestinian medical students using the HPLP II scale and found that female students performed better in domains related to health responsibility and interpersonal relationships, whereas male students performed better in physical activity [13]. Notably, this study had a limited scope that excluded academic outcomes and was limited in gender and geographical representation, highlighting the need for a multicenter study among Palestinian clinical-year medical students and medical interns that explores academic, psychological, and practical domains.

Understanding these differences may help in improving the quality and equity of clinical training for future physicians. This multicenter cross-sectional study investigates gender-based differences in academic performance, clinical exposure, mental health, and specialty choice among clinical-year medical students and medical interns across Palestinian universities.

Methodology

Study design & Sample Size

This multicenter cross-sectional observational study aimed at examining gender-based differences among clinical-year medical students and internship doctors at Palestinian medical schools. Participants were recruited from five Palestinian universities across different geographic regions of the West Bank. Data were collected through a self-administered online questionnaire covering five domains: sociodemographic variables, academic information, mental health and psychological stress, clinical exposure, and career preferences.

The sample size was calculated using an online calculator based on a 95% confidence level and a 5% margin of error, yielding an estimate of 380 participants, based on the number of internship doctors and clinical-year medical students in Palestine, and an additional 5% inflation to account for potential missing data.

Setting

The study was conducted through five Palestinian medical schools: Al-Quds University (Jerusalem), An-Najah National University (Nablus), Hebron University (Hebron), Palestine Polytechnic University (Hebron), and the Arab American University (Jenin). These institutions were selected to ensure reflection

of geographic diversity across the northern, central, and southern regions of the West Bank, thereby detecting the social and cultural variation present within the Palestinian student population. Invitations were distributed through university mailing lists and institutional social media platforms. The standardized questionnaire was distributed electronically via Google Forms, accompanied by a brief description of the study's aims and a full informed consent statement presented in both English and Arabic. Data collection took place during the 2025–2026 academic year. Extensive distribution through social media and institutional networks contributed to mitigating the underrepresentation of specific demographics and minimizing selection bias. Ethical approval was obtained by the Al-Quds University Research Ethics Committee. The study population consisted of two groups: (1) clinical-year medical students who were enrolled in their fourth, fifth, or sixth year at one of the five Palestinian universities; and (2) internship doctors who had finished their undergraduate medical degrees and were completing their postgraduate internship year within Palestinian hospitals or clinical training centers at the time that data was being collected. Both groups were included because they are actively engaged in clinical training, have been evaluated through OSCEs interact regularly with clinical supervisors, and are required to make specialty selection decisions. Preclinical students (years 1–3) were excluded due to the limited patient exposure and no formal clinical assessments. Medical graduates who had finished their internships were also excluded.

Variables

Gender was the key exposure variable, collected as a categorical variable (female, male, prefer not to say, and other). Academic performance was assessed via self-reported measures to facilitate reliable comparisons between different institutions. These measures included performance on theoretical exams, OSCE performance (five-point ordinal scale), cumulative grade averages (in percentages), history of repeating academic years (yes/no), and confidence during the most recent OSCE (five-point Likert scale). Mental health was assessed using the DASS-21, which generates subscale scores for depression, anxiety, and stress. The scores were treated as continuous variables for statistical analysis and were classified into severity levels (normal, mild, moderate, severe, and extremely severe). Clinical exposure variables, included daily clinical hours (four categories), self-rated confidence in patient examinations, comfort evaluating participants of the opposite sex, the quality and fairness of training, and the frequency of perceived gender-related negative impact (ordinal scales). Career preferences were captured by asking participants to select a preferred specialty among thirteen options (including "other"), and to identify factors influencing specialty choice from among thirteen factors (multiple selections were permitted). These variables were standardized on collection, and targeted a recent exposure to decrease recall and information bias.

Quantitative Variables

Age, GPA, and mental health scores were analyzed as quantitative variables. GPA was examined as a continuous variable, expressed on a 0–100 scale, to ensure uniformity across different institutions.

Mental health composite scores were derived from the Depression Anxiety Stress Scales-21, treated as continuous variables, and classified into severity categories for descriptive analysis. The Shapiro–Wilk test was utilized to evaluate the normality of continuous variables, supporting the use of non-parametric tests.

Results

Demographics

Our final sample included 400 medical students and interns. The mean age was 22.7 ± 1.5. 41.8% were male (n = 167), while 58.3% were female (n = 233). 42.5% of our participants were 4th year medical students (n = 170), while 16.8% were intern doctors (n = 67). 77% of the sample were enrolled in medical schools in the central West Bank (n = 308), while only 48.8% were permanent residents of this region (n = 195). 73.3% of students resided with their families and commuted daily to their placements (n = 293).

Mental Health & Gender

The mean stress score was 8.3 ± 4.9, the mean anxiety score was 6.9 ± 5, and the mean depression score was 7.1 ± 5.2. Overall, 10.8% had significant stress (n = 43), with 8.3% experiencing mild stress (n = 33), and 2.5% experiencing moderate stress (n = 10). 29.8% of student reports were consistent with depression (n = 119), with 15.8% reporting mild depressive symptoms (n = 63), 12.5% reporting moderate symptoms (n = 50), and 1.5% reporting severe symptoms (n = 6). 35.5% had responded consistently with anxiety (n = 142), 9.3% had mild patterns (n = 37), 24.8% had moderate patterns (n = 99), 4.8% had severe patterns (n = 19), and 1.8% reported patterns consistent with extremely severe anxiety (n = 7). None of these patterns differed significantly based on gender.

Academic & Clinical Differences

The mean GPA was 81.2 ± 4.8. There was a significant relationship between gender and GPA (W = 15994, p = 0.002), as males (mean = 82 ± 4.47) had higher GPAs than females (mean = 80.57 ± 4.96). 17.5% of participants reported having repeated a year in medical school. Specific written exam and OSCE based self-reported performance and confidence metrics are reported in Table 1. While 79.8% of respondents reported confidence in conducting physical examination (n = 319), only 67.8% reported comfort examining patients of the opposite gender (n = 271), and only 63% reported that there were fair clinical training opportunities regardless of gender (n = 252). Females were more likely to report gender-based fairness in clinical training ($X^2(4) = 10.17$, $p = 0.038$, $Z = 2.91$, $p < 0.001$). 37.5% of students reported having been discriminated against on the basis of gender sometimes (n = 150), while 10.5% reported it had happened often (n = 42). A chi-squared test indicated a statistically significant association between gender and reported experiences of gender-based discrimination ($X^2(3) = 8.65$, $p = 0.034$). However, post-hoc pairwise comparisons revealed no significant difference specifically between male and female

respondents (Z =-0.36, p = 0.717). Specialty preferences and factors influencing specialty preference are summarized in supplementary table 1. Overall, females were more likely to spend more time at their placements ($X^2(3) = 18.79$, $p < 0.001$, $Z = 3.85$, $p < 0.001$). We highlight the gender paradox of the gender difference between OSCE and written exam performance in Fig. 1.

Table 1
Written exam and OSCE based self-reported performance and confidence

Clinical/Academic Outcome	n,%	Chi-squared Test
Self-reported Exam Performance	Poor: 3, 0.5% Below Average: 27, 6.8% Average: 203, 50.8% Above Average: 120, 30% Excellent: 47, 11.8%	($X^2(4) = 33.32$, $p < 0.001$, $Z = 4.83$, $p < 0.001$); Better performance in males
Self-reported OSCE Performance	Poor: 4, 1% Below Average: 23, 5.8% Average: 182, 45.5% Above Average: 133, 33% Excellent: 58, 14.5%	($X^2(4) = 13.53$, $p < 0.001$, $Z = 2.34$, $p = 0.019$); Better performance in females
OSCE Confidence	Poor: 18, 4.5% Below Average: 46, 11.5% Average: 132, 33% Above Average: 153, 38% Excellent: 53, 13%	($X^2(4) = 13.23$, $p < 0.001$, $Z = 3.48$, $p < 0.001$); Males had more confidence
Satisfaction with Academic Performance	Poor: 44, 11% Below Average: 75, 18.8% Average: 153, 38% Above Average: 99, 24.8% Excellent: 29, 7.3%	($X^2(4) = 10.84$, $p = 0.028$, $Z = 1.83$, $p < 0.067$); No significant difference

Predictors of Academic Performance

We developed 3 regression models for the prediction of GPA, written exam performance and OSCE performance. Our linear regression model significantly predicted GPA ($F(6393) = 28.54, p < 0.001$), accounting for 29.3% of the variance (Adjusted $R^2 = 0.2929$). Higher GPA was significantly associated with better exam performance ($= 2.01, p < 0.001$), higher self-reported satisfaction with academic performance ($= 2.01, p < 0.001$), more study hours ($= 0.41, p = 0.005$), and higher comfort while examining patients of the other gender ($= 0.53, p = 0.011$). Confidence in conducting physical examination was negatively correlated with with GPA ($=-0.61, p = 0.014$). While male gender showed positive trends, it was not statistically significant ($p = 0.093$). Our findings are summarized in Fig. 2.

Discussion

Opening

In this study, we observed that gender-based differences among Palestinian medical students show a mixed pattern. The results showed differences between female and male students in academic performance, clinical exposure, and specialty choice, while mental health outcomes were similarly affected. These findings suggest that factors beyond gender may play a role in shaping students' experiences and future choices in the Palestinian context.

Context & Academic Performance

This multicenter, cross-sectional observational study presents a thorough evaluation of gender-based differences in the West Bank. The prevalence of depression and anxiety was 29.8% and 35.5%, respectively, which is consistent with global estimates among medical students, highlighting the enduring psychological distress in this population. Importantly, in stress, anxiety, and depression scores, the gender differences were negligible. The findings echo a recent literature that reflects the effects of sharing the environmental stressors, including expanded contextual and institutional barriers, academic demand burden, and clinical responsibilities regardless of gender.

The study's dependence on standardized academic, self-reported, and clinical performance records allowed for informative comparisons across universities with diverse evaluation systems. The discordance within this framework was identified, as better self-reported written examination performance as well as higher GPAs were found among males. On the other hand, females reported stronger performance in OSCEs and greater engagement in clinical training. All of this evidence argues that different ways of testing may focus on different skill areas, while showing the complexity of medical competency, where OSCEs mainly test interpersonal skills and the ability to apply clinical knowledge, and written exams test theoretical knowledge. Increased study time as well as greater satisfaction with academic performance, along with comfort in the examination of opposite-gender relationships, were associated with higher GPAs.

A major part of the literature has shown that women frequently have an advantage in various academic fields. Several studies show that female students typically have higher cumulative grade averages, they do better on written knowledge tests, and they perform better on clinical exams like the OSCE [1–4]. In a large Japanese cohort study, female medical students performed significantly better than their male counterparts in clinical clerkship performance evaluation and graduation examination. The authors attributed this advantage to higher motivation and better career planning awareness among female students [3]. This information aligns with how females did better in OSCEs as seen in this study.

In contrast, a parallel collection of publications raises uncertainty about the universal validity of female academic advantage. Several multi-institutional studies have demonstrated no significant association between gender and either written test scores or OSCE outcomes when institutional and motivational variables were controlled appropriately [5]. A U.S.-based clerkship study found gender was not significantly associated with any academic variables [14, 15], alongside a Libyan study showing that male and female final-year students achieved largely similar results across written and clinical examination formats [5]. These findings support the idea that not the gender itself but institutional structure and assessment standards are the primary determinants of academic performance. The present study's findings of no significant difference in overall academic satisfaction between male and female students add credibility to this perspective.

Differences in learning styles and study habits could be a reasonable explanation for the observed performance pattern. Male students are more likely to use quick or easy methods that focus on high-yield topics. Conversely, female students are more likely to adopt comprehensive and structured learning techniques, such as systematic self-assessment, spaced repetition, and analytical evaluation [2, 16, 17]. In the setting of the OSCE, stations evaluate not just a student's skill level, but also how well and consistently they use that skill, and standardized checklists are used to assess how carefully and consistently procedures are followed, which aligns with deeper learning methods. In written tests, this problem could be lessened by giving credit for rapid recall. These are two areas where methods that focus on efficiency might work better.

The results of this study regarding GPA differ from previous research. The unique sociocultural environment of Palestinian education, where cumulative GPA is influenced by lecture instructions and challenging written final exams, tends to favor the study methods used more often by male students. The fact that the male GPA advantage did not seem to be translated into better OSCE performance is particularly noteworthy, indicating that the academic capital underlying higher theoretical scores does not always translate to clinical competence domains.

Mental health

We found a high prevalence of psychological distress among participants without significant differences between female and male students. Meanwhile, existing literature often reports higher stress levels among female students [18, 19]. This is possibly due to an overall level of stress within medical students

is already elevated. Common stressors like heavy workloads, high academic expectations, and several clinical demands may contribute to a shared stress experience.

Clinical exposure

All physical examinations, including intimate examinations, are expected to be performed proficiently by a graduating medical student. However, each culture has its own set of rules, and people in different countries may view intimacy differently. In the Middle East, any touch between a male and female may be interpreted as “intimate” per se, and the majority of patients often request same-sex doctors to attend to them, consistent with our findings. [7]

Females reported that they spend more time in clinical placements compared to their male colleagues, although males have a higher GPA. Such a discrepancy could go both ways; it could indicate that having better clinical exposure does not necessarily translate into better grades or that female students, while perhaps performing equally to male peers in written exams, are more clinically oriented, maintain better doctor-patient relationships, and utilize clinical time more effectively. The reason behind this discrepancy may also align with specific disciplines singling out specific gender groups, as is the case in obstetrics and gynecology.

Most participants expressed equal clinical training opportunities for all genders, and fewer than one-third of students said they had occasionally encountered gender-based discrimination. Notably, female students were more likely to regard clinical training as gender-fair. On the other hand, male students were more likely to express disadvantages in specialties that involved exposure to female genitalia and breasts. Modesty and patient preference, heavily influence clinical exposure, as multiple students reported similar encounters in which female patients declined a physical exam from them.

Specialty Choice

Specialty choice is both crucial and difficult, as it greatly affects students’ future career, and lifestyle. Studies show that female students are more likely to opt for obstetrics and gynecology or pediatrics than male students, who are more drawn to surgically oriented specialties. Our study was consistent with other studies in this department. Females tended to favor specialties with more research opportunities, intellectual challenges, and a better work-life balance, while also expressing more uncertainty, whereas males were more influenced by prestige and core clinical experiences. Men dominate in traditionally competitive or procedurally demanding specialties, while women dominate in specialties perceived as being more patient-centered or lifestyle-friendly. Several reasons could explain the discrepancy. When choosing specializations, male students were more likely to prioritize income, prestige, and intellectual challenge. This may suggest that ambition and external reward may be more important. This may partially explain the higher male inclination for surgical fields in our study.[11, 12, 20, 21]

Limitations and Recommendations

We acknowledge that the cross-sectional design of the study limits causal deduction, and also limits insight on the development of clinical and academic gender-based differences and outcomes. The

dependance on self-reported measures also introduces bias. Future research should embed objective performance measures and adopt longitudinal designs to further clarify causal relationships and long-term outcomes associated with the observed patterns.

Educational strategies should ensure equitable assessment methods that gather both cognitive and clinical capabilities. Medical schools should start implementing accessible and culturally appropriate mental health services to support, and underpin the high impact of psychological distress. Moreover, interventions directed toward enhancing cross-gender interaction and minimizing sociocultural barriers in clinical settings may enhance both educational outcomes and patient care.

Conclusion

In summary, it is quite evident that there are gender differences in medical education in Palestine. Males were noted to have relatively high GPAs and performed better than females in written theoretical tests as well. Conversely, females scored higher grades in the OSCE test, despite less confidence, and students reported disparities in clinical performance. It is crucial to note that psychological distress is common to all students regardless of gender. This aspect emphasizes the necessity of proper medical students' mental health support systems. In addition, the results reveal that culture plays a major role in defining clinical exposure and experiences. Both males and females felt uneasy when examining the opposite gender, revealing the role of societal and cultural norms and problems rooted in conservative society.

Abbreviations

DASS-21
Depression Anxiety Stress Scale-21
OSCE
Objective Structured Clinical Examinations
GPA
Grade Point Average

Declarations

Availability of data and materials

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Consent For Publication:

Not Applicable.

Consent to Participate:
All participants in the study consented to the study prior to participation, and were able to leave the

study at any point.

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Declaration of competing interest:

The authors have no competing interests to declare.

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Generative AI use:

Generative AI and AI-assisted technologies were NOT used in the preparation of this work.

Author Contributions

IA - Data Curation, Investigation, Methodology, Validation, Writing - Original Draft. AR - Data Curation, Investigation, Methodology, Validation, Writing - Original Draft. MS - Data Curation, Investigation, Methodology, Validation, Writing - Original Draft. SA - Data Curation, Investigation, Methodology, Validation, Writing - Original Draft. JF - Data Curation, Investigation, Methodology, Validation, Writing - Original Draft. FA - Data Curation, Investigation, Methodology, Validation, Writing - Original Draft. PB - Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Supervision, Validation, Writing - Original Draft.

Ethical Approval

This study received ethical approval from the Al-Quds University Ethics Committee under the identifier: 654/REC/2025. This study was conducted in accordance with the guidelines set by the declaration of Helsinki.

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Figures

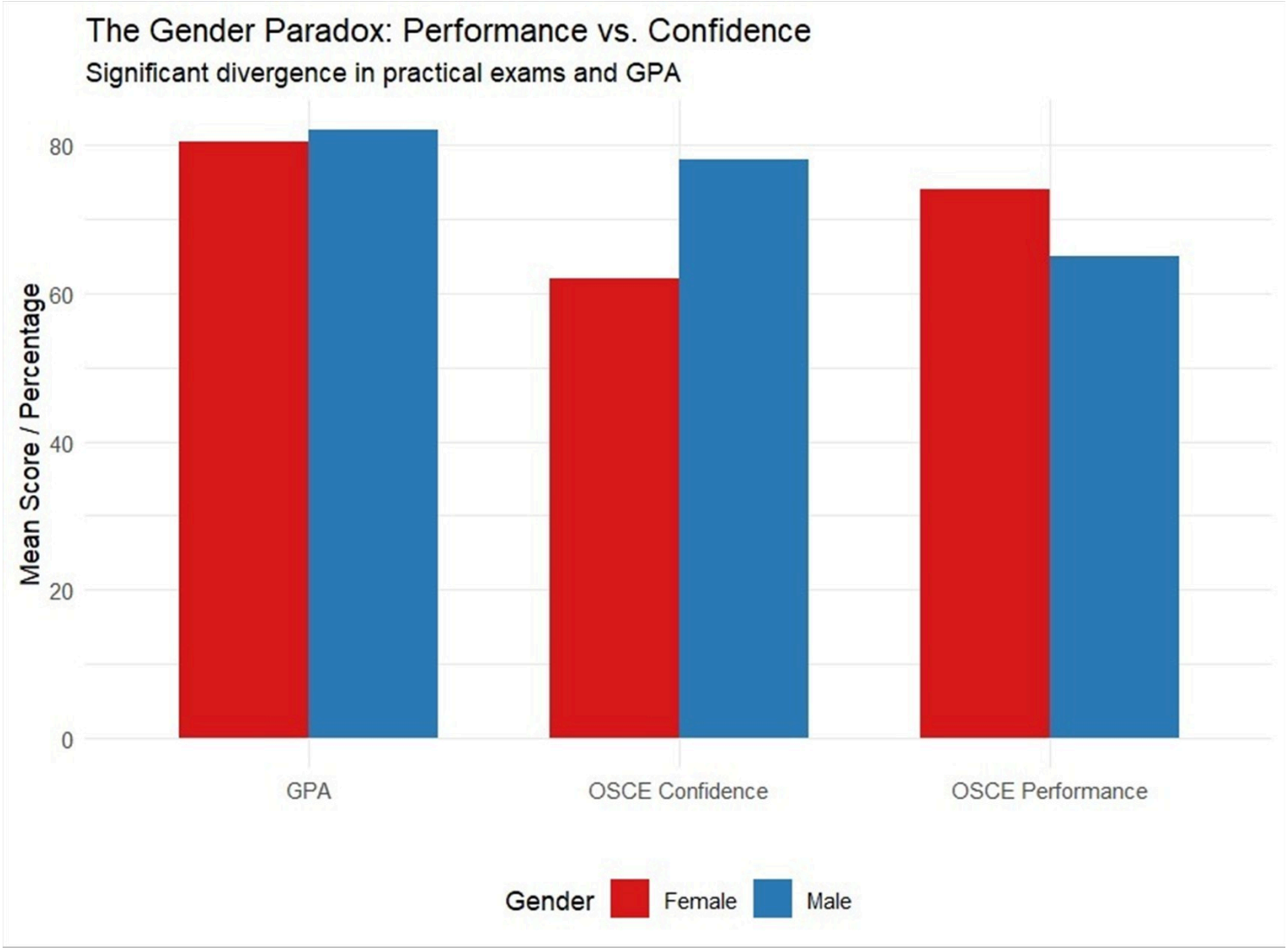


Figure 1

Performance vs. Confidence

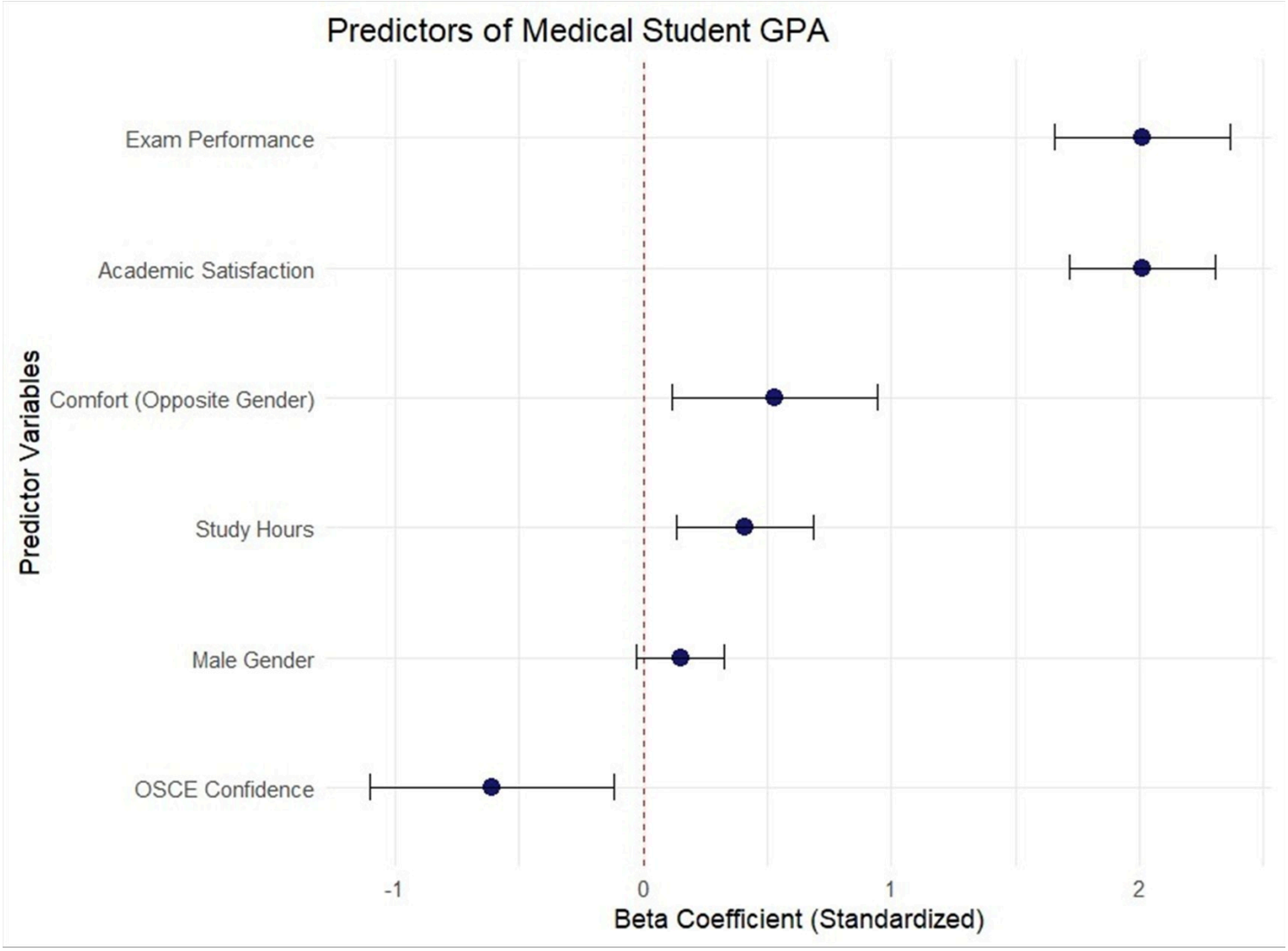


Figure 2

Forest Plot of Predictors of Medical Student GPA

Supplementary Files

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- SupplementaryTable1.docx