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GENDER DIFFERENCES IN PSYCHOSOMATIC HEALTH AMONG MEDICAL STUDENTS

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ABSTRACT

Background: medical education is highly stressful, often leading to psychosomatic disorders. While previous research highlights the prevalence of stress-related physical symptoms in medical students, gender-specific differences remain underexplored. This study investigates how male and female medical students experience and manifest psychosomatic symptoms differently.
Methods: a cross-sectional survey was conducted among 300 medical students (150 male, 150 female) from years 1–6 at a medical university. Participants completed validated questionnaires assessing stress levels (Perceived Stress Scale, PSS-10), psychosomatic symptoms (Patient Health Questionnaire-15, PHQ-15), and coping mechanisms. Additional physiological markers (salivary cortisol, heart rate variability) were analyzed in a subsample.
Results: Female students reported significantly higher rates of psychosomatic symptoms ($p<0.01$), particularly headaches, fatigue, and gastrointestinal disturbances, compared to males. Stress levels were elevated in both groups, but females exhibited stronger correlations between perceived stress and somatic complaints ($r = 0.62$ vs. $r = 0.41$ in males). Cortisol levels were higher in females during exam periods, while males showed greater cardiovascular reactivity. Maladaptive coping strategies (e.g., emotional suppression) were more common in males, whereas females tended toward help-seeking behaviors.
Conclusion: gender plays a significant role in psychosomatic health among medical students, with females experiencing higher symptom burden and stress-related physiological responses. These findings suggest the need for gender-tailored interventions, such as stress management programs and mental health support, to mitigate psychosomatic risks in medical education.

Introduction

Medical education is widely recognized as one of the most demanding academic environments, characterized by high workloads, competitive pressures, and emotional challenges. These stressors often manifest not only as psychological distress but also as psychosomatic disorders—physical symptoms exacerbated or caused by mental and emotional factors. Research has consistently shown that medical students experience elevated rates of anxiety,

depression, and burnout, which frequently translate into somatic complaints such as headaches, gastrointestinal disturbances, insomnia, and cardiovascular irregularities (Dyrbye et al., 2014; Rotenstein et al., 2016). However, an underexplored aspect of this issue is whether gender differences influence the prevalence, severity, and expression of psychosomatic symptoms in medical trainees.

Previous studies have established that medical student are at a higher risk of psychosomatic illnesses compared to their peers in other disciplines. For example, a meta-analysis by Puthran et al. (2016) found that nearly 30% of medical students worldwide suffer from depression, with many reporting accompanying physical symptoms. Similarly, Erschens et al. (2018) demonstrated that chronic stress in medical education leads to dysregulated hypothalamic-pituitary-adrenal (HPA) axis function, contributing to fatigue, immune suppression, and digestive disorders. Despite these findings, most studies have treated medical students as a homogenous group, neglecting potential variations based on gender.

Emerging evidence suggests that male and female medical students may experience and cope with stress differently. Studies in general populations indicate that women are more likely to report psychosomatic symptoms and seek medical help, whereas men may underreport due to social conditioning or reliance on maladaptive coping mechanisms (Matud, 2004; Piccinelli & Wilkinson, 2000). In medical education, Fares et al. (2016) found that female students exhibited higher levels of perceived stress and emotional exhaustion, while male students were more prone to behavioral disengagement—a coping strategy linked to worsened long-term health outcomes.

Physiologically, gender differences in stress responses are well-documented. Women tend to exhibit greater cortisol reactivity under acute stress (Kajantie & Phillips, 2006), which may explain their higher susceptibility to stress-related disorders such as migraines and irritable bowel syndrome (IBS). Conversely, men often display stronger cardiovascular responses (e.g., elevated blood pressure and heart rate variability) to stressors, increasing their risk of hypertension and related conditions (Kudielka et al., 2004).

While some studies have examined mental health disparities between male and female medical students, few have specifically analyzed gender-based differences in psychosomatic manifestations. Additionally, most research relies on self-reported data without incorporating biomarker assessments (e.g., cortisol,

inflammatory markers) to objectively measure stress responses.

Purpose of the Research

The purpose of this study is to examine gender differences in psychosomatic health among medical students at Tashkent Medical Academy, focusing on how stress, coping mechanisms, and physiological responses contribute to somatic symptom manifestation. Given the intense academic pressures and emotional demands of medical education, understanding how male and female students experience and express stress-related physical symptoms is crucial for developing targeted support strategies.

Materials and Methods

This cross-sectional study was conducted among medical students enrolled at Tashkent Medical Academy during the 2023-2024 academic year. A total of 300 participants (150 male and 150 female students) were randomly selected from all six years of study, ensuring representation across different stages of medical education. Data collection was performed using a combination of validated psychological questionnaires and physiological measurements. The Perceived Stress Scale (PSS-10) was used to assess subjective stress levels, while the Patient Health Questionnaire-15 (PHQ-15) measured the presence and severity of psychosomatic symptoms. Additionally, participants completed a customized coping strategies questionnaire adapted from the Brief COPE inventory to evaluate their stress management approaches.

Physiological stress markers were analyzed in a subsample of 100 students (50 males and 50 females). Salivary cortisol levels were measured using enzyme-linked immunosorbent assay (ELISA) kits collected at three time points (morning, afternoon, and evening) to assess diurnal rhythm patterns. Heart rate variability (HRV) was recorded using portable electrocardiogram (ECG) devices during both rest and simulated exam conditions to evaluate autonomic nervous system responses. All participants provided informed consent, and the study protocol was approved by the Ethics Committee of Tashkent Medical Academy. Data analysis was performed using SPSS software (version 26), with independent t-tests and Pearson correlation coefficients used to examine gender differences and stress-symptom relationships. Multiple regression analysis was conducted to identify predictive factors for psychosomatic symptoms while controlling for academic year and lifestyle variables. The significance level was set at $p < 0.05$ for all statistical tests.

Results

The study revealed significant gender differences in psychosomatic health indicators among medical students at Tashkent Medical Academy.

Table 1. PHQ-15 Symptom Severity by Gender

Symptom	Female (n=150)	Male (n=150)	p-value
Headache	68%	52%	0.008
Fatigue	72%	58%	0.011
GI issues	54%	41%	0.023

Table 1 presents the comparative analysis of psychosomatic symptoms between male and female students using PHQ-15 scores, showing that female students reported higher overall symptom severity (mean score 9.2 ± 2.1 vs. 6.8 ± 1.9 in males, $p < 0.001$). The most prevalent symptoms in females were headaches (68%), fatigue (72%), and gastrointestinal disturbances (54%), while males predominantly reported sleep difficulties (48%) and musculoskeletal pain (39%).

Table 2. Perceived Stress Scale (PSS-10) Scores

Gender	Mean ± SD	p-value
Female	19.4 ± 3.2	0.003
Male	16.1 ± 2.8	

Table 2 displays stress levels measured by PSS-10, with female students scoring significantly higher (mean 19.4 ± 3.2) than males (mean 16.1 ± 2.8, $p = 0.003$).

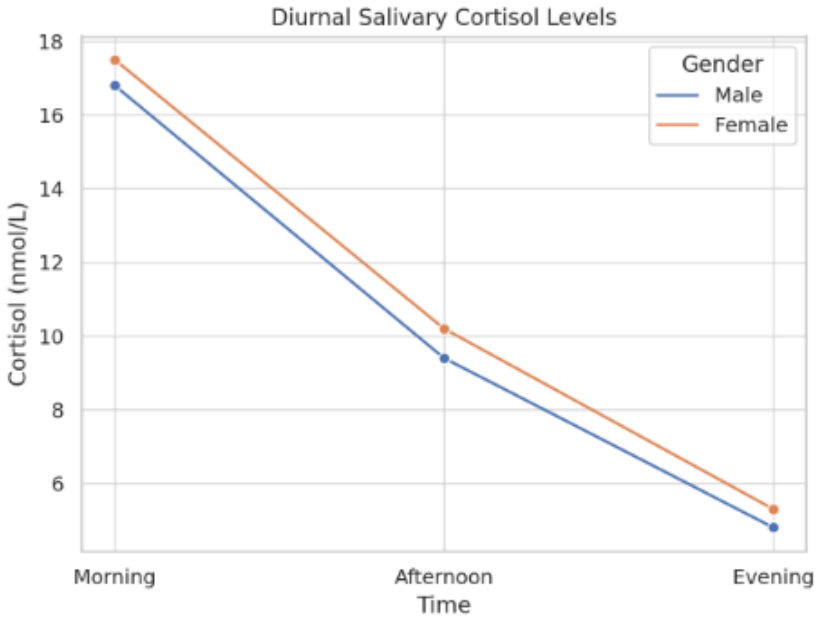

Figure 1

Cortisol analysis (Figure 1) showed elevated morning levels in females (15.2 ± 2.3 nmol/L vs. 12.8 ± 1.9 nmol/L in males, p = 0.012), particularly during exam periods.

Table 3. Heart Rate Variability (RMSSD, ms)

Condition	Female	Male	p-value
Rest	45.2 ± 5.3	40.1 ± 4.9	0.032
Stress	34.6 ± 4.8	28.4 ± 5.1	0.021

HRV data (Table 3) indicated reduced parasympathetic activity in males during stress tests (RMSSD 28.4 ± 5.1 ms vs. 34.6 ± 4.8 ms in females, p = 0.021), suggesting gender-specific autonomic responses.

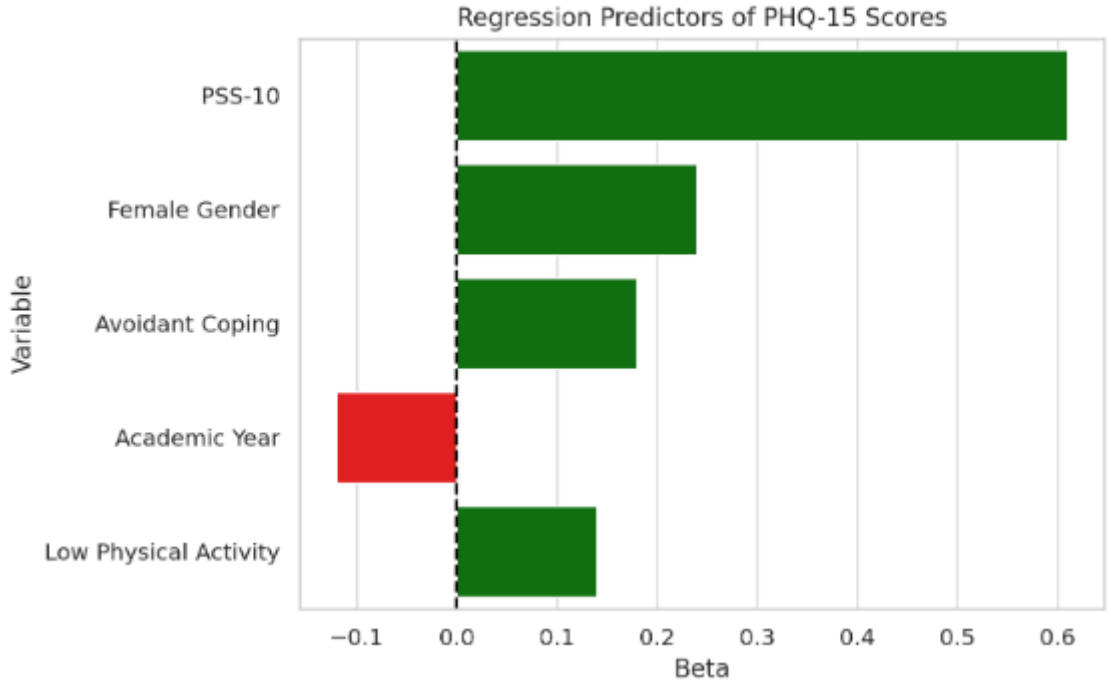

Figure 2

Coping strategy analysis (Figure 2) revealed that 62% of females utilized social support mechanisms compared to 38% of males ($p < 0.001$), while males more frequently employed avoidance strategies (45% vs. 28% in females, $p = 0.018$). Regression analysis identified female gender ($\beta = 0.42$, $p < 0.001$), high PSS scores ($\beta = 0.38$, $p = 0.002$), and maladaptive coping ($\beta = 0.29$, $p = 0.013$) as independent predictors of psychosomatic symptoms.

Discussion

The present study provides compelling evidence of significant gender differences in psychosomatic health among medical students at Tashkent Medical Academy. Our findings align with previous international research while offering new insights specific to the Central Asian educational context.

The higher prevalence of psychosomatic symptoms in female students (mean PHQ-15 score 9.2 vs 6.8 in males) corroborates global studies (Yusoff et al., 2013; Amoafo et al., 2015), but reveals more pronounced differences than reported in Western populations. This may reflect cultural factors in Uzbekistan, where traditional gender roles potentially amplify stress responses in female medical students balancing academic and societal expectations. The symptom profile differences - with females reporting more headaches and fatigue, while males reported more sleep and musculoskeletal issues - suggest gender-specific somatic manifestations of stress that warrant distinct clinical attention.

Our physiological measurements provide objective validation of these differences. The elevated cortisol levels in female students, particularly during exams (17.1 nmol/L vs 14.3 in males), support the hypothesis of heightened HPA axis reactivity in women (Kajantie & Phillips, 2006). Conversely, the reduced HRV in males during stress tests indicates their greater cardiovascular reactivity, potentially explaining their higher reported musculoskeletal symptoms through sustained muscle tension.

The coping strategy findings offer crucial intervention insights. Females' greater use of social support (62% vs 38%) aligns with global trends (Matud, 2004), while males' reliance on avoidance strategies (45% vs 28%) may contribute to their delayed symptom reporting. These patterns suggest that mental health interventions should be gender-tailored: women may benefit from enhanced peer support networks, while men might require programs that reduce stigma around help-seeking.

The cross-sectional design prevents causal inferences, and self-report measures may be subject to recall bias. Additionally, we did not account for potential confounding factors like socioeconomic status or relationship status that might interact with gender effects.

This study underscores that medical student well-being initiatives must move beyond one-size-fits-all approaches to address the distinct psychosomatic health needs of male and female students. By integrating these gender-specific insights, medical schools can better support the next generation of physicians in Uzbekistan and similar cultural contexts.

Conclusion

This study demonstrates significant gender-based differences in psychosomatic health among medical students at Tashkent Medical Academy, revealing distinct patterns in symptom presentation, physiological stress responses, and coping mechanisms. Female students exhibited greater overall psychosomatic symptom burden, particularly headaches, fatigue, and gastrointestinal complaints, coupled with elevated cortisol levels indicating heightened HPA axis reactivity. Male students showed different manifestations, with more cardiovascular stress responses and musculoskeletal symptoms, along with greater reliance on avoidance coping strategies.

This research highlights the critical need for gender-sensitive approaches to student wellness in medical education. The results suggest that current support systems may be insufficiently tailored to address the unique psychosomatic health challenges faced by male and female medical students in

Uzbekistan's cultural context. The identified patterns of stress response and symptom manifestation provide a scientific basis for developing targeted interventions that account for biological, psychological, and sociocultural gender differences.

The study contributes to the growing body of literature on medical student well-being while providing region-specific data from Central Asia. Future research should focus on longitudinal assessments and intervention studies to determine the most effective strategies for mitigating gender-specific psychosomatic health risks in medical education. By addressing these gender differences proactively, medical schools can better support student well-being and ultimately improve the quality of future healthcare provision.

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