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Behind the white coat: depression and anxiety among medical students

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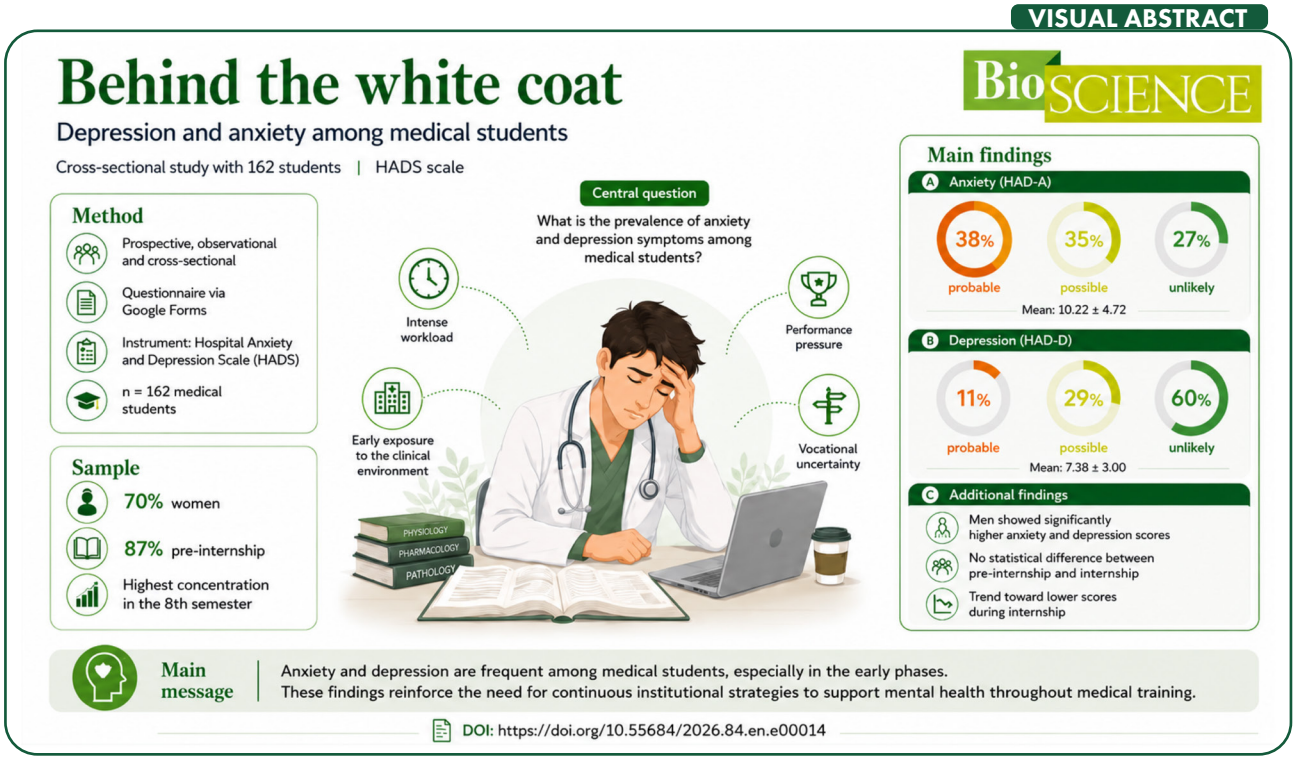
VISUAL ABSTRACT



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Author´s contribution
The authors contributed equally to this work: Conceptualization, formal analysis, investigation, methodology, writing – original draft preparation, writing – review & editing

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Central Message
Evidence shows that the prevalence of mental disorders is higher among medical students compared to the general population, potentially impairing academic performance, relationships, and professional training. Factors such as demanding workloads, performance pressure, early exposure to clinical situations, and vocational insecurity contribute to psychological symptoms

Perspective
Although no statistically significant differences were observed between pre-internship and internship groups, a trend toward reduced Hospital Anxiety and Depression Scale scores was noted during the internship. These results highlight the importance of institutional strategies to promote mental health and continuous support throughout medical training.

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ABSTRACT

Introduction: Depression and anxiety are major mental health concerns, particularly among medical students exposed to intense academic and emotional stress. Factors such as demanding workloads, performance pressure, early exposure to clinical situations, and vocational insecurity contribute to psychological symptoms. Evidence shows that the prevalence of these disorders is higher among medical students compared to the general population, potentially impairing academic performance, relationships, and professional training.

Objective: This study investigated the prevalence of depression and anxiety symptoms among medical students and identified the main factors associated with these disorders.

Method: A prospective, observational, and cross-sectional design was employed. Data collection used a questionnaire via Google Forms, applying the Hospital Anxiety and Depression Scale (HADS) as the assessment instrument.

Results: The sample included 162 medical students, predominantly women (70%). Most participants (87%) were enrolled between the first and eighth semesters, with the highest concentration in the eighth semester (19%). Anxiety results (HAD-A) indicated that 38% were classified as "probable anxiety", 35% as "possible anxiety", and 27% as "unlikely anxiety". For depression (HAD-D), 60% were classified as "unlikely", 29% as "possible", and 11% as "probable depression".

Conclusion: Anxiety and depression are significant among medical students, particularly in the early stages with greater impact among men. Although no statistically significant differences were observed between pre-internship and internship groups, a trend toward reduced HADS scores was noted during the internship. These results highlight the importance of institutional strategies to promote mental health and continuous support throughout medical training.

KEYWORDS: Depression. Anxiety. Medical students.

INTRODUCTION

The prevalence of depression and anxiety among medical students has become an increasingly relevant topic, as these individuals are frequently exposed to intense workloads, high academic pressure, and the responsibilities inherent in medical training.[1,2] This context fosters the emergence of significant psychological symptoms, making this group particularly vulnerable to the development of mental disorders.

Depression is characterized by feelings of emptiness or irritability, accompanied by somatic and cognitive changes that significantly affect the quality of life of an individual.[3] It is considered one of the most common and affecting psychiatric disorders today, affecting approximately 300 million people worldwide.[4] In Brazil, lifetime prevalence has been estimated at 15.5%, with a substantial impact on primary care, where about 10.4% of patients presented depression alone or associated with other clinical conditions.[5] Anxiety, in turn, is often a response to academic stress and the high expectations imposed on medical students. Its symptoms include excessive worry, insomnia, difficulty in concentration, and physical manifestations such as tachycardia and sweating. In 2019, it was estimated that around 301 million people worldwide suffered from anxiety disorders6, and in 2024 its prevalence ranged between 3.8% and 7.3% of the global population.[7] Brazil shows even more alarming rates, leading the world ranking, with 26.8% of the population affected by some degree of anxiety, corresponding to approximately 56 million people.[8]

Given this scenario, the urgency to investigate the magnitude and associated factors of depression and anxiety among medical students becomes evident.

This study is justified by the importance of mapping such phenomena in this specific group in order to support institutional policies and strategies for prevention and early intervention, contributing to the promotion of mental health throughout medical training.

METHOD

The study was previously approved by the Research Ethics Committee of the Mackenzie Evangelical University Hospital of Curitiba, according to the substantiated opinion No. 7,272,636 and CAAE: 85002424.7.0000.0103, issued on December 6, 2024. This research complied with all ethical principles established by Resolution No. 466/2012 of the National Health Council, ensuring confidentiality, privacy, and respect for the autonomy of the participants.

This is a prospective, observational, and cross-sectional study with a descriptive approach, emphasizing the analysis of both quantitative and qualitative data. It was conducted with the aim of identifying the prevalence of depressive and anxiety symptoms among medical students through the application of a questionnaire administered via Google Forms, using the Hospital Anxiety and Depression Scale (HADS) as the assessment instrument.

RESULTS

Profile of the participants

As presented in Table 1, the sample of 162 students was predominantly composed of female participants, representing 70% of the total, while males represented 30%, and one person identified as non-binary (1%). The distribution of students in the stages of the medical program showed the highest concentration in the eighth semester, with 19% of the participants. The vast majority of the respondents, 87%, had not yet entered the internship.

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TABLE 1 — Sociodemographic and academic characterization of the sample

Variables	Count
Gender	**n (%)**
Female	113 (70%)
Male	48 (29%)
Non-binary	1 (1%)
Semester	**n (%)**
1st semester	13 (8%)
2nd semester	28 (18%)
3rd semester	22 (14%)
4th semester	19 (12%)
5th semester	22 (14%)
6th semester	4 (3%)
7th semester	8 (5%)
8th semester	30 (19%)
9th semester	15 (9%)
10th semester	2 (1%)
11th semester	3 (2%)
12th semester	1 (1%)
Internship	**n (%)**
Before internship	141 (87%)
During internship	21 (13%)

Evaluation of symptoms

In the evaluation of anxiety symptoms (Table 2) using the Hospital Anxiety and Depression Scale (HAD-A), the mean score of the sample was 10.22 ± 4.72. The analysis of the results indicated that 38% of the students were classified as having "probable anxiety," 35% as "possible anxiety" and 27% as "unlikely anxiety." For depression symptoms (HAD-D), the mean score was 7.36 ± 3.00. The majority the participants (60%) were classified as "unlikely depression," while 29% presented "possible depression" and 11% "probable depression."

TABLE 2 — Descriptive analysis of anxiety and depression scores and classification

Variables	Count
HAD-A, Mean ± Standard Deviation	10.22 ± 4.72
Anxiety	Result, n (%)
Unlikely anxiety	44 (27%)
Possible anxiety	58 (36%)
Probable anxiety	62 (38%)
HAD-D, Mean ± Standard Deviation	7.38 ± 3.00
Depression	Result, n (%)
Unlikely depression	97 (60%)
Possible depression	47 (29%)
Probable depression	18 (11%)

HAD-A=Hospital Anxiety and Depression Scale – Anxiety Subscale; HAD-D=Hospital Anxiety and Depression Scale – Depression Subscale.

Comparison between sexes

When comparing mental health scores by sex (Table 3), statistically significant differences were found both for anxiety symptoms (p = 0.001) and for depression symptoms (p = 0.018) in the numerical difference between the scores. For anxiety (HAD-A), the mean score for males was 11.14 ± 4.60, a value higher than the mean for females, which was 7.92 ± 4.18. This difference was shown to be statistically significant in the multiple comparison test (p = 0.001) between males and females. The categorical classification analysis confirms this finding, showing that 45.1% of the male participants fell into the category of "probable anxiety", compared to 20.8% of the females (p = 0.001). With respect to depression (HAD-D), the mean score for the males (7.73 ± 3.02) was also higher than that for the females (6.44 ± 2.77). This difference was also statistically significant in the multiple comparison test (p = 0.022) between males and females.

Similarly, the prevalence of "probable depression" was higher among males (14.2%) compared to females (4.2%), with statistical significance (p = 0.028).

Comparison between course phases

When comparing medical students according to their progression in the program (Table 3), no statistically significant differences were found in anxiety or depression levels. For anxiety symptoms (HAD-A), the mean score of the students before the internship was 10.48 ± 4.83, while for those in the internship it was 8.48 ± 3.59. Although the mean was numerically lower in the internship group, the difference did not reach statistical significance (p = 0.076). Similarly, the distribution among the categories of "unlikely," "possible," and "probable" anxiety did not differ significantly between the two groups (p = 0.588). Regarding depression symptoms (HAD-D), the results were similar. The mean score for the pre-internship group was 7.44 ± 3.06, and for the internship group it was 6.81 ± 2.48, without statistically significant difference (p = 0.395). The categorical classification of depression outcomes also showed no significant variation between the groups (p = 0.738).

TABLE 3 — Distribution of anxiety and depression classification according to sex and course phase

Course Phase	Before Internship	During Internship
Anxiety Result – Female		
Unlikely	15 (9%)	5 (3%)
Possible	34 (21%)	8 (5%)
Probable	47 (29%)	4 (2%)
Anxiety Result – Male		
Unlikely	22 (14%)	2 (1%)
Possible	13 (8%)	1 (1%)
Probable	9 (6%)	1 (1%)
Anxiety Result – Non-binary		
Unlikely	0 (0%)	0 (0%)
Possible	0 (0%)	0 (0%)
Probable	1 (1%)	0 (0%)
Depression Result – Female		
Unlikely	49 (30%)	12 (7%)
Possible	32 (20%)	4 (2%)
Probable	15 (9%)	1 (1%)
Depression Result – Male		
Unlikely	34 (21%)	2 (1%)
Possible	8 (5%)	1 (1%)
Probable	2 (1%)	0 (0%)
Depression Result – Non-binary		
Unlikely	0 (0%)	0 (0%)
Possible	1 (1%)	0 (0%)
Probable	0 (0%)	0 (0%)

Comparison between course phases by sex

A stratified descriptive analysis was also conducted to explore the classification of anxiety and depression by sex, considering the course phase (before or during the internship), as shown in Table 3. In anxiety analysis, it was observed that the highest concentration of "probable anxiety" cases occurred in the female group before the internship, with 29% of the total related to anxiety; however, during the internship, this number decreased to 2%. In the male group, 6% were classified as having "probable anxiety" before the internship and one student during the internship. The non-binary participant was classified as having "probable anxiety" in the pre-internship phase. Regarding depression, among females, 9% of the total of students were classified as having "probable depression" before the internship, a number that decreased to one student during the internship. In the male group, two students (1%) had "probable depression" before the internship, with no cases in this category during the internship phase. The non-binary participant was classified as having "possible depression" in the pre-internship phase.

DISCUSSION

General interpretation of results

The analysis of the results obtained in this study reveals that anxiety showed a higher prevalence than depression among the evaluated medical students. This difference can be explained, in part, by the fact that anxiety tends to manifest more immediately in contexts of pressure and intense academic demands, which are defining characteristics of medical training. Early exposure to situations of high responsibility, such as patient care and practical evaluations, combined with extensive workload, may intensify anxious symptoms even before depressive conditions develop. Furthermore, the perfectionist profile often observed in this group of students, coupled with self-demand and fear of failure, acts as an important risk factor for the increase in anxiety levels.

Comparisons with the literature

The findings of the present study, which identified 38% of students with "probable anxiety" and 11% with "probable depression," are consistent with both national and international literature, although they present distinct prevalence rates. In Uberlˆandia, MG, Brazil[9], for example, a prevalence of depressive symptoms of 79% among medical students was reported, with varying degrees of intensity. Systematic reviews have also high-lighted high prevalence rates, such as one that included 77 studies and found 28% of depressive symptoms among medical students, with greater concentration in the early years of the program[10], a finding similar to that observed in our sample, in which pre-internship students showed higher levels of anxiety and depression compared to those in the internship. Comparable results were described in a study conducted at CEUMA University[11], which identified 54% of students with depressive symptoms, with females being more affected and internship students less symptomatic, corroborating the trend of reduced mean scores observed in our study during this phase. On a global scale, analyses involving more than 160 studies estimated a combined prevalence of depression at 27.2%[12,] while a Brazilian meta-analysis reported a prevalence of 30.6%[11,] both higher than those found in our sample. Regarding anxiety, our results (38% probable anxiety) align with studies describing high rates, such as the one conducted at the ABC Medical School[13], which found a prevalence of up to 79.9%, and research in Dubai, which identified 28.7% of anxiety symptoms among medical students.[14] Similarly, a systematic review with Chinese students reported an average prevalence of 27.22% for anxiety and 32.74% for depression[15], reinforcing that, although percent-ages vary across contexts, the presence of these disorders is consistent and concerning. Furthermore, the literature emphasizes that academic, emotional, and social factors such as workload overload and initial adaptation to the program are among the main determinants of depression and anxiety in medical students[2,16], which helps explain the higher concentration of symptoms in the early phases identified in our research.

Study limitations

Among the strengths of this study, the use of the HADS stands out, a validated and widely used instrument for assessing anxiety and depression, which allows efficient screening and comparability with data from different studies.[17,18] Another relevant aspect is the specificity of the sample, composed exclusively of medical students, which ensures greater homogeneity of the group and relevance to the field. However, some limitations must be acknowledged. This is a cross-sectional study, which makes it impossible to establish causal relationships between academic factors and the presence of symptoms.[19] In addition, the use of a self-report questionnaire may be subject to social desirability bias and underreporting of symptoms by participants. Direct comparison between the data obtained in this study and the results of other research on mental health in medical students presents important limitations, especially regarding the instruments used for symptom screening. This study employed the Hospital Anxiety and Depression Scale (HADS), an instrument developed to identify subclinical symptoms of anxiety and depression in hospital settings, with a focus on psychological manifestations and the exclusion of somatic symptoms. The HADS classifies results into ranges of normality, possible, and probable presence of disorders, which differs from scales such as the Beck Depression Inventory (BDI), PHQ-9, or STAI, which categorize symptoms into levels of clinical severity (mild, moderate, severe). Therefore, the findings of this study 38.27% probable anxiety and 11.11% probable depression should be interpreted with caution. Although they fall within the range observed

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in the literature, the nature of the instrument used may influence the sensitivity and specificity of the results.

Perspectives

Finally, it is recommended that future research consider the standardization of instruments or comparative analysis between different scales to allow greater consistency in data and facilitate the development of more effective intervention strategies. Moreover, the results reinforce the need for institutional policies that prioritize mental health in the academic context, especially in medical education. The implementation of continuous psychological support programs, stress management workshops, and well-being promotion strategies may contribute to reducing the prevalence of anxiety and depression, preventing negative impacts on academic performance and future professional practice.[2,20,21]

CONCLUSION

The results showed that the prevalence of "probable anxiety" was higher than that of "unlikely anxiety", while, in the case of depression, the values for "unlikely" were higher than those for "probable." A statistically significant difference was observed between sexes in the comparison of anxiety and depression scores, with a higher prevalence of "probable anxiety" and "probable depression" among male students. In the analysis of academic progression, considering all semesters of the medical program, no statistically significant differences were identified in anxiety and depression levels. However, there was a trend towards an increase in cases classified as "probable anxiety" and "probable depression" among students from the first to the eighth semester compared to those from the ninth to the 12th semester (internship). Among female students, a significant decrease in rates of "probable anxiety" was observed during the internship. Regarding depression, both in the female and male groups, a relevant reduction was found in cases classified as "unlikely depression" throughout this phase of the program, suggesting changes in the symptom pattern as academic progression advances.

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