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Medicine

Anxiety in Medical Students: A Moroccan Overview

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Abstract	Original Research Article

Introduction: The mental health of medical students as a subject of interest in the scientific community appears to have emerged in the literature from the 1950s. Despite the divergence on the stressful nature of medical studies, students appear to be confronted with a multitude of stress-inducing factors. Notwithstanding their high levels of distress, only a few medical students seem to seek professional help, mainly due to "self-stigmatization". ***Results:*** A total of 239 medical students of the Faculty of Medicine and Pharmacy of Rabat completed the questionnaire. 87% of students reported a history of anxiety symptoms since the beginning of their medical studies, with 57.7% having three or more areas of concern. Age and the years of study were associated with the emergence of anxiety symptoms. The second year of medical school was the only found risk factor for the presence of anxiety symptoms. ***Conclusions:*** Within medical students, anxiety appears to be particularly widespread. It causes psychological distress, which has repercussions on well-being, academic performance, and also the quality of care provided. Awareness campaigns should be one of the main focuses of both Moroccan and worldwide public health programs and healthcare professionals to promote the mental health of future caregivers.
Keywords: Anxiety, medical students, cross-sectional, Arab population, Moroccan survey.

INTRODUCTION

The mental health of medical students as a subject of interest in the scientific community appears to have emerged in the literature from the 1950s. Since then, studies have diverged on this subject: some suggest that medical studies do not differ from other disciplines, while others support the anxiety-provoking nature of this curriculum, exposing students to a variety of mental disorders, including anxiety and depressive disorders, burnout, as well as substance-related disorders [1, 2].

Despite the divergence on the stressful nature of medical studies, students appear to be confronted with a multitude of factors: the lengthy years of study, the heavy workload, the reduction of leisure activities, constant evaluation through exams, and frequent exposure to diseases and suffering [1, 3].

In addition, the psychological stress resulting from these different factors would be associated with the presence of suicidal ideation, thoughts of interrupting medical studies, a reduction in empathy, as well as a decrease in academic performance [4].

Notwithstanding their high levels of distress, only a few medical students seem to seek professional help. As supported by Puthran et al., only one medical student out of 7 would consult a professional at the onset of depressive symptoms [2, 4].

This lack of recourse to professional help is mainly due to "self-stigmatization," as students fear being perceived by their peers and faculty members as less capable of assuming their responsibilities [2].

If we want to improve the mental health of medical students, we must not only treat disorders but also prevent their onset by helping students move toward a state of well-being [5].

Thus, in our Moroccan context, where the length and exhausting nature of medical education is undeniable, the objective of our study is to determine, in the first instance, the prevalence of anxiety symptoms and their description among medical students at the Faculty of Medicine and Pharmacy of Rabat. In second instance, we aim to analyze the factors associated with these symptoms.

MATERIAL AND METHODS

➢ *Study Population*

Regarding medical studies in Morocco, they are among the longest higher education programs. These studies are organized into three cycles within one of the seven faculties of medicine and pharmacy associated with one of the seven university hospital centers (CHU). The total duration of the program varies from 7 years (general medicine) to 13 years (residency). The studies are structured as follows:

- A first cycle of preclinical sciences: first and second year;
- A second cycle: third, fourth, and fifth year;
- A third cycle: sixth year; seventh year; internship and residency.

This cross-sectional study was conducted in the Faculty of Medicine and Pharmacy of Rabat during the first two weeks of November 2022.

➢ *Tools and Data collection*

A French-language questionnaire was created using Google Forms and shared on medical student groups on Facebook©. It was strictly anonymous. After a literature review, we included a total of 22 items organized around several axes:

- Sociodemographic characteristics: age, gender, level of education, nationality;
- Personal and family psychiatric history;
- Substance use;
- History of anxiety symptoms and their description:
  - Intensity: evaluated based on an arbitrary scale consisting of 4 items of increasing intensity (mild: spontaneously reversible; moderate: spontaneously reversible, causing discomfort during the day; severe: requiring medical intervention; extreme: requiring emergency consultation)
  - Frequency: daily, weekly, monthly, quarterly, semi-annually, annually;
  - Sources of stress: number and themes;
- Sources of mental health information and faculty resources.

➢ *Data Management and Analysis*

First, the study population was described based on different characteristics, followed by a comparison between students with anxiety symptoms and those without (The two groups were independent) before analyzing the factors associated with the presence of anxiety symptoms using univariate and multivariate analysis. Comparison of percentages was done using the Chi-square test or Fisher's exact test, and we used the Mann-Whitney test for median comparison. Concerning factors independently related to anxiety symptoms, we chose the logistic regression model. In all statistical tests, the significance level (*p*-value) was set at 0.05.

Statistical analysis was performed using JAMOVI software.

Furthermore, anxiety symptoms could not be analyzed based on their intensity and frequency due to the reduced sample size in the different strata.

RESULTS

1. Socio-demographic characteristics and psychiatric history in the study population

A total of 239 students with a median age of 21 years [19, 23] completed the questionnaire. There was a clear female predominance with a sex ratio of 0.38. Regarding the level of education, 13% were in their first year of medicine, 28% in their second year, 6.7% in their third year, 6.3% in their fourth year, 15.5% in their fifth year, 20.9% in their sixth year, and 9.6% in their seventh year. Concerning nationality, 16.3% of the students who answered the questionnaire were foreign students.

Of the participants, 17.6% had previously consulted a psychiatrist, and 23.4% had a family history of a mental disorder. Substance use was observed in 17.2% of the participating students: Tobacco was the most consumed substance (50%), followed by alcohol (31%), then cannabis (16.7%), and benzodiazepines (2.4%).

As for anxiety, 87% of students reported a history of anxiety symptoms since the beginning of their medical studies. The number of sources of stress reported by students varied from 1 to 7 domains, with 57.7% having three or more areas of concern (Table 1).

Table 1: Socio-demographic characteristics and psychiatric history in the study sample

Characteristics	Values
	(N=239)
Age (years) [a]	21 [19, 23]
Female sex [b]	174 (72,8)
Year of study	
1st year [b]	31 (13,0)
2nd year [b]	67 (28,0)
3rd year [b]	16 (6,7)
4th year [b]	15 (6,3)
5th year [b]	37 (15,5)
6th year [b]	50 (20,9)

Characteristics	Values
7th year [b]	23 (9,6)
Foreign nationality [b]	39 (16,3)
History of psychiatric consultation[b]	42 (17,6)
Family history of a mental disorder[b]	56 (23,4)
Substance use [b]	41 (17,2)
History of anxiety symptoms [b]	208 (87,0)
Sources of stress[b]	
1 domain	62 (25,9)
2 domains	39 (16,3)
3 domains	60 (25,1)
4 domains	40 (16,7)
5 domains	21 (8,8)
6 domains	8 (3,3)
7 domains	9 (3,8)

a: Median [Q1, Q3]
b: Number (percentage)

2. Description of anxiety symptoms in the study population

> *Frequency*

Regarding frequency, 30.4% of medical students admitted experiencing anxiety symptoms daily, while 30.4% reported a weekly experience. Deductively, 60.4% of students would suffer from anxiety symptoms at least once a week (Figure 1).
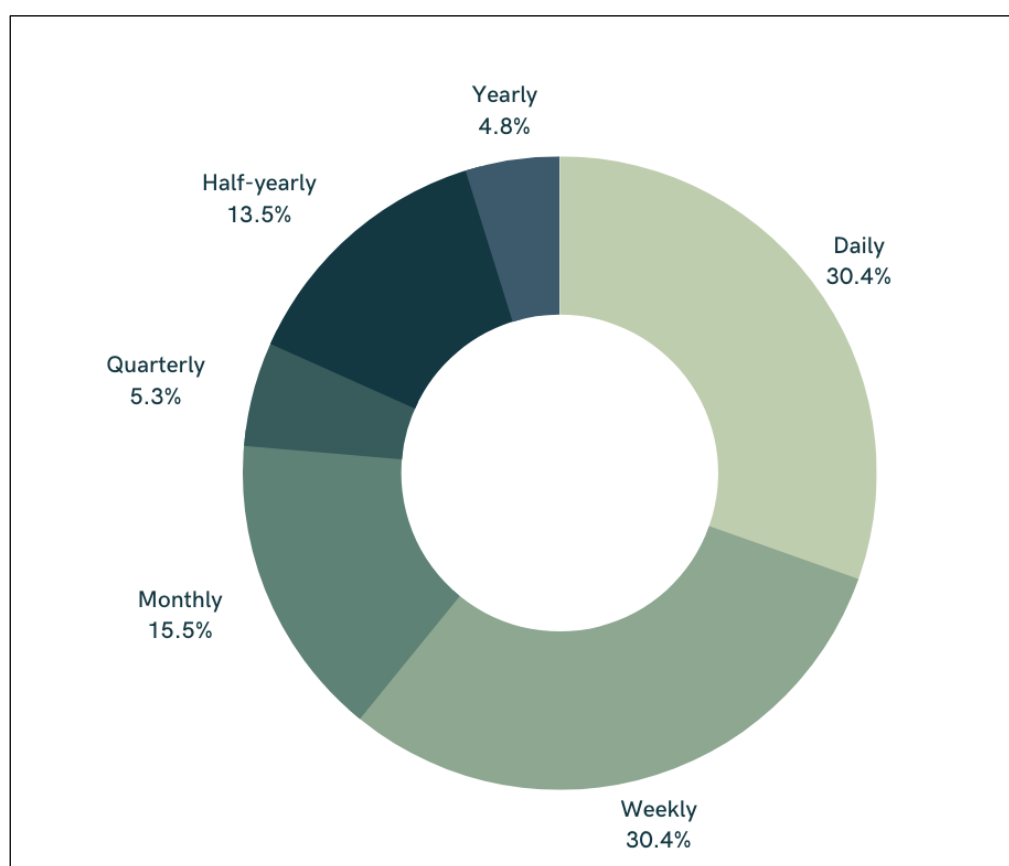

Figure 1: Anxiety symptoms frequency in the study population

> *Intensity*

59.7% of the participating students reported experiencing anxiety symptoms of moderate intensity, 15.6% reported experiencing severe symptoms, and 1.9% reported seeking emergency consultation for extreme anxiety symptoms (Figure 2).
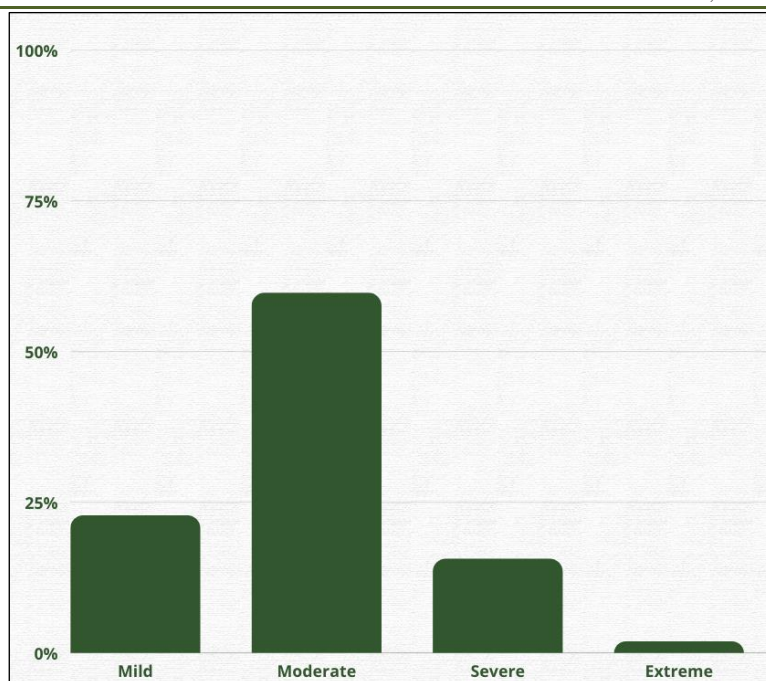
Figure 2: Anxiety symptoms intensity in the study population

> ➢ *Sources of stress*
> As previously mentioned, 57.7% of participants had three or more areas of concern. Hereby is the descending order of the areas by prevalence (Figure 3):
> - Academic demands: 61.1%
> - University life (relationships with other students, faculty, etc.): 55.7%

- Family problems: 49.6%
- Hospital work (clinical internships, shifts, etc.): 34.4%
- Sentimental life: 34%
- Financial situation: 32.4%
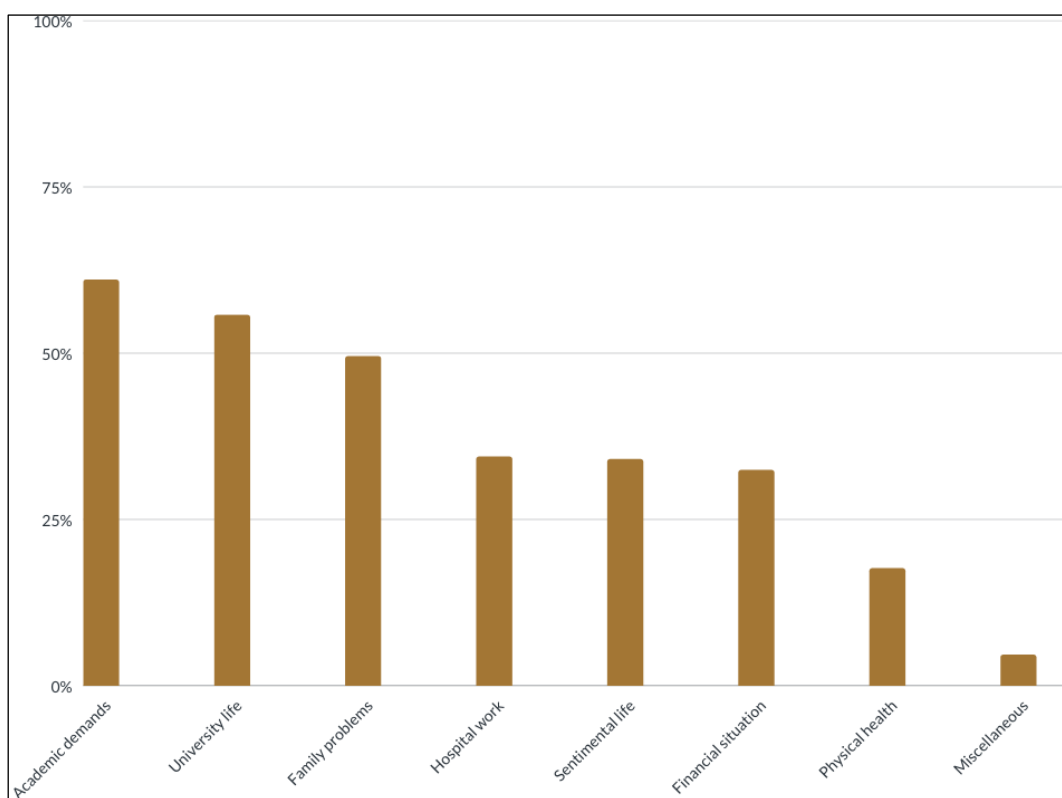- Physical health: 17.6%
- Miscellaneous areas: 4%

Figure 3: Prevalence of the sources of stress in the study population

➢ **Sources of mental health information and faculty resources**

In our study, the primary source of mental health information for medical students was the Internet (66.9%), followed by lectures (25.9%) and various other sources (7.1%) (Figure 4)
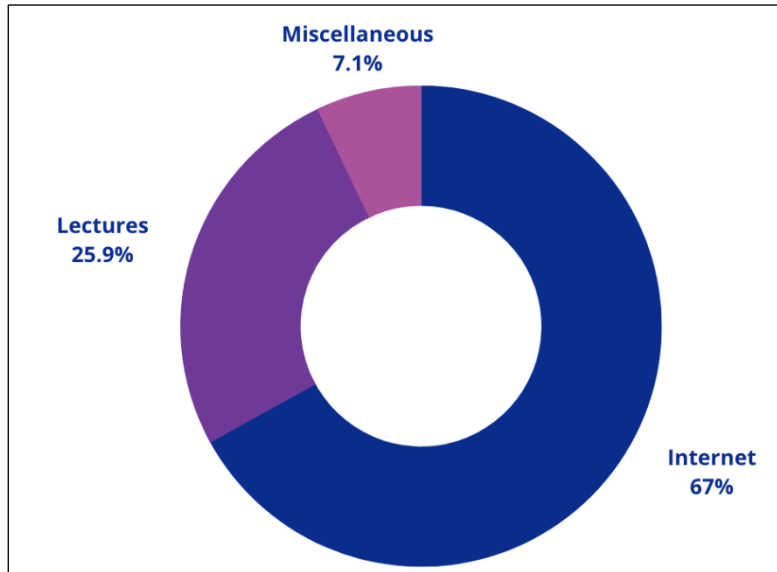

Figure 4: Sources of mental health information in the study population

Concurrently, 89.1% of the students believed that the faculty did not provide enough resources to manage their anxiety symptoms, and over 90% reported being interested in mental health awareness campaigns.

3. Association between anxiety symptoms and socio-demographic characters

Regarding age, students who experienced anxiety symptoms were significantly older (median age = 21 [19, 23]) compared to those who did not present such symptoms (median age = 19 [18, 21]) (p=0.005) (Figure 5).
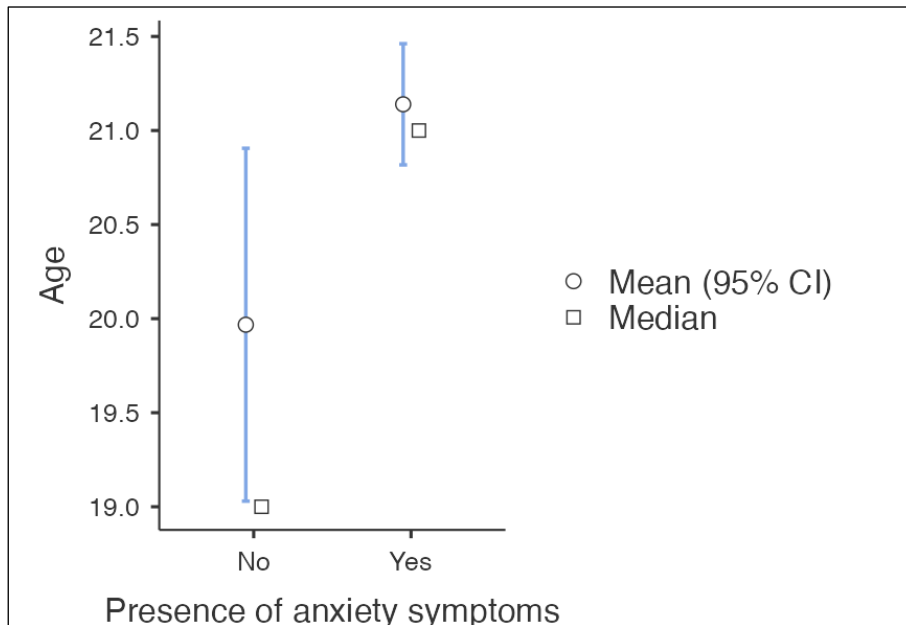

Figure 5: Association between age and anxiety symptoms in the study population

Furthermore, there was a statistically significant difference between these two groups regarding the years of study (p<0.001) (Figure 6).
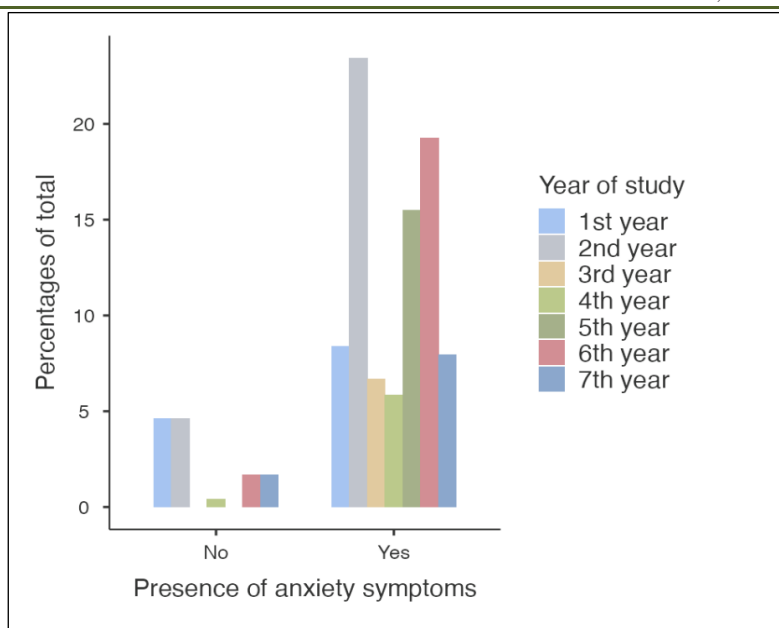
Figure 6: **Association between the years of study and anxiety symptoms in the study population**

However, no statistically significant difference could be found in terms of sex or foreign nationality (Table 2).

Table 2: Association between anxiety symptoms and socio-demographic characteristics

Characteristics	Presence of anxiety symptoms (n=208)	Absence of anxiety symptoms (n=31)	*p*-value
Age[a]	21 [19, 23]	19 [18, 21]	0,005
Female sex[b]	155 (74,5)	19 (61,3)	0,123
Year of study[b]			<0.001
1st year [b]	20 (9,6)	11 (35,5)	
2nd year[b]	56 (26,9)	11 (35,5)	
3rd year [b]	16 (7,7)	0 (0)	
4th year [b]	14 (6,7)	1 (3,2)	
5th year [b]	37 (17,8)	0 (0)	
6th year [b]	46 (22,1)	4 (12,9)	
7th year [b]	19 (9,1)	4 (12,9)	
Foreign nationality[b]	37 (17,8)	2 (6,5)	0,111

a: Median [Q1, Q3]
b: Number (percentage)

4. Association between anxiety symptoms and psychiatric history

As for psychiatric history, no statistically significant difference could be observed in regard to history of psychiatric consultation, family history of a mental disorder, substance use, or the number of sources of stress (Table 3).

Table 3: Association between anxiety symptoms and psychiatric history

Characteristics	Presence of anxiety symptoms (n=208)	Absence of anxiety symptoms (n=31)	*p*-value
History of psychiatric consultation[b]	40 (19,2)	2 (6,5)	0,081
Family history of mental disorders[b]	51 (24,5)	5 (16,1)	0,304
Substance use[b]	37 (17,8)	4 (12,9)	0,501
Sources of stress[b]			
1 domain	50 (24,0)	12 (38,7)	0,336
2 domains	35 (16,8)	4 (12,9)	
3 domains	55 (26,4)	5 (16,1)	
4 domains	36 (17,3)	4 (12,9)	
5 domains	16 (7,7)	5 (16,1)	
6 domains	8 (3,8)	0 (0)	
7 domains	8 (3,8)	1 (3,2)	

b: Number (percentage)

5. Factors associated with anxiety symptoms in the study population

In univariate and multivariate analyses, after adjusting for the studied parameters (age, sex, year of study, history of psychiatric consultation, family history of a mental disorder, substance use, and the number of sources of stress), only the second year of medical school appears to be associated with the presence of anxiety symptoms.

Indeed, second-year students had 4.8 times the risk of developing anxiety symptoms compared to students in other years (OR=4.8, 95% CI=[1.39-16.59], *p*=0.01) while adjusting for the other parameters (Table 4).

Table 4: Factors associated with anxiety symptoms (Logistic regression by univariate and multivariate analysis)

	Univariate analysis			Multivariate analysis		
	OR	IC 95%	p	OR	IC 95%	p
Age	1,25	[1,04 – 1,5]	0,014	0,87	[0,48 – 1,58]	0,65
Female sex	1,85	[0,84 – 4,06]	0,127	2,33	[0,88 – 6,16]	0,08
Year of study						
1st year	Réf.			Réf.		
2nd year	2,8	[1,05 – 7,46]	0,039	4,8	[1,39 – 16,59]	*0,013*
3rd year	$1,73^{e8}$	[0,00 – Inf]	0,994	$4,12^{e8}$	[0,00 – Inf]	0,99
4th year	7,7	[0,89 – 66,64]	0,064	16,37	[0,99 – 269,07]	0,05
5th year	$1,73^{e8}$	[0,00 – Inf]	0,991	$3,21^{e8}$	[0,00 – Inf]	0,99
6th year	6,32	[1,79 – 22,28]	0,004	12,24	[0,45 – 331,97]	0,13
7th year	2,61	[0,7 – 9,64]	0,149	9,01	[0,1 – 751,27]	0,33
Foreign nationality	3,14	[0,71 – 13,73]	0,129	2,3	[0,4 – 12,95]	0,34
History of psychiatric consultation	3,45	[0,79 – 15,07]	0,099	3,22	[0,59 – 17,43]	0,17
Family history of a mental disorder	1,69	[0,61 – 4,63]	0,308	1,49	[0,46 – 4,8]	0,5
Substance use	1,46	[0,48 – 4,42]	0,503	1,76	[0,44 – 7,09]	0,42
Sources of stress						
1 domain	Réf.			Réf.		
2 domains	2,1	[0,62 – 7,05]	0,23	2,79	[0,71 – 10,8]	0,13
3 domains	2,64	[0,86 – 8,02]	0,08	3,15	[0,87 – 11,31]	0,07
4 domains	2,16	[0,64 – 7,24]	0,21	3,13	[0,78 – 12,5]	0,1
5 domains	0,76	[0,23 – 2,51]	0,66	0,80	[0,19 – 3,28]	0,76
6 domains	$3,76^{e6}$	[0,00 – Inf]	0,98	$4,56^{e7}$	[0,00 – Inf]	0,99
7 domains	1,92	[0,21 – 16,85]	0,55	1,77	[0,16 – 19,7]	0,63

DISCUSSION

In our study, 87% of medical students reported experiencing anxiety symptoms since the beginning of their medical studies. This proportion seems to be high compared to data from the available literature. For example, 22.6% of Swiss medical students reported having anxiety symptoms [4]. In the meta-analysis by Quek *et al*., the global prevalence of anxiety symptoms among medical students was around 33.8% [2].

However, as anxiety disorders appear to be the most common mental disorder among student populations, some studies show a difference between countries regarding its prevalence. Kronfol *et al*., observed that generalized anxiety disorder was the most frequent mental disorder in Arab and American universities. However, the respective prevalence of this disorder were 36.1% in Arab universities compared to only 15.9% in American universities [7].

In Morocco, two studies investigated the mental health of medical students. Barrimi *et al*., found that 31% of students had suicidal ideation, with 5% having a history of suicide attempts, highlighting significant psychological distress among Moroccan medical students [6]. At the same time, Barrimi *et al*., observed that most dermatological conditions in these students were psychosomatic. Thus, presenting a mental disorder was five times more frequent in students diagnosed with a dermatological condition than in students who were not [8].

As for age, we observed that the participating students who reported anxiety symptoms were older than those who did not. This result is consistent with numerous studies [9, 10].

As in the general population, female sex would be a risk factor for anxiety disorders [2, 3, 11]. Increased performance pressure in women may be a risk factor, mainly due to the added burden of maintaining a more conventional gender norm, particularly in some conservative communities [11]. Surprisingly, there was no statistically significant difference regarding sex in our findings.

In terms of the years of study, it is difficult to compare our results with other studies, given the diversity of medical education systems worldwide. For example, Shao et al. found that first- and second-year Chinese medical students were less likely to report anxiety symptoms, while the Spanish study by Capdevila-Gaudens *et al*., did not find a statistically significant difference between the years of study in terms of anxiety [9, 12].

Correspondingly, in our study, the second year of medical studies was a risk factor for anxiety symptoms, probably because it is known as a year of transition to the second cycle, resulting in a heavier workload than in the first year.

An overwhelming majority of medical and college students seem to be exposed to several stressors. Academic demands, workload, financial worries, lack of sleep, poor diet, and factors interfering with personal life are well-identified stressors among medical students [9]. In our sample, 57.7% of students had three or more areas of concern, especially in regard to academic demands, university life, and family problems. In Karyotaki *et al*.,'s study, 73.8% had three or more sources of concern, with the most reported sources being work relationships, family relationships, and physical health [13].

Anxious students are 4.97 times more likely to have poor sleep quality. At the same time, a diet high in fat and sugar, widespread among medical students, is a well-known risk factor for sleep disorders [14].

Acute or chronic stress affects the brain reward system and increases the risk of substance use and the risk of relapse after withdrawal [15]. Medical students do not appear exempt from this risk. Indeed, the phenomenon of substance use among medical students is widely discussed in the literature and increasingly becoming a subject of concern [2, 16-19]. Accordingly, Assaf *et al*., reported that students with high levels of anxiety were at significant risk of substance use [16]. As for our study, 17.2% of the participating medical students reported substance use.

Furthermore, anxiety, as well as depression, experienced by medical students could be a predisposing factor for burnout during residency or postdoctoral training years [20].

In addition, variables such as female sex, 4th year of medical school, and experiencing three domains of stress had a *p*-value close to the significance threshold, likely due to a relatively small sample size.

Moreover, if we want to improve the health of medical students, treating mental disorders can't be enough: We need to prevent their occurrence by helping students strive for a state of well-being. Many teams around the world have tried interventions to help them.

The most common interventions are mindfulness or psychoeducation interventions, directly targeting students [5].

Weaknesses:
Our study has some limitations:
- A larger number of respondents could have impacted the results in terms of reduced statistical power.
- Due to this study being cross-sectional, risk factors should be more thoroughly studied by cohort and case-control studies.
- Not using internationally validated standardized scales to describe anxiety symptoms could have better framed our study.
- Regarding socio-demographic characteristics, marital status as well as living alone or with family were important variables to include in the study but were not included due to logistical reasons.
- The practice of physical exercise is another important variable that was not studied, given recent studies on its significance and its impact on neuroplasticity.

RECOMMENDATIONS
At the end of our study, we were able to draw significant conclusions. Therefore, we can make the following recommendations:
- Organize awareness campaigns on mental health within the faculty since the information acquired from the Internet may not always be reliable.
- Provide resources to manage anxiety symptoms in medical students (meditation, support groups, psychologists) and a hotline to help the most severe cases.

CONCLUSION
Within medical students, anxiety appears to be particularly widespread. It causes psychological distress, which has repercussions on well-being, academic performance, and also the quality of care provided.

Substance use seems to be a frequent comorbidity, which is increasingly becoming a concern within this population.

Awareness campaigns should be one of the main focuses of both Moroccan and worldwide public health programs and healthcare professionals to promote the mental health of future caregivers.

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