ORIGINAL ARTICLE

First- and last-year medical students: is there a difference in the prevalence and intensity of anxiety and depressive symptoms?

Ana M. Bassols,[1,2] Lucas S. Okabayashi,[3] Anais B. da Silva,[3] Bruna B. Carneiro,[3] Fernando Feijó,[3] Guilherme C. Guimarães,[3] Gabriela N. Cortes,[3] Luis A. Rohde,[1,2] Claudio L. Eizirik[1,4]

[1]Department of Psychiatry, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, RS, Brazil. [2]Division of Child and Adolescent Psychiatry, Hospital de Clinicas de Porto Alegre (HCPA), UFRGS, Porto Alegre, RS, Brazil. [3]UFRGS, Porto Alegre, RS, Brazil. [4]Division of Psychiatry, HCPA, UFRGS, Porto Alegre, RS, Brazil.

Objective: Medical training is considered a significant stress factor. We sought to assess the prevalence and intensity of anxiety and depressive symptoms in medical students and compare samples of first-year and sixth-year students.
Method: This was a cross-sectional study of first- and sixth-year medical students who attended classes regularly. The study instruments were a sociodemographic questionnaire, the Beck Depression Inventory (BDI), and the Beck Anxiety Inventory (BAI).
Results: A total of 232 students (110 first-year, 122 sixth-year) completed the questionnaires, for a response rate of 67.4%. Overall 50.4% of respondents were male (56.4% of first-year and 45.1% of sixth-year students). Anxiety symptoms were reported by 30.8% of first-year students and 9.4% of sixth-year students (p < 0.001). Female students were more affected by anxiety. There were no significant between-group differences in depressive symptoms.
Conclusion: A higher prevalence of anxiety symptoms was found in first-year medical students as compared with sixth-year students. Strategies should be developed to help medical students, particularly female students, manage these symptoms at the beginning of their medical training.

Keywords: Medical students; depression; anxiety

Introduction

Medical school is recognized as a factor that has great impact on the life and health of students. Factors associated with this impact include the large amount of information to be assimilated, the pressure of being under constant assessment, interaction with patients, financial concerns, and lifestyle changes.[1-4]

The presence of anxiety and depression is quite common in conflicting or highly demanding situations, such as medical training.[5,6] Anxiety presents itself as an impending sense of danger, a reaction to a real or imaginary threat.[5] Some level of anxiety may be beneficial for medical students, but, from a certain degree onward, it can be painful, paralyzing, or block thinking and behavior.[7]

In the studied context, the uncertainty about the future, the need to learn, the day-to-day interactions with new colleagues, and the pressure from assessments are among the most anxiogenic factors.[8] Medical students are known to exhibit a higher prevalence of anxiety symptoms as compared with the general population.[1]

Correspondence: Ana Margareth Siqueira Bassols, Serviço de Psiquiatria da Infância e Adolescência, Hospital de Clínicas de Porto Alegre, Rua Ramiro Barcelos, 2350, CEP 90035-903, Porto Alegre, RS, Brazil.
E-mail: ambassols@gmail.com

In the literature, depressive symptoms are also frequent in samples of university students; their presence is associated with perfectionism and with the constant stress to which this group is subjected.[9,10] Symptoms of depression, including slowness of thought, difficulty concentrating, and indecisiveness, have been known to jeopardize academic development.[9,11-14]

Research focused on university students has gained space in recent decades. Studies worth highlighting include a systematic review by Dyrbye et al.[1] that found a substantial prevalence of distress among these subjects (around 21%). Despite the relevance of this subject, Brazilian studies regarding anxiety and depressive symptoms in this population are still few.[12]

Each stage of medical school is associated with its own specific challenges.[15,16] Our aim was to assess two defining moments – the beginning and end of medical school – at a public federal university in Southern Brazil, to ascertain whether the prevalence and severity of anxiety and depressive symptoms differ between the two abovementioned moments of medical training.

Methods

Sample and procedures

This quantitative, cross-sectional study assessed students of both genders from the first and sixth years of

medical school at Universidade Federal do Rio Grande do Sul (UFRGS). For the purpose of data collection, the first-year group considered students enrolled in the first and second semesters of 2010, and the sixth-year group, students enrolled in the 11th and 12th semesters (2010 and 2011). The first-year students completed the study questionnaires in their classrooms, after being invited to participate by research assistants, with the permission of the professor responsible for the group/class at the time. The sixth-year students were contacted by the researchers at different times, as they are distributed across several internship/training sites at the end of their medical training (see limitations). We could not obtain information regarding the students who did not complete the questionnaires.

All subjects completed the research instruments anonymously and voluntarily after providing written informed consent. The study was approved by the Hospital de Clínicas de Porto Alegre Ethics Committee (no. 09-444).

Instruments

The following instruments were used: a) a sociodemographic questionnaire devised specifically for this study, designed to collect information on factors associated with the psychiatric disorders investigated – including sex, family and personal income, whether the student lived with his/her family or in other arrangements (e.g., in communal off-campus housing), whether the student participated in leisure activities, use of alcohol and drugs, performance-enhancing drugs, medications, or presence of physical illness[13,17]; b) the Beck Anxiety Inventory (BAI),[18] validated for Brazil,[19] an instrument composed of 21 items that assess anxiety symptoms. Evaluation is summative; the greater the severity of symptoms, the higher the final score. Individual scores range from 0 to 3, and the total score, from 0 to 63. Scores are classified as follows: 0-10, minimum; 11-19, mild; 20-30, moderate; and 31-63, severe. A score of 10 was used as the cutoff point for the diagnosis of anxiety[18,19]; and c) the Beck Depression Inventory (BDI),[20] also validated for Brazil,[19] which is composed of 21 items, including symptoms and attitudes. Again, individual scores range from 0 to 3, and the maximum possible score is 63 points. The BDI items refer to aspects ranging from feelings of sadness and self-depreciation to suicidal ideation. Scores for the Brazilian Portuguese of the BDI can be classified as follows:0-1, minimum; 12-19, mild; 20-35, moderate; and 36-63, severe.[1,12,19,20] A score of 11 was used as the cutoff point for the diagnosis of depression.

Statistical analysis

To detect differences in the order of 20% in total scores between the two groups, considering a power of 80% and a significance level of 95%, the sample size was calculated at approximately 103 students in each group.

The first objective of the analysis was to ascertain whether the groups were statistically comparable. Income was found to be an important confounding factor; therefore, all later analyses were performed so as to control for that variable.

Analyses were conducted using the chi-square test for categorical variables and the *t* test for continuous variables. Simple bivariate Poisson regression analyses – with adjustment for robust variances – were performed, with anxiety and depression as the outcome. Variables with a p-value below 0.2 were included. All analyses were conducted in PASW Statistics 18.0.

Results

Between-group comparisons

Overall, 149 students were enrolled in the first year of the UFRGS School of Medicine in 2010, and 195 students were enrolled in the sixth year in 2010 and 2011, according to a list provided by the university. Two-hundred and thirty-two questionnaires were collected: 110 from first-year students (73.82% of those enrolled) and 122 from sixth-year students (62.56% of the students enrolled) (Table 1).

The variables income, medication use, and alcohol/ drug intake were controlled in between-group comparisons. Groups differed significantly in terms of age, which was expected in view of the 6-year duration of medical school in Brazil (p < 0.001). Mean age was 20.7±2.6 years in the first-year group and 25.3±2.7 years in the sixth-year group. Involvement in paid activities was significantly higher in the sixth-year group (p < 0.001).

Overall, 44.5% of the sample reported alcohol/drug intake. The frequency of consumption was higher among sixth year students (p = 0.005). Use of stimulants was reported by 78.7%, with no significant difference between first- and sixth-year students. Tobacco use was infrequent (4.4% of the sample). Use of various medications was reported by 42.8% of the sample, at a higher frequency among sixth-years (p = 0.012).

Severity and prevalence of anxiety symptoms

The mean scores of anxiety symptoms among first-year students (8.61±7.66) were higher than those observed in sixth-years (4.99±5.36). Among the students who exhibited anxiety symptoms in the first-year group, 19.2% (n=20) had mild symptoms, 8.7% (n=9) had moderate symptoms and 2.9% (n=3) had serious symptoms. Gender analysis revealed a higher prevalence in women, who constituted 62.5% of the sample (n=20). In the sixth-year group, 6.8% (n=8) had mild symptoms, 1.7% (n=2) had moderate symptoms, and 0.9% (n=1) had severe symptoms; 82% of sixth-years with anxiety symptoms were women (n=9). The difference in prevalence levels was statistically significant (p < 0.001).

Bivariate analysis of the entire sample by gender revealed a higher prevalence of anxiety symptoms in women (26.6% [n=29], 20 of whom were first-year students) than men (12.5% [n=14], 12 of whom were first-year students (Table 2).The following variables were not associated with presence of anxiety: involvement in

Table 1 Summary of sample characteristics

Variable	First year (%)	Sixth year (%)	Total	p-value
Number of students, % (n)	47.4 (110)	52.6 (122)	232	
Age, mean ± standard deviation*	20.7±2.6	25.34±2.7	23.1±3.2	-
Males[†]	56.4	45.1	50.4	0.113
Involved in leisure activities[†]	87	90.1	88.6	0.605
Living with family[†]	59.6	45.9	52.4	0.051
Living in communal off-campus housing[‡]	7.3	6.6	6.9	> 0.999
Household income[‡] (categorical)				
< R$ 3,000.00[§]	16.8	108.3	12.3	0.021
R$ 3,000.00 to R$ 10,000.00[‖]	53.3	45.8	49.3	
≥ R$ 10,000.00[¶]	29.0	45.8	38.3	
Paid employment[†]	10.0	35.5	23.4	< 0.001
Coffee intake[†]	74.1	82.8	78.8	0.147
Alcohol/drug use[†]	35.2	54.5	45.4	0.005
Physical illness[†]	25.9	3.5	30.7	0.180
Medication use[†]	33.6	51.3	42.8	0.012

Data expressed as percentages unless otherwise stated.
* Student's *t* test.
[†] Pearson's chi-square test with continuity correction.
[‡] Pearson's chi-square.
[§] Equivalent to US$ 1,749.27 at the time of data collection.
[‖] Equivalent to US$ 1,749.27-5,830.90 at the time of data collection.
[¶] Equivalent to US$ 5,830.90 at the time of data collection.

recreational activities, living with family, living in communal off-campus housing, coffee intake, cigarette smoking, and presence of physical illness. Anxiety symptoms were present in 30.8% of the first-year students and in 9.4% of the sixth-year students, with a significant between-group difference (p < 0.001).

When variables were adjusted for sex, leisure activities, living in off-campus communal housing, paid activities, drug use, alcohol intake, cigarette smoking, and medication use (all with p > 0.20), the only variables which remained statistically significant were year of medical school and medication use. The relative risk (RR) of developing anxiety symptoms in the first year was 3.79 (95%CI 1.56-9.20, p = 0.003), and medication use increased the risk of anxiety by 2.69 (95%CI 1.43-5.08, p = 0.002).

Severity and prevalence of depression symptoms

There was no significant between-group difference regarding the severity of depressive symptoms, with mean scores of 8.02±6.14 and 6.62±5.23 points on the BDI scale in first- and sixth-year respondents respectively. Within the overall sample, there were 43 students with depressive symptoms (18.6%), of whom 34 (14.7%) presented mild symptoms and nine (3.9%) had moderate symptoms. None of the subjects in the sample exhibited a serious level of depressive symptoms.

There was no difference in prevalence of depressive symptoms when comparing first- and sixth-year respondents. In the first-year group, 24 students reported depressive symptoms (21.8%), of whom 18 had mild and six had moderate symptoms. In the sixth-year group, 19 students (15.6%) had depressive symptoms, of whom 16 had mild and three had moderate symptoms. Of the students exhibiting depressive symptoms, 18 (42.9%) were male and 25 (58.1%) were female.

The final regression model presented in Table 3 demonstrated an association between depressive symptoms and tobacco smoking (RR 3.12, 95%CI 1.30-7.51) and between depressive symptoms and dissatisfaction with medical school (RR 4.32, 95%CI 2.34-7.97).

Discussion

The main objective of the present study was to investigate the differences in prevalence and severity of anxiety and depressive symptoms among medical students, comparing first-year to sixth-year (last-year) students, at the UFRGS School of Medicine.

Yusoff et al. noted that, even before entering medical school, the future pupils assessed in his study exhibited high levels of anxiety, probably as a secondary or side effect of the admission process. He also reports that, contrary to expectations, the students' stress level did not diminish after the admission process.[13] Our findings are in line with those of Yusoff et al., demonstrating high prevalence and severity of anxiety among first-year medical students. On the other hand, our findings differ from those of Baldassin,[2] who reported a higher frequency of anxiety symptoms among sixth-year students in the preparatory period that precedes residency program entrance exams.

Sample

The overall response rate to the questionnaires was 67.4%, with a higher resistance to participation among sixth-year students, which resulted in the inclusion of new sixth-year groups in 2011.

Regarding the profile of the groups, the age difference observed is consistent with what was expected, taking into account the length of the course. Regarding income and paid activities, it bears stressing that sixth-year students had better financial conditions, which may be due to activities such as research or extension grants or even working duty shifts. Furthermore, the first-year

Table 2 Bivariate analysis and Poisson regression with anxiety as outcome

		Bivariate analysis		Poisson regression	
	n (%)	Relative risk, crude (95%CI)	p-value	Relative risk, adjusted (95%CI)	Adjusted p-value
Sex					
Female	29 (26.6)	2.13 (1.19-3.80)	0.011	1.64 (0.88-3.04)	0.119
Male	14 (12.5)	1.00		1.00	
Age					
Lower than median ($\leqslant$ 23 years)	29 (25.0)	1.87 (1.05-3.35)	0.034		
Higher than median ($>$ 23 years)	14 (13.3)	1.00			
Year of medical school					
First year	32 (30.8)	3.27 (1.74-6.16)	$<$ 0.001	3.27 (1.75-6.08)	$<$ 0.001
Sixth year	11 (9.4)	1.00		1.00	
Involvement in leisure activities					
Yes	35 (18.1)	0.59 (0.31-1.13)	0.111	0.66 (0.37-1.15)	0.144
No	8 (30.8)	1.00		1.00	
Living with family					
Yes	24 (20.5)	1.11 (0.65-1.91)	0.700		
No	19 (18.4)	1.00			
Living in communal off-campus housing					
Yes	1 (7.1)	0.35 (0.05-2.37)	0.283		
No	42 (20.3)	1.00			
Family income					
$<$ R$ 3,000.00*	7 (25.0)	1.71 (0.47-3.91)	0.205		
R$ 3,000.00 to R$ 10,000.00[†]	23 (21.5)	1.47 (0.78-2.77)	0.236		
$\geqslant$ R$ 10,000.00[‡]	12 (14.6)	1.00			
Paid employment					
Yes	4 (8.2)	0.36 (0.13-0.95)	0.040	0.48 (0.17-1.36)	0.167
No	39 (22.8)	1.00		1.00	
Coffee intake					
Yes	31 (18.0)	0.77 (0.42-1.41)	0.400		
No	11 (23.4)	1.00			
Alcohol/drug use					
Yes	13 (13.3)	0.55 (0.30-1.00)	0.049	0.82 (0.45-1.48)	0.511
No	29 (24.2)	1.00		1.00	
Cigarette smoking					
Yes	3 (33.3)	1.73 (0.66-4.55)	0.264		
No	40 (19.2)	1.00			
Physical illness					
Yes	20 (29.9)	2.13 (1.24-3.66)	0.006	1.44 (0.86-2.42)	0.165
No	21 (14.0)	1.00		1.00	
Medication use					
Yes	29 (31.9)	2.73 (1.53-4.86)	0.001	2.77 (1.47-5.20)	0.002
No	14 (11.7)	1.00		1.00	
Satisfaction with the course					
Dissatisfied	4 (44.4)	2.35 (1.06-5.19)	0.035	2.07 (1.06-4.06)	0.034
More or less satisfied	7 (16.3)	0.86 (0.41-1.81)	0.691	0.93 (0.49-1.77)	0.824
Satisfied	32 (18.9)	1.00		1.00	

95%CI = 95% confidence interval.
* Equivalent to US$ 1,749.27 at the time of data collection.
[†] Equivalent to US$ 1,749.27-5,830.90 at the time of data collection.
[‡] Equivalent to US$ 5,830.90 at the time of data collection.

group included students admitted under affirmative action policies at the time of data collection (20% of the total number of students), which might have contributed to a reduction in mean household income.

The overall prevalence of illicit drug use (cannabis, hashish, cocaine, crack, hallucinogens, volatile solvents, and amphetamines) in the sample was 44.5%. According to Barría et al.,[14] use of drugs and psychoactive agents increases throughout academic life as access to such drugs becomes easier, since almost half of their sample began using drug only after being admitted to university. In the medical school setting, drug use is associated with social life (e.g., in events that help integrate freshmen and seniors), provides a means of escaping from anxiogenic situations, and (particularly stimulant use) is used as a means of enhancing work and study capacity.

Table 3 Bivariate analysis and Poisson regression with depression as outcome

		Bivariate analysis		Poisson regression	
	n (%)	Relative risk, crude (95%CI)	p-value	Relative risk, adjusted (95%CI)	Adjusted p-value
Sex					
Female	25 (21.7)	1.41 (0.82-2.46)	0.217		
Male	18 (15.4)	1.00			
Age					
Lower than median ($\leqslant$ 23 years)	27 (22.1)	1.52 (0.87-2.67)	0.143	1.21 (0.52-2.80)	0.659
Higher than median ($>$ 23 years)	16 (14.5)	1.00		1.00	
Year of medical school					
First year	24 (21.8)	1.40 (0.81-2.41)	0.224	0.91 (0.40-2.06)	0.814
Sixth year	19 (15.6)	1.00		1.00	
Involvement in leisure activities					
Yes	36 (17.7)	0.66 (0.33-1.33)	0.242		
No	7 (26.9)	1.00			
Living with family					
Yes	22 (18.2)	0.95 (0.55-1.63)	0.859		
No	21 (19.1)	1.00			
Living in communal off-campus housing					
Yes	5 (31.1)	1.78 (0.81-3.88)	0.150	1.64 (0.70-3.85)	0.257
No	38 (17.6)	1.00		1.00	
Family income					
$<$ R\$ 3,000.00*	7 (25.0)	1.67 (0.74-3.78)	0.215		
R\$ 3,000.00 to R\$ 10,000.00[†]	21 (18.8)	1.26 (0.67-2.36)	0.482		
$\geqslant$ R\$ 10,000.00[‡]	13 (14.9)	1.00			
Paid employment					
Yes	5 (9.3)	0.44 (0.18-1.07)	0.071	0.51 (0.20-1.29)	0.156
No	37 (20.9)	1.00		1.00	
Coffee intake					
Yes	29 (16.0)	0.60 (0.34-1.07)	0.085	0.66 (0.36-1.20)	0.178
No	13 (26.5)	1.00		1.00	
Alcohol/drug use					
Yes	20 (19.2)	1.09 (0.63-1.89)	0.751		
No	22 (17.6)	1.00			
Cigarette smoking					
Yes	4 (40.0)	2.24 (0.99-5.03)	0.052	3.12 (1.30-7.51)	0.011
No	39 (17.9)	1.00		1.00	
Physical illness					
Yes	16 (22.9)	1.34 (0.77-2.32)	0.301		
No	27 (17.1)	1.00			
Medication use					
Yes	22 (23.2)	1.40 (082-2.39)	0.218		
No	21 (16.5)	1.00			
Satisfaction with the course					
Dissatisfied	8 (80.0)	5.48 (3.42-8.77)		4.32 (2.34-7.97)	
More or less satisfied	9 (20.5)	1.40 (0.71-2.77)	$<$ 0.001	1.14 (0.54-2.37)	$<$ 0.001
Satisfied	26 (14.6)	1.00	0.333	1.00	0.731

* Equivalent to US\$ 1,749.27 at the time of data collection.
† Equivalent to US\$ 1,749.27-5,830.90 at the time of data collection.
‡ Equivalent to US\$ 5,830.90 at the time of data collection.

The difference in alcohol and drug intake between the first- and sixth-year groups was statistically significant, with a lower prevalence of use among first-years. The remaining demographic variables, including involvement in leisure activities, living with family or in communal off-campus housing, coffee intake, and presence of physical illness, were similar in the two groups. The clinical conditions most cited by participants with some physical illness were rhinitis (n=16), asthma (n=14), attention deficit/hyperactivity disorder (ADHD) (n=6), and hypothyroidism (n=6); 22 other illnesses were reported by one participant each.

Anxiety

Regarding anxiety symptoms, the literature notes that young people who study biomedical sciences are more

anxious than those who study humanities. The same fact was mentioned in a U.S.-based systematic review by Dyrbye et al.,[1] in which the prevalence of anxiety symptoms among medical students proved to be higher than in the general population. These figures were similar among cross-sectional and longitudinal studies using different instruments. Sahoo & Khess showed a 24.4% prevalence of anxiety among students aged 17 to 22 years who attended various colleges.[21]

In the present sample, the prevalence of anxiety symptoms was 19.5% – higher than the average in the Brazilian general population, which is estimated at 12.5% for disorders of the anxiety spectrum and lower than in college students in the Sahoo & Khess sample.[5,21] In a review of Brazilian studies published from 1997 to 2009, Baldassin[12] found that anxiety levels among medical students ranged from 1.9 to 79.9%. We were unable to find any epidemiological studies reporting anxiety levels in the general Brazilian population in the same age range of our sample.

Despite this difference, it is important to note that the higher prevalence of anxiety symptoms found in these subjects is entirely attributable to the high prevalence of these symptoms in the first-year groups, in which 30.8% of students reported anxiety symptoms; conversely, the sixth-year groups had a 9.4% prevalence of anxiety, which is lower than that seen in the general population. Besides the difference in prevalence, the severity of anxiety exhibited by first-year students was 3.27 times greater than that of sixth-year respondents.

The studies reviewed by Dyrbye et al.[1] point to a higher prevalence of anxiety symptoms among women, but there was no unanimity or consensus among the authors in this respect. The present investigation found a statistically significant gender difference in the prevalence of anxiety symptoms on bivariate analysis, but this outcome was not found in the multivariate model.

Several factors were found to be protective against anxiety symptoms in the bivariate model, such as involvement in leisure activities, paid activities, and drug and alcohol use; conversely, risk factors for anxiety included female gender, attending the first year of medical school, presence of a physical illness, medication use, and dissatisfaction with the course.

In the final model, the sole factors associated with increased risk of anxiety were attending the first year of medical school (RR 3.27, 95%CI 1.75-6.08) and medication use (RR 2.77, 95%CI 1.47-5.20), conditions which, if concomitant, provide a relative accumulated risk of 9.06.

Sixth-year students were less anxious and used more medication. One possibility is that use of medication interferes as a mediating factor between year of medical school and presence of anxiety symptoms.

Depression

The age of onset of depression is usually between 20 and 40 years. Social factors may place younger people at a higher risk.[5] Studies[17,22] have reported a prevalence of depressive symptoms of 12% among younger students

of health-related areas, demonstrating that the occurrence of depression tends to decrease as the course progresses.

In contrast to the current literature,[1,9] which tends to demonstrate a higher prevalence of depressive symptoms among females, male and female students in our sample did not show significant differences.

Brandtner & Bardagi[5] demonstrated that factors such as academic performance, involvement in leisure activities, psychological and psychiatric treatment, family atmosphere, and degree of satisfaction with the course reduced the occurrence of depressive symptoms. In our sample, however, no statistically significant correlation was obtained, a fact that might be related to the percentage of students who reported depressive symptoms (18.6%).

A sample similar to ours was studied by Brandtner & Bardagi,[5] who assessed medical students attending a private university in the same state of Brazil. The overall prevalence of depressive symptoms in that study was 29.5% – higher than that found in the present investigation, which was 18.6%. Ibrahim et al.[23] reported a mean prevalence of depression of 30.6% among undergraduate university students. Coelho et al. noted that the prevalence of depressive symptoms among Brazilians aged 18 to 24 years was 28.2%.[24]

The highest prevalence of depressive symptoms found (79.25%) was described in Uberlândia, state of Minas Gerais, in the Southeast region of Brazil.[24] As found on bivariate analysis of the present sample, depressive symptoms are more prevalent among first-year students, as found in both studies carried out in Southern Brazil and running counter to the findings observed in the Uberlândia study.[25] In all of these studies, the prevalence of anxiety symptoms was higher than the prevalence of depression in the general population, which is 3-11%.

Even with prevalence differences, Abrão et al.[25] found the same inverse and statistically significant relationship between degree of satisfaction with medical school and depressive symptoms, as shown in this study. The authors reported that low involvement in academic activities, as measured by the degree of satisfaction, is reflected by more expressive symptoms of depression.[24]

Therefore, the present study contributes to the literature by presenting the profile of those medical students more likely to suffer from depressive symptoms: namely, smokers who are dissatisfied with medical school present, who present a 13.48 relative risk of experiencing symptomatic depression.

Transition moments in life are drivers of anxiety. This might justify the findings of the study, which demonstrated a greater intensity of anxiety symptoms in first-year medical students. Medical training exposes students to the reality of hospital life since the first year of the course, contributing to insecurity in beginners (freshmen) who must start to deal with illness and face – prematurely – life and death dilemmas. The knowledge acquired throughout medical school, the changes in age group, and the day-to-day experiences of clinical practice may be conducive to better emotional conditions for the sixth-year

students to face problems similar to those confronted when they first entered medical school; this might explain the lessening of anxiety symptoms seen by the end of the course.

One might assume that the higher prevalence of anxiety in students who are beginning medical school is the result of a sum of factors: the high level of physical and mental demands imposed by the entrance exam, in which only a minority of applicants are approved in their first attempt; family expectations, which might rebound on the students; their own expectations as freshmen, who often fantasize about an idealized environment and have difficulties facing university life, with a very different approach from high school and preparatory courses; the ambivalent attitude of seniors, who may welcome new entrants with assistance, but often subject them to heavy hazing; and the need to adapt to a new world of relationships and duties and to the emotional impact of these demands.

Over the course of medical school, a progressive adaptation to all of the aforementioned aspects can be observed, as can an increasing acceptance of the role of being a medical student, through successive identification with several role models – such as professors and residents; encountering positive and negative experiences with patients and different approaches to care; and participation in research groups and social interactions, so that the initial anxiety is significantly reduced, as observed in this sample.

These findings can be used to draw a profile of students at higher risk of anxiety and depression, onto which efforts and early intervention strategies can focus, highlighting the fact that medical school is in itself an important stressor, particularly for female students. We suggest that intervention proposals be developed to protect the mental health of medical students.

In summary, the results presented herein provide information on the mental health of students attending the first and last years of medical school, revealing a high prevalence of anxiety and identifying factors associated with these symptoms in the sample, mainly among first-year students.

These findings highlight the need for making psychological counseling and support services available to vulnerable students. In addition, these findings should be further explored in longitudinal studies to identify the stressors leading to adverse mental health outcomes and appropriate interventions. Counseling and preventive mental health services should be an integral part of routine care in clinical facilities that serve medical students.

Some limitations of the present study should be taken into account. Because of its cross-sectional design, no causal relationships between events could be established, as data on exposure and outcome were being collected concomitantly.

The initial difficulty of data collection due to the low adherence of sixth-year students should be taken into account. This may be attributable to such factors as higher workload and longer hours, call hours, and increased study demands due to impending residency exams. Therefore, the data collection period had to be extended, including one more semester in the sample of sixth-year students.

Data collection between the first- and sixth-year groups was carried out in different environments due to the reality of the students' activities within the program. To the detriment of the initial semesters, during which subjects of the core curriculum are studied in class, later stages of the course involve more subjects which are mostly practical, as well as internships, meaning that students' activities take place in different facilities and even in different hospitals. This accounts for the heterogeneity of places where the data were collected.

While the first-year groups completed their questionnaires in class and at the same time (May 2010, halfway through the semester), sixth-year data collection took place at different points in time, depending on students' current rotations. It bears stressing that the results of this study refer only to the sample of students attending medical school at UFRGS and to the geographical setting where the research was carried out, and should not be generalized to other populations.

Furthermore, due to logistical issues, we could neither collect data simultaneously nor obtain data from the students who did not complete the study instruments.

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Disclosure

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