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ORIGINAL ARTICLE

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ABSTRACT

Background: Anxiety and depression can affect university students at any stage of their academic life. Studies that assessed the prevalence of mental disorders during remote teaching amid the COVID-19 pandemic are scarce in Brazil.

Objective: This study aimed to estimate the prevalence of symptoms of anxiety and depression and their relationship with sociodemographic characteristics among university students from

the Federal Institutions of Higher Education (IFES) in the Brazil during the COVID-19 pandemic.

Methods: This is a multicenter, cross-sectional study carried out with students regularly enrolled in undergraduate courses at eight Brazilian IFES. Data collection was conducted between October 2021 and February 2022 using an online self-completed questionnaire, which addressed sociodemographic and academic characteristics, lifestyle habits, and health conditions. Symptoms of anxiety and depression were assessed using the Depression, Anxiety, and Stress Scale-21 (DASS-21). Variables were analyzed descriptively using frequency distribution and Pearson's chi-square test. To estimate the prevalence of symptoms of anxiety and depression, the proportion and 95% confidence interval (95%CI) were used. The level of adopted statistical significance was 5%.

Results: A total of 8.650 students participated, and most of them were women, white, heterosexual, cisgender, unmarried, with mean age of 23.9 years (SD: ± 6.34), and living with family members. Symptoms of anxiety and depression were observed in 59.7% (95%CI: 58.7–60.7) and 63.0% (95%CI: 62.0–64.0) of the students, respectively. These symptoms were associated with sex, age, skin color, sexual orientation, gender identity, marital status, education of the head of the family, family income, decrease in income during the pandemic, and area of knowledge.

Conclusion: Most university students showed symptoms of anxiety and depression during the suspension of face-to-face activities in universities, indicating the need for institutional actions and public policies aimed at promoting the health and mental well-being of students in universities.

KEYWORDS: covid-19. Anxiety. Depression. Mental health. Students. Multicenter study

INTRODUCTION

Anxiety and depression are among the most prevalent mental health disorders, particularly in low-income countries. At a global level, it is estimated that 3.6%–4.4% of the population is affected by anxiety and depression, respectively.[1] The COVID-19 pandemic caused widespread concern and raised several questions about its impacts on mental health, driven by direct psychological effects and short- and long-term social and economic consequences for the population.[2,3]

In response to the COVID-19 pandemic, universities suspended face-to-face activities for a period and later adopted remote teaching. Studies indicate that this adopted strategy resulted in negative psychological effects among university students, probably owing to the interruption of academic routine, which compromise the progress of undergraduate courses, uncertainty regarding future careers, and impact on social life, as interaction among people was affected.[4,5]

Moreover, prior to the pandemic, university students were characterized as a group susceptible to experiencing episodes of anxiety and depression at any stage of their academic life, both because of their vulnerability to psychosocial stressors related to the difficulties of their academic routine —and because of different changes that occur in their life.[6,7] The intensification of study hours and amplification of self-demand are potential elements of mitigation of students' psychological state.[8] However, most studies that assess the prevalence of symptoms of anxiety and depression among university students are restricted to particular courses, such as in the health area, limiting the extrapolation of results to the university population in general.[9–11]

Thus, considering that university students are a vulnerable group to the negative effects of the COVID-19 pandemic, particularly with regard to mental health, this study estimates the prevalence of symptoms of anxiety and depression and their relationship with sociodemographic characteristics of university students from Federal Institutions of Higher Education (IFES) in the Brazil during the COVID-19 pandemic. Such information can help in understanding the factors related to the increase in the prevalence of mental disorders among university students. It shall support the development and improvement of strategies and actions on structuring supportive and inclusive environments aimed at physical and mental well-being of university students, considering the restart of face-to-face academic activities.

METHODS

Study design and population

The study "Symptoms of anxiety and depression disorder among university students in Minas Gerais: Prevalence and associated factors," also called Project on Anxiety and Depression in University Students (PADu multicenter), is a multicenter survey conducted on undergraduate students in eight IFES: Universidade Federal de Ouro Preto (UFOP), Universidade Federal de Minas Gerais (UFMG), Universidade Federal de Uberlândia (UFU), Universidade Federal de Juiz de Fora (UFJF), Universidade Federal de São João del-Rei (UFSJ), Universidade Federal de Lavras (UFLA), Universidade Federal dos Vales do Jequitinhonha e Mucuri (UFVJM), and Universidade Federal de Alfenas (UNIFAL-MG).
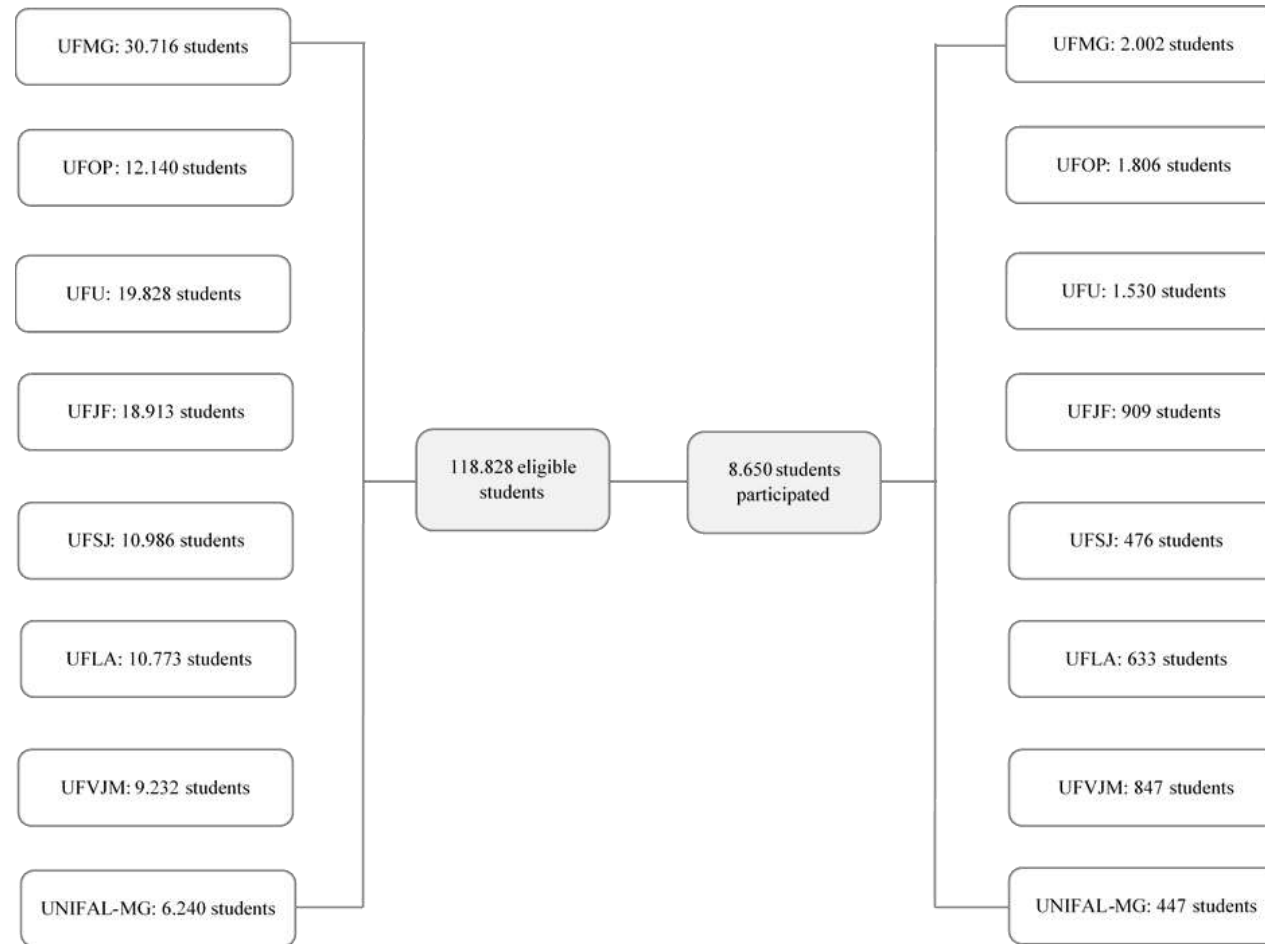
All students who were regularly enrolled in the second half of 2021 in the eight IFES were invited to participate in the survey, with 118.828 undergraduate students considered eligible. The PADu multicenter dataset was composed of valid information from 8.650 students, with a response rate of 7.3%. **Figure 1** presents a flowchart of student participation by university.

Inclusion criteria were age $\geq$ 18 years, students enrolled in any undergraduate courses in the eight IFES participating in the project, and those enrolled in any academic period. Students who did not complete the questionnaire, postgraduate and residency students, and those who were regularly enrolled butaway from academic activities or on exchange during data collection were excluded from the survey. It is important to highlight that as the questionnaire is online and that any student can access to it through social networks, graduate students and residents participate in the study. Only the data of undergraduate students who met the inclusion criteria were retained.

Data collection

Data collection was conducted between October 2021 and February 2022, which lasted for three months in each participating IFES. It began after the issuance of approval by the Research Ethics Committee of each university.

Figure 1. Flowchart of student participation by university. Minas Gerais, Brazil, 2021-2022

UFMG: 30.716 students			UFMG: 2.002 students
UFOP: 12.140 students			UFOP: 1.806 students
UFU: 19.828 students			UFU: 1.530 students
UFJF: 18.913 students	118.828 eligible students	8.650 students participated	UFJF: 909 students
UFSJ: 10.986 students			UFSJ: 476 students
UFLA: 10.773 students			UFLA: 633 students
UFVJM: 9.232 students			UFVJM: 847 students
UNIFAL-MG: 6.240 students			UNIFAL-MG: 447 students

The survey was widely publicized on the websites and social networks of the IFES and PADu (@padufederais), in addition to tutoring programs, laboratories, study and research groups, centers, and academic directories. As a communication and recruitment strategy for participants, a visual identity was developed and applied to all promotional materials, social networks, questionnaires, and materials used by the team.

Students received an invitation text and a link to access the self-administered and confidential questionnaire by email, which were available on Google Forms. Participation in the study was initiated when accessing the questionnaire upon agreement through the online check of the Free and Informed Consent Form presented electronically and available for download. All questionnaire items were presented, detailing important points and possible confusion.

To conduct data collection, the study required the participation of postgraduate students (doctoral and master's students) and scientific initiation. Each IFES had a reference researcher and at least one graduate or scientific initiation student to assist in the project. The team received prior training from the coordinating center (UFOP) aimed at standardizing data collection in different IFES. During the training, the researchers were informed about the importance of the research, topics addressed in the questionnaire, and methodological criteria of the study, in addition to how to send the questionnaire link and approach individuals for dissemination. In addition, a field manual was prepared, which contained information about the project, general instructions for collection, schedule of activities, and sending of emails. The entire data collection was monitored by a general research coordinator, aiming to maintain consistency in data collection procedures and homogeneity of information and, consequently, obtaining reliable data and reducing the chance of possible errors and biases, such as duplicates and typos.

Data collection instrument

The questionnaire used in the PADu multicenter study included questions specifically designed for the study, which were prepared by the team of researchers, and questions used in national surveys. Questions related to general, sociodemographic, and academic characteristics, lifestyle habits, health conditions, social support, quality of life, and resilience were included **(Table 1).**

To select the investigated topics, the researchers considered the available evidence regarding the outcomes of interest, comparability with similar studies, validated

instruments with open access, and meeting the research objectives of the eight IFES in the study.

Study variables

The presence of symptoms of anxiety and depression in the health condition block was assessed using the Portuguese version of the Depression Anxiety Stress Scale-21 (DASS-21) proposed in 2014 by Vignola and Tucci. The DASS-21 is a self-reported test composed of a set of three independent subscales, with seven questions each. The scale assesses symptoms of anxiety, depression, and stress presented by individuals in the last week, that is, the week prior to data collection, through the total scores obtained in the subscales.[27] The subscale items are divided as follows: depression subscale includes questions 3, 5, 10, 13, 16, 17, and 21; anxiety subscale includes questions 2, 4, 7, 9, 15, 19, and 20; and stress subscale incudes questions 1, 6, 8, 11, 12, 14, and 18.[32]

Responses to items were structured on a four-point Likert-type scale, ranging from 0 (did not apply at all) to 3 (applied a lot or most of the time). The answers "applied to some degree or for a short time" and "applied to a considerable degree or for a good part of the time" refer to scores 1 and 2, respectively. The scores for anxiety and depression are generated from the total scores and are then multiplied by 2, generating the classification levels as "normal," "mild," "moderate," "severe," and "extremely severe," **(Chart 1)**.

Chart 1. Instructions for summing individual scores for each response on the DASS-21 scale.

Classification of symptoms	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely severe	≥ 28	≥ 20	≥ 34

Source: Adapted from VIGNOLA, Rose Claudia Batistelli; TUCCI, Adriana Marcassa. Adaptation and validation of the depression, anxiety and stress scale (DASS) to Brazilian Portuguese. Journal of affective disorders, v.155, p.104-109, 2014.

In the present study, only symptoms of anxiety and depression were evaluated. Based on the classification presented above, the "moderate," "severe," and "extremely severe" levels were recategorized as "moderate to extremely severe" and the "normal" and "mild" levels as "normal and mild."

The sociodemographic variables used to describe the sample included: sex (male and female), age (18 to 20 years old, 21 to 22 years old, 23 to 25 years old, and ≥ 26 years old), skin color (white, brown, black and yellow, indigenous, and others), sexual orientation (heterosexual, homosexual, bisexual and asexual, and others), gender identity (cisgender, transgender, and non-binary), marital status (single, married/stable union, widowed, and divorced), housing (with family members and without family members), education of the head of the family (no education or incomplete primary education, complete primary education or incomplete secondary education, complete secondary education or incomplete higher education, and complete higher education), total family income (≤ 1 to 2 minimum wages, 3 to 5 minimum wages, 6 to 10 minimum wages, and > 10 minimum wages), and decrease in family income in the three months prior to the survey (no and yes). The salary value considered in this study refers to the minimum wage in force in 2021 (R$ 1.100.00).

Academic aspects related to the area of knowledge of the course (life sciences, exact sciences, and human and social and applied sciences) were also investigated and used to describe the data.

Statistical analyses

The use of the online questionnaire enabled the development of an automatic database that was exported to Microsoft Excel 2013. Subsequently, data coding and consistency were performed to ensure the quality and validation of the information.

For sample characterization and data comparison, the variables were analyzed using frequency distribution and Pearson's chi-square test. To estimate the prevalence of symptoms of anxiety and depression, the proportion and 95% confidence interval (95%CI) were used. The level of statistical significance in this study was 5%. Analyses were performed using Stata statistical software version 13.0 (Stata Corporation, College Station, USA).

Table 1. Topics included in the questionnaire of the Project on Anxiety and Depression among University Students (PADu-multicenter), 2021-2022.

Modules	Variables	References
Student identification	Enrollment*, course and institution	Questions prepared by the project researchers.
General characteristics and socioeconomic conditions	Age, city of residence and housing, race, biological sex, gender identity, sexual orientation, level of education of the head of the family, marital status, family income and religious belief	Questions taken from and/or based on the *Instituto Brasileiro de Geografia e Estatística*[12] and *Pesquisa Nacional de Saúde*[13] census.
Life habits	Number of subjects in remote teaching, difficulties in dealing with the pandemic, study routine Consumption of alcohol, tobacco and illicit substances. Practice of physical exercise and sedentary behavior Frequency and eating habits, self-efficacy for adopting healthy practices, emotional eating, body image, dysfunctional eating attitudes	Questions prepared by the project researchers. Questions taken from and/or based on the *Instituto Brasileiro de Geografia e Estatística,*[12] *Pesquisa Nacional de Saúde*[13] and *Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico* – VIGITEL[14] census. Questions based on VIGITEL. [14] Instrument constructed from items addressed in previous research with adolescents and young adults.[15-21] The Three Dietary Factors Questionnaire (TFEQ-21) was used to analyze the profile of eating behavior according to the emotional eating subscale score.[22] The translated and validated version for the Brazilian population was used.[23]

		Simplified questionnaire of dysfunctional eating attitudes based on the study by Ferreira and Veiga (2008).[24]
Health conditions	General health aspects, such as self-reported weight and height, presence of morbidities, self-rated health, suicidal ideation and medication use	Questions taken and/or adapted from the PNS (2013),[13] use of medication adapted from the study by Bertoldi et al. (2016)[25] and study of self-injury adapted from Fonseca et al. (2018).[26]
Anxiety, depression and stress scale	Variables that assess symptoms of anxiety, depression and stress	*Depression Anxiety Stress Scale-21* (DASS-21), translated and validated by Vignola and Tucci (2014).[27]
Social support scale	Variables that assess social support	Social support satisfaction scale (ESSS), version adapted from Ribeiro (1999)[28] and Zanini et al. (2009).[29]
Quality of life scale	Variables that assess quality of life	WHOQOL-bref, translated and validated by Fleck et al. (2000).[30]
Resilience scale	Variables that assess resilience	Connor-Davidson Resilience Scale (CD-RISC-10), translated and validated by Lopes and Martins (2011).[31]

Note: *The UFU CEP did not authorize collecting this information in order not to identify the student.

Ethical aspects

The PADu multicenter project was conducted according to the guidelines established by the Declaration of Helsinki and was approved by the Research Ethics Committee of the coordinating center (UFOP) under CAAE 43027421.3.1001.5150 and by the Ethics Committees of all (UFMG: 43027421.3.2004.5149; UFU: 43027421.3.2001.5152; UFJF: 43027421.3.2003.5147; UFSJ: 43027421.3.2002.5545; UFLA: 43027421.3.2006.5148; UFVJM: 43027421.3.2009.5108; e UNIFAL-MG: 43027421.3.2008.5142).

All participants were duly informed about voluntary collaboration and guaranteed anonymity, the research objectives, steps to be taken, risks and benefits of their participation, before signing the Free and Informed Consent Term and approval by the Ethics Committees in search.

RESULTS

Of the 8.650 participating students, the majority were women, with mean age of 23 years and 9 months (SD±6.34), white, heterosexual, cisgender, single, and living with family members. Approximately 41.0% of the students reported a family income of three to five minimum wages, and 51.6% reported a decrease in family income three months prior to data collection. With regard to the education of the head of the family, 39.4% of the students reported completing higher education. Students reported being enrolled in courses in the following areas of knowledge: 39.5% exact sciences, 31.9% life sciences, and 28.9% human and social and applied sciences. **Table 2** presents the main sociodemographic and academic characteristics of the participants.

Univariate analysis **(Table 2)** showed that sex, age, skin color, sexual orientation, gender identity, marital status, education of the head of the family, family income, decrease in family income, and area of knowledge were related to symptoms of anxiety and depression among students (p<0.050).

Among the participants, 59.7% (95%CI: 58.7–60.7) were classified as having anxiety symptoms; of them, 33.9% had extremely severe symptoms. The prevalence of symptoms of depression among students was 63.0% (95%CI: 62.0–64.0); of them, 32.5% were classified as having extremely severe symptoms **(Figure 2).**

Table 2. Sociodemographic characteristics of university students according to the presence of anxiety and depression symptoms during the covid-19 pandemic. PADu-multicentric, 2021-2022 (n= 8.650)

Variables	Total (n, %)	Anxiety symptoms		P value*	Depression symptoms		P value*
		Normal and mild (n=3.486)	moderate to extremely severe (n=5.164)		Normal and mild (n=3.201)	Moderate to extremely severe (n=5.449)	
Biological sex (n= 8.615)				<0.001			<0.001
Male	2.955 (34.3)	1.560 (52.8)	1.395 (47.2)		1.234 (41.8)	1.721 (58.2)	
Female	5.660 (65.7)	1.913 (33.8)	3.747 (66.2)		1.959 (34.6)	3.701 (66.4)	
Age				<0.001			0.006
18-20 years	2.552 (29.5)	969 (38.0)	1.583 (62.0)		977 (38.3)	1.575 (61.7)	
21-22 years	2.135 (24.7)	855 (40.0)	1.280 (60.0)		789 (37.0)	1.346 (63.0)	
23-25 years	2.000 (23.1)	759 (38.0)	1.241 (62.0)		677 (33.9)	1.323 (66.1)	
≥ 26 years	1.963 (22.7)	903 (46.0)	1.060 (54.0)		758 (38.6)	1.205 (61.4)	
Skin color (n= 8.474)				0.016			<0.001
White	4.694 (55.4)	1.953 (41.6)	2.741 (58.4)		1.833 (39.0)	2.861 (61.0)	
Brown	2.622 (30.9)	1.047 (39.9)	1.575 (60.1)		961 (36.7)	1.661 (63.3)	
Black	1.039 (12.3)	382 (36.8)	657 (63.2)		307 (29.6)	732 (70.4)	
Yellow, indigenous, and others	119 (1.4)	55 (46.2)	64 (53.8)		45 (37.8)	74 (62.2)	
Sexual orientation (n=8.374)				<0.001			<0.001
Heterosexual	5.714 (68.2)	2.614 (45.8)	3.100 (54.2)		2.412 (42.2)	3.302 (57.8)	
Homosexual	753 (9.0)	254 (33.7)	499 (66.3)		217 (28.8)	536 (71.2)	
Bisexual	1.685 (20.1)	467 (27.7)	1.218 (72.3)		448 (26.6)	1.237 (73.4)	
Asexual and others	222 (2.7)	51 (23.0)	171 (77.0)		37 (16.7)	185 (83.3)	
Gender identity (n= 8.433)				<0.001			<0.001
Cisgender	8.211 (97.4)	3.353 (40.8)	4.858 (59.2)		3.075 (37.4)	5.136 (62.6)	
Transgender	59 (0.7)	17 (28.8)	42 (71.2)		24 (40.7)	35 (59.3)	
Non-binary	163 (1.9)	42 (25.8)	121 (74.2)		30 (18.4)	133 (81.6)	

				P*			P*
Marital status				**<0.001**			**<0.001**
Single	7.775 (90.6)	3.067 (39.4)	4.708 (60.6)		2.819 (36.3)	4.956 (63.7)	
Married/stable union	709 (8.3)	356 (50.2)	353 (49.8)		321 (45.3)	388 (54.7)	
Widowed and divorced	98 (1.1)	42 (42.9)	56 (57.1)		44 (44.9)	54 (55.1)	
Housing				0.061			0.211
Without family members	2.048 (23.7)	2.697 (40.9)	3.905 (59.1)		2.467 (37.4)	4.135 (62.6)	
With Family members	6.602 (76.3)	789 (38.5)	1.259 (61.5)		734 (35.8)	1.314 (64.2)	
Education of the head of the family (n=8.528)				**<0.001**			**<0.001**
No education or incomplete primary education	1.297 (15.2)	429 (33.1)	868 (66.9)		405 (31.2)	892 (68.8)	
Complete primary education or incomplete secondary education	941 (11.0)	371 (39.4)	570 (60.6)		342 (36.3)	599 (63.7)	
Complete secondary education or incomplete higher education	2.931 (34.4)	1.171 (40.0)	1.760 (60.0)		1.035 (35.3)	1.896 (64.7)	
Complete higher education	3.359 (39.4)	1.463 (43.6)	1.896 (56.4)		1.381 (41.1)	1.978 (58.9)	
Total family income**				**<0.001**			**<0.001**
≤ 1-2 minimum wages	2.595 (32.1)	812 (31.3)	1.783 (68.7)		754 (29.1)	1.841 (70.9)	
3-5 minimum wages	3.310 (40.9)	1.383 (41.8)	1.927 (58.2)		1.219 (36.8)	2.091 (63.2)	
6-10 minimum wages	1.397 (17.3)	642 (46.0)	755 (54.0)		603 (43.2)	794 (56.8)	
> 10 minimum wages	788 (9.7)	416 (52.8)	372 (47.2)		404 (51.3)	384 (48.7)	
Drop in family income (n=8.195)				**<0.001**			**<0.001**
No	3.966 (48.4)	1.854 (46.8)	2.112 (53.2)		1.704 (43.0)	2.262 (57.0)	
Yes	4.229 (51.6)	1.463 (34.6)	2.766 (65.4)		1.332 (31.5)	2.897 (68.5)	
Area of knowledge				**<0.001**			**<0.001**
Exact Sciences	3.416 (39.5)	1.494 (43.7)	1.922 (56.3)		1.310 (38.3)	2.106 (61.7)	
Life Sciences	2.731 (31.6)	1.151 (42.1)	1.580 (57.9)		1.092 (40.0)	1.639 (60.0)	
Humanities and Social and Applied Sciences	2.503 (28.9)	841 (33.6)	1.662 (66.4)		799 (31.9)	1.704 (68.1)	

*P value obtained using Pearson's Chi-Square test; **The minimum wage in force in Brazil in 2021 = R$ 1.100.00

In bold: the statistically signifcant variables in the bivariate analysis.

Figure 2. Prevalence of anxiety symptoms and depression symptoms in university students. PADu-multicentric, 2021-2022 (n= 8.650)
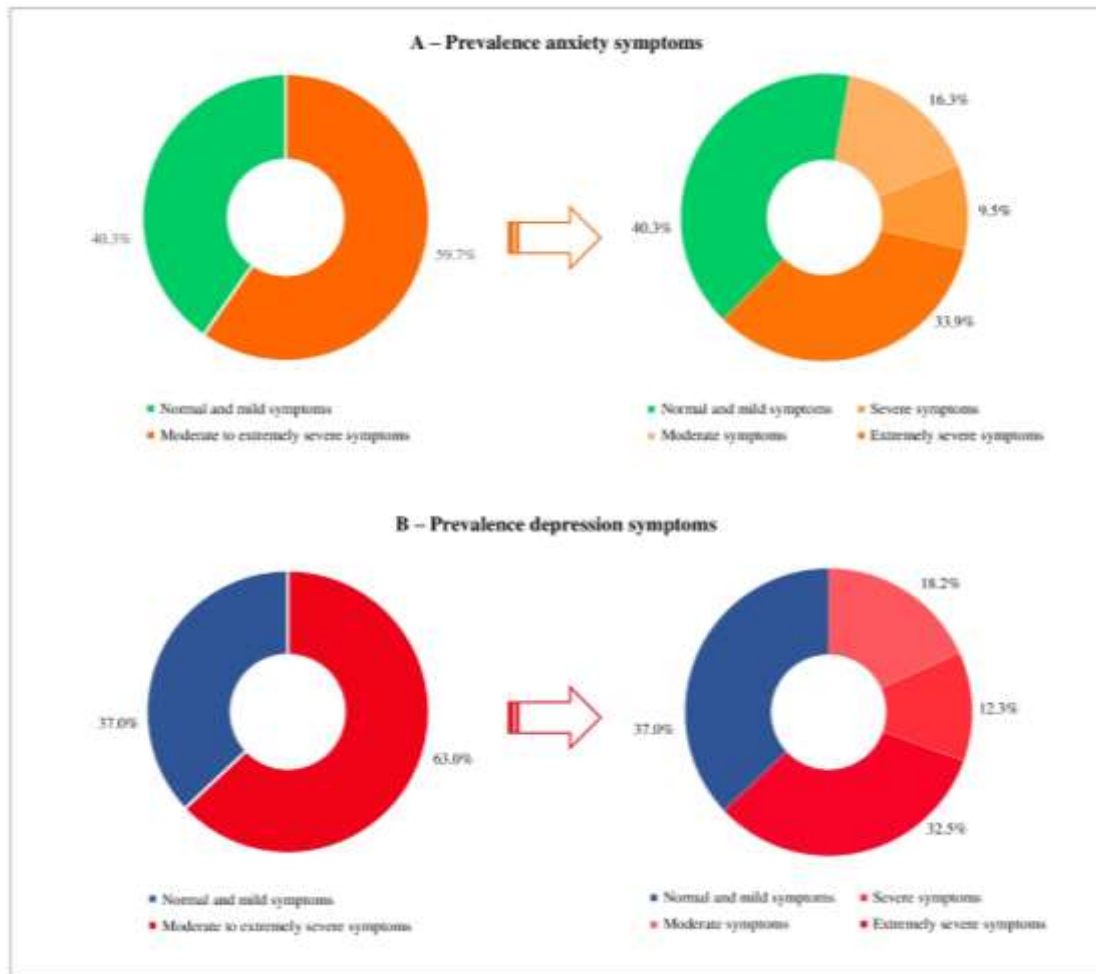
Figure 3 shows the prevalence of symptoms of anxiety and depression according to severity. It was observed that students from UFOP had a higher proportion of absence of symptoms of anxiety (40.8%) and depression (32.1%), considering the normal classification, and a lower proportion of extremely severe symptoms of both anxiety (29.3%) and depression (26.5%). When comparing the IFES, there was a higher prevalence of extremely severe anxiety symptoms among students from UNIFAL-MG (38.9%) and UFVJM (37.7%). However, a higher proportion of students with symptoms of extremely severe depression were observed in UFMG (35.4%) and UFJF (35.7%).

Figure 3. Prevalence of levels of anxiety symptoms and symptoms of depression in university students, according to participating federal institutions of higher education. PADu-multicentric, 2021-2022 (n= 8.650)
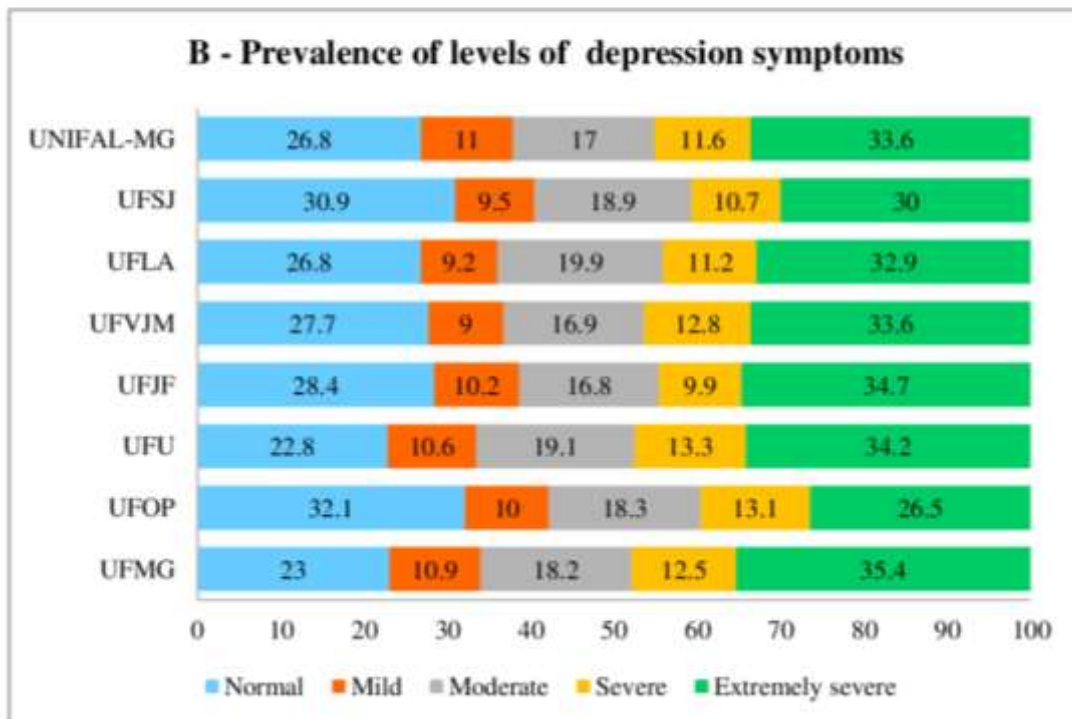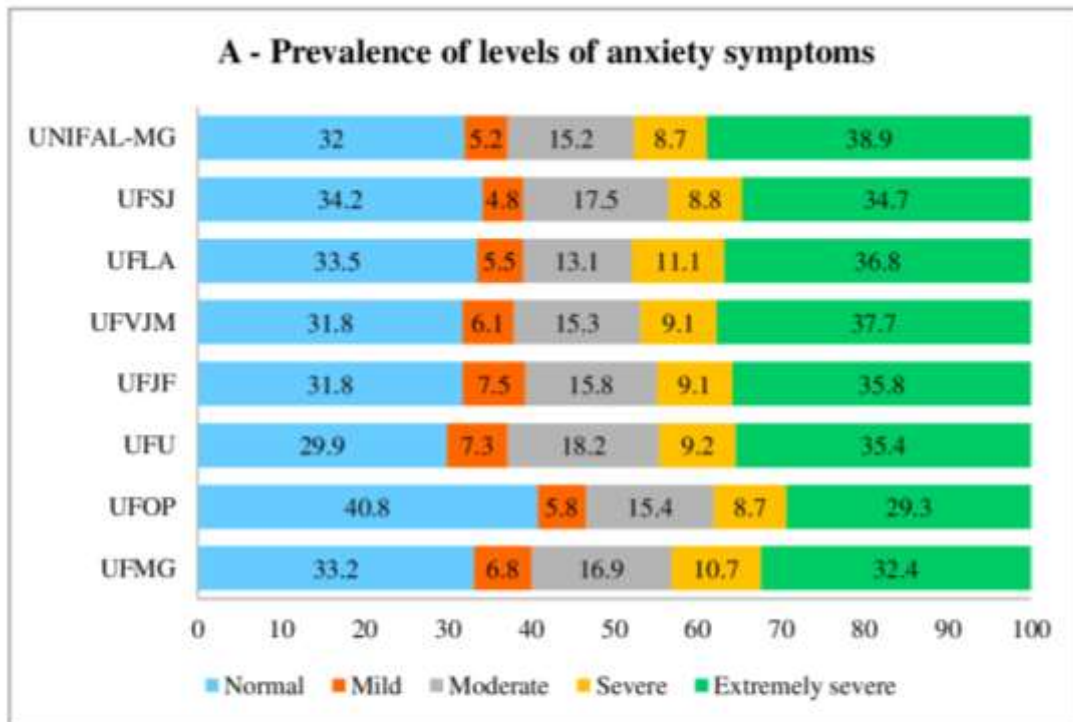
DISCUSSION

The results of this study indicate that the symptoms of mental disorders were highly prevalent among students from the eight IFES in Minas Gerais during the COVID-19 pandemic. In addition, there was a significant difference between the prevalence of moderate to extremely severe symptoms of anxiety and depression in relation to the analyzed sociodemographic and academic characteristics.

In the COVID-19 pandemic, high prevalence rates of mental disorders were estimated in the world population. Different meta-analyses indicate prevalences between 26.9%–38.1% and 28.0%–34.3% for symptoms of anxiety and depression in the general population, respectively.[33–36] In the pandemic context, Santomauro et al. (2021)[3] indicated an increase of 25.6% in anxiety diagnoses and 27.6% in new cases of depression. In a household epidemiological survey conducted on adults over 18 years of age during the pandemic between October and December 2020 in two cities in Brazil, symptoms of anxiety and depression were observed in 23.3% and 15.6% of the participants, respectively.[37]

In the university population, the prevalence of anxiety and depression during the pandemic is similar to or higher than that found in the general population,[38,39] corroborating the findings of this study. The results indicate an increase in the prevalence of mental disorders among university students during the COVID-19 pandemic when compared to studies conducted before this period.[40,41] In a study conducted in 2019 on students in the first semester at a public university, which used the DASS-21 scale, De Paula et al. (2022)[40] observed that the self-reported prevalence of symptoms of anxiety and depression among university students was 42.5% (95%CI: 37.4–47.7) and 33.2% (95%CI: 28.3–38.2), respectively, suggesting lower levels of mental disorders than those found in the present study during the pandemic.

In a survey conducted on students at a university in the United States in the first half of 2020, Wang et al. (2020)[42] found that 48.1% of undergraduate and graduate students had a moderate to severe level of depression, whereas 38.5% of students had mild to severe level of anxiety. The authors also found that most participants (71.3%) reported increased stress and anxiety levels during the COVID-19 pandemic owing to the abrupt transition and maintenance of online classes, concerns about grades, and late graduation. The prevalences found in the study by Wang et al. (2020)[42] are lower than those found in the present study; however, they show an increased prevalence in mental disorders among university students during the pandemic.

Thus, physical closure of educational institutions and the suspension of face-to-face activities during the COVID-19 pandemic resulted in challenges for the academic community and society,[43] with psychological implications for university students.[5] The period of distance teaching and learning was unprecedented and could have resulted in negative psychological consequences among university students.[4,43] Thus, it is possible that the higher prevalence of symptoms of anxiety and depression in this population can be a consequence of the drastic change in the routine of the university community, with significant effects in the short and long term.

In the present study, the estimates of the prevalence of symptoms of anxiety and depression varied according to the sociodemographic and academic characteristics of university students, such as sex, age, skin color, sexual orientation, gender identity, marital status, education of the head of the family, family income, decrease in income during the pandemic, and area of knowledge. Evidence show that mental disorders are more prevalent among female students, those who are older and of low socioeconomic status, those among ethnic-racial and sexual minorities (homosexuals and bisexuals), and students in health courses.[40,41,44,45] For example, gender difference may be correlated with personal stigma, vulnerability, prejudice, and gender discrimination, in addition to the fact that non-heterosexual women recognize symptoms of depression better and seek more help from counseling and health services than men and heterosexual women.[41,45]

The findings of this study are consistent with those in other studies conducted in the context of the pandemic, demonstrating that culturally disadvantaged and vulnerable groups, such as women, those of black origin and minority ethnicity, those with lower socioeconomic status, and sexual orientation of minorities, have a higher prevalence of symptoms of anxiety and/or depression.[2,46] Studies conducted on students in France between April and May 2020 observed that being of the binary or non-binary gender, reporting a decrease in income, poor quality housing, and not living with family members were risk factors associated with mental health problems among students who experienced the COVID-19 pandemic.[46]

This scenario may be understandable, considering the magnitude of changes in the academic routine owing to the inclusion of remote teaching.[47] However, universities play a fundamental role in supporting university students and in the development of public policies that focus on promoting mental health, as well as actions and strategies to better address the effects of the pandemic. In addition, considering that universities represent an opportune environment for health promotion, institutions should contribute support

networks and a welcoming counseling center for students for sharing coping resources and encouraging them to take measures to protect their mental health.[7]

The findings of the present study must be interpreted considering some limitations. First, the inherent limitation of the adopted design, owing to its cross-sectional nature, does not allow the assessment of the impact of the pandemic on the occurrence of mental disorders. Another limitation is the non-probabilistic sample, in which all students were invited to participate. Thus, the possibility of a response bias was highlighted. It is likely that those with a previous diagnosis of a mental disorder or related difficulties were more likely to participate in the study, which may have contributed to the overestimation of the prevalence of symptoms of mental disorders found in the present study. In addition, it is noteworthy that the presence of symptoms of anxiety and depression was measured using a self-reported scale that assesses the symptoms and is not based on a medical diagnosis of the disease. The stratification of the classifications adopted in this study may differ from those adopted by other authors in both national and international studies. Furthermore, it is important to consider that different measurement tools and cutoff points have been used to assess the presence of symptoms of anxiety and depression, which may have influenced the comparison of the studies presented here. Although the results indicate a high prevalence of mental disorders among students, interpretation and comparison with other studies should be conducted with caution.

Despite the mentioned limitations, the study has strengths and expands scientific knowledge about mental disorders among university students during the COVID-19 pandemic. It was conducted with a large sample of university students from eight public institutions of higher education, and the findings presented must be considered both at the state and local levels so that actions for the protection, control, and reduction of mental disorders could be targets for sustainable and effective policies in the university population.

CONCLUSION

Results showed a high prevalence of symptoms of anxiety and depression among students during the suspension of face-to-face activities in universities. Thus, together with other findings in the literature, this study adds relevant evidence to guide more cost-effective actions to priority groups, in addition to providing evidence of possible damages

resulting from the pandemic that require attention, as they may have consequences in the short and long terms.

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