Key characteristics including sex, sexual orientation and internet use associated with worse mental health among university students in Brazil and implications

Waléria de Paula[1], João Marcos Pereira[2], Nathalia Sernizon Guimarães[1], Brian Godman[3,4], Renata Cristina Rezende Macedo do Nascimento[5], Adriana Lúcia Meireles[6]

[1] Postgraduate Program in Health and Nutrition, Federal University of Ouro Preto, Ouro Preto, Minas Gerais, Brazil. Email: waleria.paula@aluno.ufop.edu.br
Email: nasernizon@gmail.com

[2] School of Nutrition, Federal University of Ouro Preto, Ouro Preto, Minas Gerais, Brazil. Email: joaomarcos1311@hotmail.com

[3] Strathclyde Institute of Pharmacy and Biomedical Sciences, University of Strathclyde, Glasgow, United Kingdom. Email: brian.godman@strath.ac.uk

[4] Division of Public Health Pharmacy and Management, School of Pharmacy, Sefako Makgatho Health Sciences University, 0204 Ga-Rankuwa, South Africa

[5] Department of Pharmacy, Postgraduate Program in Pharmaceutical Sciences (CiPharma), School of Pharmacy. Federal University of Ouro Preto, Ouro Preto, Minas Gerais, Brazil. Email: renata.nascimento@ufop.edu.br

[6] Department of Clinical and Social Nutrition, Postgraduate Program in Health and Nutrition, Federal University of Ouro Preto, Ouro Preto, Minas Gerais, Brazil. Email: adriana.meireles@ufop.edu.br

Corresponding Author: Waléria de Paula; Postgraduate Program in Health and Nutrition, School of Nutrition, Federal University of Ouro Preto, w/n. Zip-Code 35400-000, Ouro Preto, Minas Gerais - Brazil. Phone: +55 31 994772867 E-mail address: waleria.paula@aluno.ufop.edu.br

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Abstract

Background: The symptoms of anxiety and depression disorders are multifactorial and can trigger a series of problems especially among university students. The aim of this study was to assess the prevalence and associated factors with anxiety and depression symptoms among first-semester university students at a Federal University in Brazil given the paucity of such data and the first-semester is the most stressful time. **Methods:** Cross-sectional study with first-semester university students. The questionnaire included socio-demographic variables,

lifestyles, health conditions and the Depression Anxiety Stress Scales (DASS-21). Descriptive analysis was performed, followed by bivariate analysis and Poisson regression analysis. **Results:** 356 students (65.2%) across a range of courses in their first-semester participated. The prevalence of anxiety was 42.5% and depression 33.2%. Regarding symptoms of anxiety and depression disorders, a positive association was observed among females, non-heterosexual, non-white skin color, excessive internet use, lack of physical activity, not attending university parties, having psychological counseling, history of anxiety in first or second-degree relatives, poor self-rated health and use of psychotropic medicines. **Conclusions:** Due to the high prevalence of anxiety and depression symptoms, the importance of developing programs to promote mental and physical health of university students is highlighted.

Keywords: anxiety, depression, first-semester university students, universities, prevalence, Brazil.

Introduction

Anxiety and depression disorders are important public health problems, compromising the individual's daily activities, especially social relationships[1,2]. According to the World Health Organization (WHO), 3.6% and 4.4% of the world's population are affected by anxiety and depression disorders, respectively[3]. Mental health currently accounts for between 10.0% and 13.0% of the global disease burden, and is a leading cause of years lived with disability[4,5]. Of concern is that among lower- and middle-income countries (LMICs), the global burden of mental health disorders has increased in recent years enhanced by demographic, environmental and socio-political issues[6-8], and is particularly prevalent among the young with reported prevalence rates up to 28.0% for significant symptoms of anxiety and depression[9]. Depression in particular is associated with higher direct medical costs, with highest costs among adolescents[10]. Consequently, among university students, the prevalence of anxiety and depressive disorders may be even higher when compared to the general population[11-14], with this transition period between adolescence and adulthood predisposing university students to this development. It is also between the ages of 18 to25 years that most mental disorders arise, since many university students have difficulties in leaving their families along with the challenges of adaptation to the academic routine[13-18].

Overall, in any one year, it is estimated that between 12.0% to 46.0% of university students are affected by mental health disorders[13,19,20]. However, many studies that assess the prevalence in university students typically involve undergraduates in health-related courses[21-25]. We are aware that there have been several studies including all university students; however, few assess this population according to their time at university, i.e. the beginning, middle or end of their course[26,27]. Most first-semester university students are still experiencing the transition from adolescence to adulthood, which is a phase of multiple changes. In Brazil, university education is increasingly required as a condition of employment and social inclusion. However, the educational level among the Brazilian population is typically low and unequal although this is changing[28]. The method of entry into public universities in Brazil is the National High School Exam (*Exame Nacional do Ensino Médio – ENEM*), based on individualistic and competitive logic, which can increase the burden of stress alongside issues of anxiety, self-collection, and pressure from parents[15]. All of these points can make the first-semester a period when there is likely to be greater psychological vulnerability.

Given the high prevalence rates of anxiety and depression among university students generally, as well as the lack of studies evaluating differences between courses, especially in LMICs[17,20,29], the objective of this study was to analyze the prevalence of anxiety and depression symptoms and to investigate the potential associated factors among first-semester university students from the Federal University of Ouro Preto (UFOP) in Minas Gerais, Brazil. We believe it is particularly important to study this in Brazil as the country appears to have the highest prevalence of anxiety cases worldwide, corresponding at 9.3% of the population[3]. We choose UFOP for this initial research as UFOP is a traditional public university in Brazil admitting students from the different regions in Brazil[30]. Consequently, we believe our findings can lead to the development of pertinent initiatives to reduce future levels of anxiety and depression among this particularly vulnerable group not only in this University but across all of Brazil and wider.

Methods

Study design and population

This is a cross-sectional study, part of the project on anxiety and depression among university students – PADu, and uses data from the baseline of the longitudinal study conducted with university students at the UFOP: "Symptoms of anxiety and depression among university

students in Minas Gerais: longitudinal study". This study has data collection at three points in time. Firstly, at the beginning of the course (T0), secondly after two years of study (T1) and thirdly in the last year of the course (T2). The present study uses the data collected at T0. Due to the possible losses, which may occur in a longitudinal study, all university students enrolled in the first-semester of any of the included 14 UFOP courses, in 2019, were invited to participate.

The inclusion criteria were all university students officially registered in first-semester of UFOP selected courses, in 2019, in the major topic areas. These selected courses included life sciences (Physical Education, Pharmacy, Medicine and Nutrition), exact sciences (Architecture, Mathematics, Civil Engineering, Geological Engineering and Production Engineering) and humanities, social and applied sciences (Scenic Arts, Law, History, Journalism and Pedagogy), aged 18 years or older, encompassing a total of 546 first-semester students. The choice of courses took into account the greater number of students enrolled and the lower dropout rate throughout the chosen courses allowing for future comparison of data in a longitudinal study. Due to the possible losses, which may occur in a longitudinal study, all university students were invited to participate.

Data Collection and instrument

A pilot study with students from the last year of the UFOP Nutrition course, who would not enter the sample, was undertaken prior to data collection, between November and December 2018. This study tested the logistics of the survey, trained those responsible for the collection, as well as tested the understanding, acceptability and adequacy of the questionnaire for the purposes of the study.

Before starting data collection, one professor from each course was asked to give one hour / class to allow students to complete the questionnaire to enhance response rates. University students signed a consent form and answered a self-administered, confidential, printed questionnaire containing sociodemographic, lifestyle and health condition variables and the Depression Anxiety and Stress Scale (DASS-21) [31,32].

Outcome and explanatory variables

The outcome variable of this study was "anxiety and depression disorder symptoms" which was obtained through the DASS-21 scale. This scale is composed of three subscales, designed to self-report the symptoms of anxiety and depression during the week prior to data

collection[31,32]. Self-reporting is a basic approach, less expensive and frequently used in epidemiological studies. However, it cannot be considered a tool to define a diagnosis of a psychological disorder[33].

The scores for anxiety and depression were generated after the sum of the scores and subsequently multiplied by 2. The symptoms were categorized as "normal", "mild", "moderate", "severe" and "extremely severe". The symptoms of anxiety and depression disorder were subsequently reclassified as three categories (moderate, severe and extremely severe) used as determinants of the presence of the disorders. This was necessary to obtain a more homogeneous division of the sample in which statistical tests for two categories, such as chi square and Poisson regression, could be performed. In addition, this division allows separating common everyday symptoms ("normal" and "mild") from more harmful symptoms ("moderate", "severe" and "extremely severe").

The DASS has a larger version consisting of 42 items (DASS-42) and a reduced version with 21 questions (DASS-21). As for the validity and reliability of the results, this abbreviated version is equivalent or even superior to the DASS-42[34], consequently, used in our study. The DASS-21 questionnaire has been translated into Portuguese and validated for use in Brazil[32].

The explanatory variables were obtained by a compilation of validated questions from previous studies undertaken in Brazil – sociodemographic, lifestyles and health conditions[35-40]. In the statistical analysis, for the variables that presented numerical values (example "age" and "family income"), the median value was used as a cutoff point to categorize in a dichotomous way.

The research was approved by the UFOP Research Ethics Committee under number 9467919.5.0000.5150.

Statistical analyses

Firstly, the explanatory variables were categorized by the median and described by the frequency distribution.

Secondly, to verify association between the explanatory and the outcome variables, Poisson regression with robust variance was used considering a significance level of 5.0%. In this step, the explanatory variables with a p-value less than 0.20 in the bivariate analysis were selected for the multivariate analysis (Poisson regression) and age was used as adjustment.

Thirdly, the multivariate analysis by Poisson regression was performed, adopting the backward method was adopted to obtain the final model, where the variables with p-value lower than 0.05 remained. Lastly, the adjustment quality was verified by Hosmer-Lemeshow test.

All data analysis was performed using the software Stata® version 13.0.

Results

Among 546 first-semester university students officially registered in the selected 14 courses at UFOP, 356 (65.2%) completed the questionnaire. The descriptive data and the bivariate analysis of symptoms of anxiety and depression disorder are presented in Table 1. The majority of the students were female (57.6%), were 20 years old or less (65.2%), were heterosexual (79.7%), lived in students housing and/or with friends (56.2%), had religious beliefs (66.0%), made medium use of the internet (76.1%), practiced physical activity (62.9%), consumed alcohol (73.9%), attended college parties (56.9%), had good self-rated health (59.0%) and without excess body weight (77.5%), but had inadequate or risk eating habits (80.6%).

Table 1. Bivariate analysis of depression disorder symptoms in relation to sociodemographic variables, lifestyles and health conditions of first-semester students of the Federal University of Ouro Preto, 2019.

Variables	n	%	Anxiety (%)	p-value	Depression (%)	p-value
Sociodemographic characteristics						
Sex						
Male	151	42.4	31.3		26.0	
Female	205	57.6	50.7	**0.001**	38.5	**0.016**
Age						
18 - 20 years	232	65.2	45.0		34.2	
> 20 years	124	34.8	37.9	0.206	31.4	0.603
Knowledge área						
Life sciences	148	41.6	42.1		36.0	
Exact sciences	86	24.1	33.7	0.213	31.4	0.475
Human and social and applied sciences	122	34.3	49.2	0.250	31.1	0.400
Skin color						
White	181	50.8	37.6		27.6	
Other (yellow, brown, mulatto or black)	175	49.2	47.7	**0.055**	39.1	**0.024**
Sexual orientation* (n= 355)						
Heterosexual	283	79.7	38.6		30.5	
Non-heterosexual	72	20.3	56.9	**0.002**	43.1	**0.034**
Total household income (MW = R$ 998.00 or $ 200.00)						
<4 minimum wages	206	57.9	45.1		33.5	

≥ 4 minimum wages	150	42.1	38.9	0.248	32.9	0.904
Home						
Alone or with Family/ relatives	156	43.8	41.3		39.3	
Student housing or with friends	200	56.2	43.5	0.677	28.5	**0.032**

Table 1. Bivariate analysis of depression disorder symptoms in relation to sociodemographic variables, lifestyles and health conditions of first-semester students of the Federal University of Ouro Preto, 2019 (Continuation).

Religious belief						
No	121	34.0	44.6		38.8	
Yes	235	66.0	41.4	0.564	30.3	0.103
Lifestyles						
Internet use* (n= 351)						
Medium	267	76.1	39.3		28.5	
High or extreme	84	23.9	53.0	**0.020**	49.4	**<0.001**
Physical activity						
Yes	224	62.9	35.4		28.2	
No	132	37.1	54.6	**<0.001**	41.7	**0.009**
Alcohol consumption						
No	93	26.1	41.9		32.3	
Yes	263	73.9	42.7	0.892	33.6	0.816
Excessive consumption of alcohol* (n= 354)						
No	198	55.9	39.6		31.0	
Yes	156	44.1	46.1	0.215	35.9	0.328
Smoking						
No	294	82.6	41.0		31.7	
Yes	62	17.4	50.0	**0.170**	40.3	**0.176**
Illicit drug use						
No	297	83.4	41.2		32.1	
Yes	59	16.6	49.1	0.240	39.0	0.290
Attends college parties* (n=355)						
Yes	202	56.9	42.8		28.4	
No	153	43.1	42.5	0.955	39.9	**0.023**

Table 1. Bivariate analysis of depression disorder symptoms in relation to sociodemographic variables, lifestyles and health conditions of first-semester students of the Federal University of Ouro Preto, 2019 (Continuation).

Health conditions						
Self-rated health (SRH)						
Good SRH	210	59.0	35.4		23.9	
Poor SRH	146	41.0	52.7	**0.001**	46.6	**<0.001**
BMI (Body Mass Index) * (n= 355)						
Without excess body weight	275	77.5	41.2		30.7	
Excess body weight	80	22.5	46.2	0.415	42.5	**0.040**
Eating habits						
Inadequate	120	33.7	49.2		40.8	
Risk	167	46.9	39.2	**0.090**	33.7	0.217
Adequate	69	19.4	39.1	**0.197**	18.8	**0.005**
History of anxiety in first or second degree relatives						
No	223	62.6	39.6		29.3	

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Yes	133	37.4	47.4	**0.149**	39.8	**0.039**
History of depression in first or second degree relatives						
No	201	56.5	35.5		29.0	
Yes	155	43.5	51.6	**0.002**	38.7	**0.054**
Psychological counseling						
No	219	61.5	34.9		30.3	
Yes	137	38.5	54.7	**<0.001**	38.0	**0.132**
Use of psychotropic medicines						
No	278	78.1	35.4		27.1	
Yes	78	21.9	67.9	**<0.001**	55.1	**<0,001**

NB: * Variables that did not show n = 356 due to data not made available by the participants. PR: prevalence ratio; 95% CI: 95% confidence interval. MW: Minimum wage (A minimum wage corresponds to R$ 998.00 corresponds to approximately $ 200.00 in March 2020). BMI: Body mass index. SRH: Self-rated health. Courses in the major areas = life sciences (Physical Education, Pharmacy, Medicine and Nutrition), exact sciences (Architecture, Mathematics, Civil Engineering, Geological Engineering and Production Engineering) and humanities, social and applied sciences (Performing Arts, Law, History, Journalism and Pedagogy). Excessive consumption of alcoholic beverages was considered to be the consumption of at least five doses for men and four for women, on a single occasion, with one dose containing between 10 and 12 grams of alcohol, which can be present in a glass of wine (100 ml), in a beer can (350 ml) or in a dose of distilled drink (30 ml).

The prevalence of anxiety disorder symptoms was 42.5% (95% CI 37.4-47.7%) and depression disorder symptoms was 33.2% (95% CI 28.3-38.2%). Analyzing by sex, it was found that women were the most affected in both disorders, 68.9% for symptoms of anxiety and 66.9% for symptoms of depression (Figure 1).

Figure 1. Prevalence, by sex, of the symptoms of anxiety and depression disorder of university students entering the year 2019 from the Federal University of Ouro Preto (n = 355).
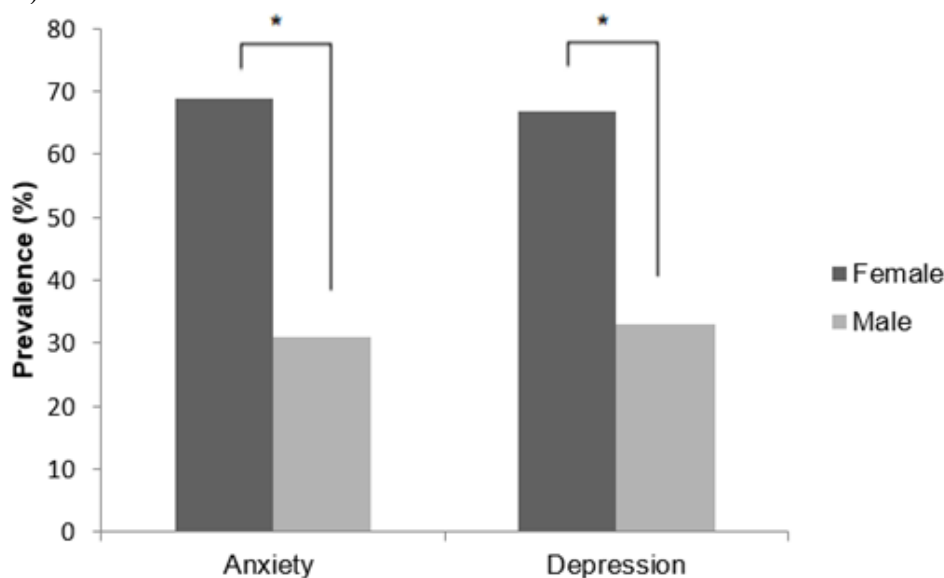

* Significantly different prevalence between genders (p <0.05).

Regarding the education, the symptoms of anxiety disorder were higher in the Journalism (63.6%), followed by History (60.6%) and Pharmacy courses (56.2%), while depression symptoms were higher in the Mathematics (71.4%) and Pharmacy (52.1%) courses. The lowest prevalence of these disorders were among first-semester Architecture students for

symptoms of anxiety (16.7%) and in the Performing Arts course for symptoms of depression (12.5%) (Figure 2).

Figure 2. A: Distribution in ascending order of the prevalence of anxiety symptoms per course among university students entering the year 2019 from the Federal University of Ouro Preto (n = 355). B: Distribution in ascending order of the prevalence of symptoms of depression per course among university students entering the year 2019 from the Federal University of Ouro Preto (n = 355).
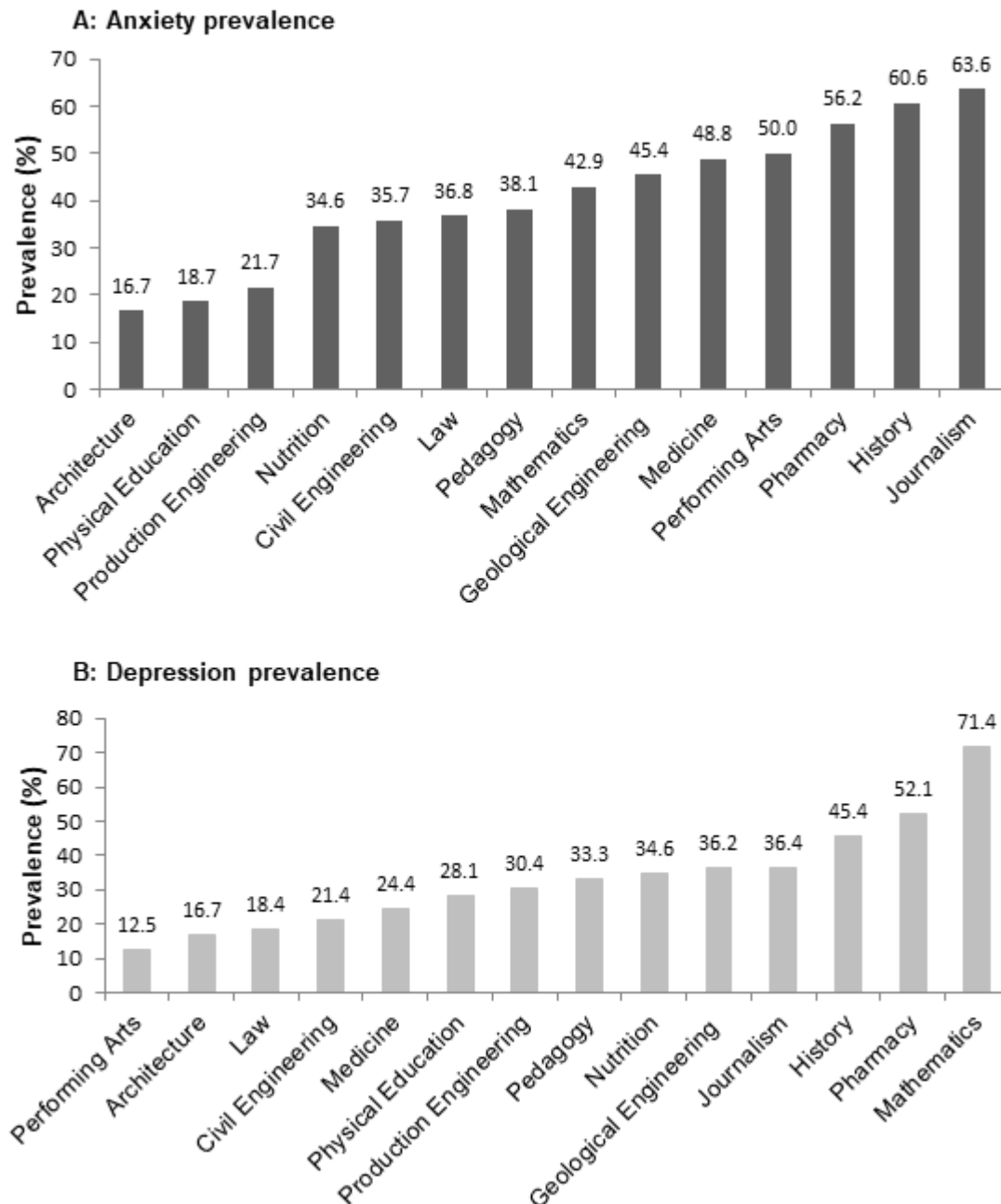
The results of the multivariate analysis of the symptoms of anxiety and depression disorders are shown in Table 2. It was observed that being female (PR= 1.38; 95%CI 1.07 - 1.78), non-white skin color (PR= 1.30; 95% CI 1.03-1.62), not being heterosexual (PR= 1.37; 95% CI

1.08-1.73), high or extreme internet use (PR= 1.30; 95% CI 1.03-1.64), lack of physical activity (PR= 1.44; 95% CI 1.15-1.79), having psychological counseling (PR= 1.35; 95% CI 1.05-1.72) and use of psychotropic medicines (PR= 1.71; 95% CI 1.36-2.17) were statistically significantly associated with symptoms of anxiety disorder.

Table 2. Multivariate analysis using age-adjusted Poisson regression for symptoms of anxiety and depression disorder and associated factors in first semester students at the Federal University of Ouro Preto, 2019.

Variables	Anxiety		Depression	
	PR (95% CI)	p-value	PR (95% CI)	p-value
Sociodemographic characteristics				
Sex				
Male	1		1	
Female	1.38 (1.070 - 1.780)	0.013	1.41 (1.041 - 1.909)	0.026
Skin color				
White	1		1	
Other (yellow, brown, mulatto or black)	1.30 (1.032 - 1.624)	0.025	1.41 (1.068 - 1.868)	0.016
Sexual orientation				
Heterosexual	1		-	
Non-heterosexual	1.37 (1.083 - 1.727)	0.009		
Lifestyles				
Internet use				
Medium	1		1	
High or extreme	1.30 (1.030 - 1.644)	0.027	1.60 (1.227 - 2.079)	<0.001
Physical activity				
Yes	1		-	
No	1.44 (1.152 - 1.790)	0.001		
Attends college parties				
Yes	-		1	
No			1.51 (1.146 - 1.983)	0.003

Table 2. Multivariate analysis using age-adjusted Poisson regression for symptoms of anxiety and depression disorder and associated factors in first-semester students at the Federal University of Ouro Preto, 2019 (Continuation).

Health conditions				
Self-rated health (SRH)				
Good SRH	-		1	
Poor SRH			1.80 (1.360 - 2.374)	<0.001
History of anxiety in first or second degree relatives				
No	-		1	
Yes			1.35 (1.026 - 1.782)	0.032
Psychological counseling				
No	1		-	
Yes	1.35 (1.054 - 1.722)	0.017		

Use of psychotropic medicines				
No	1		1	
Yes	1.71 (1.361 - 2.166)	<0.001	1.84 (1.404 - 2.416)	<0.001

PR: prevalence ratio; 95% CI: 95% confidence interval. SRH: Self-rated health.
Considered p-value: $p \leq 0.005$.
Model adjusted by age.

Regarding the symptoms of depression, it was observed that being female (PR= 1.41; 95% CI 1.04-1.91), non-white skin color (PR= 1.41; 95% CI 1.07-1.87), having a high or extreme internet use (PR= 1.60; 95% CI 1.23-2.08), not attending university parties (PR= 1.51; 95% CI 1.15-1.98), poor self-rated health (PR= 1.80; 95% CI 1.36-2.37), having a history of anxiety in first or second degree relatives (PR= 1.35; 95% CI 1.03-1.78) and using psychotropic medicines (PR= 1.84; 95% CI 1.40-2.42) were statistically significantly associated with depression symptoms.

Discussion

Main finding of this study

Overall, there was a high prevalence of moderate, severe and extremely severe symptoms of self-reported anxiety and depression, identified by DASS_21, in the studied population. The prevalence of anxiety was 42.5% and depression 33.2% among first-semester students. Sex, skin color, sexual orientation, physical activities and internet use were factors related to a higher prevalence of anxiety and/or depression disorders. Alongside this, our findings show that culturally disadvantaged groups (women, non-whites and non-heterosexuals) had a higher prevalence of symptoms of anxiety and depression in addition to excessive internet use. Among anxious students, physical inactivity is also a risk factor and among depressed students, non-participation in university parties is another risk factor. The use of psychotropic drugs was also associated with both anxiety and depression as well as the family's history of anxiety.

To the best of our knowledge, we believe this is the first study to investigate the prevalence of anxiety and depression disorder symptoms and their associated factors among first-semester university students from different courses at a Brazilian Public University. There were similarities to previous studies from other countries[26,27], which have important implications for the academic community in Brazil.

What is already known on this topic

In general, the prevalence of anxiety and depression symptoms in university students are higher when compared to the general population[11-14]. However, many studies only evaluate courses in the health sciences[21-25] and do not consider students from different courses in the first-semester

students[17,29]. Consequently, we sought to understand the potential factors that may be related to the presence of symptoms of anxiety and depression among the first-semester university student population in our University.*What this study adds*

We found that university students in Architecture and Scenic Arts had the lowest prevalence of symptoms of anxiety disorder and depression, respectively, with the highest prevalence rates among students in Journalism, History, and Pharmacy courses for anxiety and Mathematics, Pharmacy and History for depression. In a study among Brazilian undergradute students, Bolsoni-Silva and Loureiro (2015) found the highest and the lowest prevalence of anxiety and depression were seen among humanities and biological sciences, respectively[41]. Other studies indicate that university students in health sciences have a higher prevalence of mental disorders when compared to university students in general[23,24]. This can be partially explained because these are mostly full-time courses with high levels of psychological stress. However, studies evaluating different courses are still scarce, with the majority of studies evaluating just medicine courses or only health sciences.

The high prevalence of symptoms of these disorders in the first-semester students highlights that university students already have symptoms of anxiety and depression before starting their undergraduate courses, which can interfere in their academic trajectory and increase dropout rates[42]. This may be due to the fact that the Brazilian strategy of access to universities through the National High School Exam (ENEM) may cause high anxiety and depression before starting university. Upon entering university, the lack of welcoming policies can also potentially worsen mental health[43]. This at a time of considerable lifestyle changes and uncertainties regarding professional futures, which can generate stress and exacerbate mental health problems[44,45].

In line with other studies involving university students, females appeared to be at higher risk for the development of mental disorders[22,46], which may be related to genetic factors[47,48] and biological factors including hormonal characteristics[49,50].

Non-white skin color was another factor related to a higher prevalence of anxiety and depression disorders in our study. This relationship is poorly reported in the literature, which can be explained by the difficulty in classifying individuals in relation to skin color. In Brazil, skin color is seen as a factor that can directly affect opportunities related to education, social

aspects and finances[51-54], and an assumption, based on the present findings, is that this could subsequently influence the presence of mental disorder symptoms.

High or extreme internet use was associated with an increasing prevalence of both anxiety and depression symptoms in our study, mirroring the findings of Younes et al. (2016) and Truzoli et al. (2019) who also found an association between internet addiction and anxiety and depression[55,56]. Elhai et al. (2017) also found that the severity of anxiety and depression disorders were significantly linked to smartphone addiction[57]. This may be because people tend to use their cell phones as a method to deal with their negative and depressive emotions[58,59]. Excessive internet use can also lead to the loss of social life, in addition to the influence of standards imposed by society by social media pages and networks that are often unreachable[27].

Sexual orientation was associated only with symptoms of anxiety in our study. Non-heterosexuals students presented 1.37 more symptoms of anxiety disorder than heterosexual students. This is perhaps not surprising since this group are more likely to develop anxiety disorders, depression and suicidal ideation due to their own acceptance, low self-esteem and the social prejudices they face[60-62].

Lack of physical activity was also associated with increased symptoms of anxiety disorder in our study. This is again perhaps not surprising since physical activity is known to reduce the development of symptoms of anxiety and depression disorders, and exercise can be a complement to traditional forms of therapy[63-65]. McMahon et al. (2017) observed in a sample of European adolescents that playing sports and physical activity were associated with lower levels of anxiety and depression[66]. In a recent meta-analysis, physical activity also had a reducing effect on anxiety and depression[67].

In our study, not attending parties was also associated with symptoms of depression. This may well indicate low social contact with colleagues outside the university environment. According to Beck et al. (2008), students who show symptoms of anxiety and are not exposed to alcohol consumption episodes are more likely to be isolated[68]. Hefner et al. (2009) also found that social support was associated with a lower likelihood of depression, anxiety, suicide and eating disorder, regardless of the frequency of social contacts and other individual characteristics[69]. Other studies have also shown that the shorter the time devoted to leisure activities the high the extent of depressive symptoms[46,70]. Considering the characteristics of Ouro Preto, a small town, where most students live in student housing and have easy social contacts, this habit of not

attending parties can be used as an indicator of greater vulnerability leading to potential initiatives to try and address this.

The association among poor self-perceived health and symptoms of depression may indicate the first-semester university students´ recognition of their mental diseases. Furegato et al. (2010) observed that students with poor self-rated health were more likely to develop anxiety and depression disorders[71]. Gonçalves et al. (2018) when studying the health of Brazilian women also pointed out that the positive participants' perception of health is a protective factor against mental health disorders. Consequently, more needs to be done among first year students with poor self-perceived health going forward among universities to address concerns with their mental health[72].

The use of psychotropic medicines among first-semester university students at UFOP was also associated with symptoms of anxiety disorder and depression as well as psychological counseling with symptoms of anxiety, in our study. This association indicates that university students are using medicines to manage their symptoms, which is important and encouraging. Medicines, when prescribed and taken safely and correctly, help relieve and control the symptoms of anxiety and depression[73,74].

According to Rosenthal and Wilson (2008), only a quarter of university students affected by mental disorders seek professional help and Auerbach et al. (2017) pointed out that just 16.4% of university students with mental illness receive some type of treatment[29,75]. It is important that individuals with symptoms of anxiety and/or depression do seek ways to relieve these symptoms, either through psychological monitoring or pharmacotherapy. At UFOP, assistance programs are offered whereby university students can receive assistance and guidance on pedagogical, academic and psychosocial aspects[76]. We will be following this up to make sure such facilities are being used where pertinent.

We are also aware that genetic factors can influence the prevalence of anxiety and depressive symptoms. Individuals with a family history of anxiety and depression tend to be more vulnerable to mental illnesses[77,78], and we saw in our study that first-semester university students with history of anxiety in first or second degree relatives had a higher prevalence of depression. The absence of an association between anxiety and heredity can potentially be explained by the fact that in most cases anxiety precedes depression[79]; however, it was not possible to identify this at the time of data collection.

Finally, most factors associated with mental disorders, such as anxiety and depression, are also present in university students from other countries. As observed in our work, studies involving university students from different LMICs indicate that being female sex, lack of physical activity, intense internet use and other health risk behaviors are related to poor mental health[80,81]. Consequently, whilst a low economic situation can negatively influence mental health[82,83], there are also numerous sociodemographic, lifestyle and health factors that can lead to the appearance of symptoms of anxiety and depression and are common to university students worldwide.

Limitations of this study

The principal limitation of this study is that this was cross-sectional. Consequently, it was not possible to establish a temporality relationship between symptoms of anxiety disorder and depression and explanatory variables. In addition, the questionnaires were self-administered and, therefore, subject to incomplete filling and potential bias. However, we believe our methodology was robust enhanced by a high response rate, thereby enhancing its external validity for the first-semester university students' population. Our results of depression prevalence among the first-semester university students were similar to those found in a university in the south of the country that also investigated the presence of depression among the first-semester university students[84], which reinforces the external validity.

In addition, strategies were used at all stages to ensure the quality of information and the internal validity of the study. This included the extent of testing the instruments used, exhaustive training of researchers for data collection and tabulation, as well as multiple approaches to the academic community, via email and social networks, aiming to raise the awareness of students in participating in the research. As a result, reduce potential bias in the participants taking part.

Conclusion

There was a high prevalence of symptoms of anxiety and depression disorder among first-semester students in Brazil with sex, skin color, sexual orientation, physical activities and internet use factors influencing to a higher prevalence of these disorders. Acknowledging these factors coupled with increased recognition of mental disorders in first-semester university students can improve institutional actions. Overall, these findings corroborate the importance

of promoting mental and physical health policies to improve the well-being of first-semester university students, as well as creating a welcoming environment within universities We will be building on this.

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