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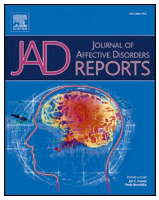

Research Paper

Prevalence and risk factors for anxiety, stress and depression among higher education students in Portugal and Brazil

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ABSTRACT

Objective: Determine the prevalence and risk factors for anxiety, stress and depression among higher education students in a sample from Portugal and Brazil.
Methods: Students from Portugal (n = 709) and Brazil (n = 487) answered the Depression, Anxiety and Stress Scale (DASS-21) and demographic and academic characteristics questions.
Results: Rates of anxiety, stress, and depression were 55.3 %, 55.9 % and 56.3 % for Portuguese students and 71.5 %, 75.6 % and 68.2 % for Brazilian students, respectively. In the total sample, being Brazilian was found to predict anxiety, stress and depression. In both samples, being female was found to predict anxiety and stress. Being displaced was also found to affect mental health: anxiety for the Portuguese sample; stress for the Brazilian sample. Furthermore, in the Portuguese sample, fields of study were found to affect mental health: Education and Human Motricity protected from anxiety, stress and depression; Psychology protected from anxiety and depression; Medicine protected from depression. Non-working status was also found to predict depression in this sample.
Limitations: The cross-sectional design prevents the establishment of causal relationships; self-report measures may be susceptible to response bias; the recruitment of participants may be susceptible to selection bias; cultural factors and institutional differences between these countries may affect mental health.
Conclusions: Country, gender, displacement, field of study, and working status were found to affect higher education students' mental health. From a clinical perspective, specific programs addressing anxiety, stress and depression in university students should be tested, as these disorders have a noteworthy prevalence in this population.

1. Introduction

Transition to higher education is a universally challenging period for students (Fruehwirth et al., 2023), exposed to various academic and social challenges (Amanvermez et al., 2022; Rosiek et al., 2016). Common stress sources include interpersonal stressors (e.g., exposure to new people; having to work with people they don't know; relationships with parents, classmates and significant others; wanting to make good impressions to others), intrapersonal stressors (e.g., new responsibilities, such as financial and time management; financial difficulties; speaking in public; change in eating habits; making decisions on a higher level; being on one's own environment, living away from home for the first time, deprived of previously accessible support; change in sleeping habits), and academic stressors (e.g., greater academic demands; standards of higher education; increase in workload; lower grades than expected; anticipation of graduation) (Bulo & Sanchez, 2014; Fruehwirth et al., 2023; Ross et al., 1999).

Globally, stress among higher education students is high (Pacheco et al., 2023), impacting not only on performance (Frazier et al., 2019) but also mental health. Consequences include suicidal thoughts (Rosiek et al., 2016), substance use (Boulton & O'Connell, 2017), sleep disorders (Amaral et al., 2018), anxiety and depression (Rosiek et al., 2016), all of which exacerbate academic difficulties (Chapell et al., 2005; Hysenbegasi et al., 2005).

Anxiety - a physiological hyperactivation -, stress - a repeated experience of negative affect as a result of the subjective interpretation

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of a survival-threatening event -, and depression - a decrease in positive affectivity - (Mello et al., 2007) have been used as indicators of higher students' mental health in different countries or regions [e.g., China (Jiang et al., 2021); Hong Kong (Wong et al., 2006); Thailand (Jiang et al., 2021); Indonesia (Jiang et al., 2021); Malaysia (Jiang et al., 2021); Turkey (Bayram & Bilgel, 2008); United States (Beiter et al., 2015); France (Herrmann et al., 2019); Brazil (Barbosa et al., 2023; Lopes & Nihei, 2021); and Portugal (Laranjeira et al., 2023)] (cf. Fig. 1).

Certain demographic and academic variables have been identified as significant risk factors for higher students' anxiety, stress and depression. For instance, gender (specifically, being female) was identified by Bayram and Bilgel (2008) as a risk factor for both anxiety and stress, in a Turkish sample; and by Farrer et al. (2016) as a risk factor for anxiety, in an Australian sample. Year of enrolment was also identified as a risk factor, but with contradictory results. Bayram and Bilgel (2008) identified first and second year students as having higher anxiety, stress and depression scores than students from later years. Farrer et al. (2016) also identified first year students as a having higher risk of depression. In contrast, Fauzi et al. (2021) identified higher stress scores in students of advanced years, in a Malaysian sample. Being displaced and financial stress were identified as risk factors for anxiety by Farrer et al. (2016). Lastly, the field of study (specifically, social and political sciences, vs. basic sciences and engineering or medicine) was identified as a risk factor for anxiety and depression by Bayram and Bilgel (2008).

This study aims to enhance the global understanding of mental health in higher education through a cross-country analysis of a sample from Portugal and a sample from Brazil. Previous studies showed a significant difference in the prevalence of anxiety, stress and depression in higher education student in these two countries (cf. Fig. 1). Analyzing the explanatory factors that predict the prevalence in these two samples will contribute to explain the difference in these mental health indicators. In this study, firstly, it is analyzed the prevalence of anxiety, stress and depression among higher education students in these samples from both countries, and secondly, it is analyzed gender, year of enrolment, displacement from habitual residence, scholarship status, field of study, and work status as potential risk factors. By implementing this cross-samples analysis from Portugal and from Brazil, the study seeks to contribute not only to academic knowledge, but also to the development of targeted intervention policies and support strategies for this population in both countries.

2. Materials and methods

2.1. Study design

This study employs a cross-sectional observational design to investigate the prevalence and potential risk factors of anxiety, stress and depression among higher education students in two samples, one from Brazil and another from Portugal.

2.2. Participants

A total of 1196 higher students were enrolled in the study, 709 from Portugal and 487 from Brazil.

2.3. Procedure

In Brazil, the data was collected online using the Google Forms tool. The search for participants was based on an inventory of the researchers' network of contacts and the identification of higher education institutions, students and teachers who could help disseminate the questionnaires to student groups via social networks (Facebook, WhatsApp, Twitter, email, and Instagram) and student associations. To achieve a greater heterogeneity of respondents, the five different regions of the country were also considered, as well as fields of study, types of institution and teaching modalities. The inclusion criteria involved individuals enrolled in undergraduate degree programmes at Brazilian higher education institutions who were at least 18 years old and attending university for the first time.

In Portugal, the data was collected online using Qualtrics. All undergraduate students from University of [redacted due to anonymity] were contacted to participate in the study.

In both countries the research proposal was submitted to the local ethics committee and approved before the study began. Each participant had to give their consent digitally before participating in the study. In addition, all participants were informed about the objectives, the procedure, and the significance of the study. The anonymity of participants was ensured. Data collection was completed within three months, between April and June of 2022.

2.4. Materials

Lovibond and Lovibond (1995) developed the Depression Anxiety Stress Scales (DASS) to assess these conditions, where: (*i*) the Anxiety Scale links enduring anxiety to acute fear responses; (*ii*) the Stress Scale indicates persistent arousal and tension with a low frustration threshold; and (*iii*) the Depression Scale involves a loss of self-esteem an incentive, and is perceived by the individual as being associated with a low probability of attaining their life goals.

The Depression-Anxiety-Stress Scales 21 (DASS-21; Lovibond & Lovibond, 1995), consist of three 7-item scales measuring anxiety (e.g., "I felt scared without any good reason."), stress (e.g., "I tended to over-react to situations.") and depression (e.g., "I couldn't seem to experience any positive feeling at all."). Participants rated how these statements applied to them over the past week on a 4-point Likert-type scale (0 = did not apply to me at all; 3 = applied to me very much or

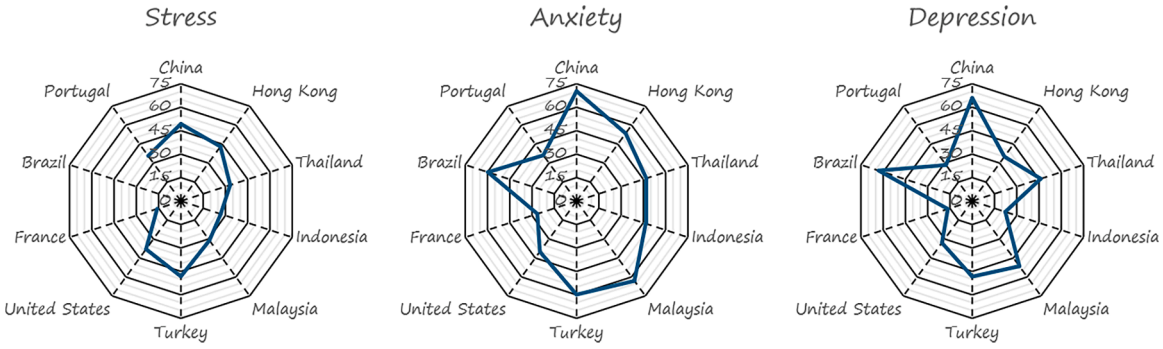

Fig. 1. Prevalence of stress, anxiety, and depression (%) among higher education students in eight nations, based on the Depression Anxiety Stress Scales questionnaire (Brazil, Barbosa et al., 2023; China, Indonesia, Malaysia, and Thailand, Jiang et al., 2021; France, Herrmann et al., 2019; Hong Kong, Wong et al., 2006; Portugal, Laranjeira et al., 2023; Turkey, Bayram & Bilgel, 2008; United States, Beiter et al., 2015).

most of the time). The Validated DASS-21 versions in Portuguese (Ribeiro et al., 2004) and Brazilian Portuguese (Vignola & Tucci, 2014) were used for Portuguese and Brazilian students, respectively. Cut-off scores of >7 for anxiety, >14 for stress and >9 for depression, were obtained by multiplying a final score number with two, represent a positive screening for anxiety, stress and depression, respectively (i.e., a case, meaning occurrence) and were used to calculate the prevalence of each, as in previous studies (Fuad et al., 2015; Tomičević & Land, 2021; Vignola, 2013).

The sociodemographic variables evaluated as potential risk factors were Gender (Male; Female); Year of Enrolment; Displaced from habitual residence (No; Yes); Scholarship (No; Yes); Field of Study (Architecture; Psychology; Medicine; Education; Human Motricity); and Working status (No; Yes).

2.5. Statistical analyses

To examine the relationship between the independent variables and the dependent variables, nine binary logistic regression analyses (three for the global sample with both samples: one for anxiety, one for stress, and one for depression; three for each country: one for anxiety, one for stress, and one for depression) were performed using IBM SPSS software (version 27). The independent variables included field of study, gender, year of enrolment, displaced from habitual residence, work status and scholarship. The dependent variables were anxiety, stress and depression. The multi-category (field of study) was transformed into five dummy variables corresponding to the different categories, using Architecture as a reference for comparison to facilitate inclusion in the regression model.

3. Results

Table 1 presents sample characteristics.

3.1. Prevalence of psychological distress

Based on the results of the DASS-21 questionnaire, the prevalence rates of mental health issues among students were as follows: among Portuguese students, 55.3 % reported anxiety ($n = 392$), 55.9 % reported stress ($n = 396$), and 56.3 % reported depression ($n = 399$). In contrast, among Brazilian students, 71.5 % reported anxiety ($n = 348$), 75.6 % reported stress ($n = 368$), and 68.2 % reported depression ($n = 332$).

3.2. Correlations

Table 2 (total sample) and Table 3 (from Brazil and Portugal, separately) present the correlations between the investigated constructs, levels of anxiety, stress and depression in higher education students.

3.3. Regression analyses

Binary logistic regression analyses were conducted to examine the relationship between independent variables and the occurrence of anxiety, stress and depression among higher education students from the total sample (Table 4), from Brazil (Table 5) and from Portugal (Table 6).

Country demonstrated a statistically significant association with anxiety ($B = -0.910$, $p \leq 0.001$, OR = 0.403), stress ($B = -0.884$, $p < 0.001$, OR = 0.413), and depression ($B = -0.600$, $p < 0.001$, OR = 0.549), showing that Brazilian students have worse results (cf. Table 4). Gender demonstrated a statistically significant association with anxiety ($B = 0.889$, $p < 0.001$, OR = 2.432 in the total sample; $B = 0.968$, $p < 0.001$, OR = 2.633 in the Brazilian sample; $B = 0.805$, $p < 0.0001$, OR = 2.238 in the Portuguese sample) and stress ($B = 0.970$, $p < 0.001$, OR = 2.639 in the total sample; $B = 1.068$, $p < 0.0001$, OR = 2.911 in the Brazilian sample; $B = 0.905$, $p = 0.000$, OR = 2.471 in the Portuguese sample), with female students showing worse results (cf. Tables 4, 5, and 6). Furthermore, in the Portuguese sample female students also showed a worse result of depression ($B = 0.489$, $p < 0.007$, OR = 1.631) (cf. Table 6). Displaced students showing worse results: in Brazilian sample being displaced predicts stress ($B = 0.633$, $p = 0.017$, OR = 1.883) and in the Portuguese sample being displacement predicts anxiety ($B = 0.335$, $p = 0.043$, OR = 1.399). Exclusive to the Portuguese sample, students' field of study demonstrated significant associations with all three mental health indicators. When controlling for all other variables, 'Psychology' demonstrated a statistically significant inverse association with anxiety ($B = -0.660$, $p = 0.004$, OR = 0.517) and depression ($B = -0.849$, $p = 0.0001$, OR = 0.428); 'Medicine' demonstrated a statistically significant inverse association with depression ($B = -0.613$, $p = 0.016$, OR = 0.542); 'Education' demonstrated a statistically significant inverse association with anxiety ($B = -0.579$, $p = 0.034$, OR = 0.560), stress ($B = -0.549$, $p = 0.043$, OR = 0.577), and depression ($B = -0.916$, $p < 0.001$, OR = 0.400); 'Human Motricity' also demonstrated a statistically significant inverse association with anxiety ($B = -0.676$, $p = 0.007$, OR = 0.509), stress ($B = -0.621$, $p = 0.013$, OR = 0.537), and depression ($B = -0.737$, $p = 0.004$, OR = 0.479). Moreover, in the Portuguese sample non-work status predicts depression ($B = -0.400$, $p = 0.049$, OR = 0.670), Other factors, such as year of enrolment and scholarship did not exhibit a significant association with anxiety, stress nor depression in either samples ($p > 0.05$) (cf. Tables 4, 5 and 6).

Table 1
Descriptive Statistics.

Variable	Categories	Portugal *n* (%)	Brazil *n* (%)
Field of Study	Architecture	155 (21.9%)	31 (6.37%)
	Psychology	187 (26.4%)	218 (44.8%)
	Medicine	133 (18.8%)	94 (19.3%)
	Education	103 (14.5%)	26 (5.3%)
	Human Motricity	131 (18.5%)	118 (24.2%)
Gender	Male	176 (24.8%)	63 (12.9%)
	Female	533 (75.2%)	424 (87.1%)
Year of Enrollment	1	296 (41.7%)	83 (17%)
	2	186 (26.2%)	92 (18.9%)
	3	227 (32%)	93 (19.1%)
	Other[a]	0 (0%)	213 (43.7%)
Displaced from habitual residence	Yes	260 (36.7%)	164 (33.7%)
	No	449 (63.3%)	323 (66.3%)
Working Status	Works	132 (18.6%)	190 (39%)
	Does not Work	577 (81.4%)	297 (61%)
Scholarship	Received	153 (21.6%)	207 (42.5%)
	Not received	556 (78.4%)	280 (57.5%)
Anxiety	Case	392 (55.3%)	348 (71.5%)
	Non-case	317 (44.7%)	139 (28.5%)
Stress	Case	396 (55.9%)	368 (75.6%)
	Non-case	313 (44.1%)	119 (24.4%)
Depression	Case	399 (56.3%)	332 (68.2%)
	Non-case	310 (43.7%)	155 (31.8%)
Total		709	487

[a] In Portugal, according to the Bologna Process, undergraduate degrees typically last for 3 years, whereas in Brazil, undergraduate degrees last for 5 or 6 years.

Table 2
Correlations between variables in the total sample.

Constructs		Correlated Constructs												
		Country	Field of Study					Gender (M/F)	Enrolment (Years)	Displacement (Y/N)	Working (Y/N)	Scholarship (Y/N)	Case of		
			Architecture	Psychology	Medicine	Education	Human Motricity						Anxiety (Y/N)	Stress (Y/N)	Depression (Y/N)
Country		–													
Field Of Study	Architecture	,210**	–												
	Psychology	-,191**	-,307**	–											
	Medicine	-,007	-,208**	-,346**	–										
	Education	,146**	-,149**	-,249**	-,168**	–									
	Human Motricity	-,070*	-,220**	-,367**	-,248**	-,178**	–								
Gender (M/F)		-,146**	-,005	,101**	-,035	,039	-,109**	–							
Enrolment (Years)		-,476**	-,034	,109**	-,016	-,146**	,030	,060*	–						
Displaced (Y/N)		,031	,073*	-,124**	,190**	-,049	-,066*	-,006	-,019	–					
Working Status (Y/N)		-,226**	-,011	,151**	-,222**	,008	,042	,020	,197**	-,146**	–				
Scholarship (Y/N)		-,224**	-,065*	,108**	-,099**	,113**	-,058*	,036	,176**	,013	,132**	–			
Case of	Anxiety (Y/N)	-,164**	,057	-,053	,016	-,005	,000	,189**	,052	,049	-,024	,023	–		
	Stress (Y/N)	-,202**	,001	,049	,027	-,058*	-,039	,216**	,091**	,062*	-,003	,023	,574**	–	
	Depression (Y/N)	-,120**	,077**	-,056	,001	-,032	,020	,099**	,061*	,032	-,034	,034	,486**	,493**	–

* Correlation is significant ($p \leq 0.05$; 2-tailed).
** Correlation is significant ($p \leq 0.01$; 2-tailed).

Table 3
Correlations between variables in the Brazilian sample (diagonal downwards) and the Portuguese sample (diagonal upwards).

Constructs		Correlated Constructs												
		Field of Study					Gender (M/F)	Enrolment (Years)	Displacement (Y/N)	Working (Y/N)	Scholarship (Y/N)	Case of		
		Architecture	Psychology	Medicine	Education	Human Motricity						Anxiety (Y/N)	Stress (Y/N)	Depression (Y/N)
Field Of Study	Architecture		-,317**	-,254**	-,218**	-,252**	,043	,092*	,100**	,036	-,029	,119**	,072	,157**
	Psychology	-,235**		-,288**	-,247**	-,285**	,085*	-,101**	-,084*	-,015	-,057	-,054	,068	-,066
	Medicine	-,128**	-,440**		-,198**	-,229**	,000	,080*	,077*	-,118**	-,103**	,054	,034	,016
	Education	-,062	-,214**	-,116*		-,196**	,079*	-,108**	-,073	-,002	,222**	-,024	-,061	-,056
	Human Motricity	-,147**	-,509**	-,277**	-,134**		-,214**	,033	-,023	,099**	-,002	-,098**	-,133**	-,057
Gender (M/F)		-,025	,064	-,106*	,010	,032		-,050	,031	-,044	,024	,179**	,206**	,106**
Enrolment (Years)		,080	,109*	-,098*	-,090*	-,035	,032		,001	,118**	-,025	-,003	,032	,053
Displaced (Y/N)		-,008	-,170**	,356**	-,015	-,119**	-,062	-,009		-,086*	,070	,102**	,052	,063
Working Status (Y/N)		,050	,245**	-,359**	,128**	-,049	,032	,095*	-,214**		-,101**	-,073	-,056	-,075*
Scholarship (Y/N)		-,003	,203**	-,105*	,036	-,157**	-,027	,155**	-,041	,266**		-,011	-,031	,013
Case of	Anxiety (Y/N)	,034	-,135**	-,048	,130**	,113*	,149**	-,060	-,021	-,054	-,018		,554**	,506**
	Stress (Y/N)	-,028	-,074	,012	,050	,065	,165**	-,041	,102*	-,045	-,014	,572**		,476**
	Depression (Y/N)	-,020	-,103*	-,023	,084	,109*	,039	-,036	-,007	-,050	-,001	,427**	,494**	

Results diagonally downwards refer to the Brazilian sample. Results diagonally upwards refer to the Portuguese sample.
* Correlation is significant ($p \leq 0.05$; 2-tailed).
** Correlation is significant ($p \leq 0.01$; 2-tailed).

Table 4
Binary logistic regression analyses of the relationship between independent variables and the occurrence of stress, anxiety, and depression among higher education students from the total sample (Portugal and Brazil).

Variable(s) entered		Anxiety				Stress				Depression			
		B	S.E.	*p.*	OR	B	S.E.	*p*	OR	B	S.E.	*p*	OR
Country		-,910	,160	**<,001**	,403	-,884	,162	**<,001**	,413	-,600	,153	**<,001**	,549
Field Of Study	Psychology	-,765	,201	**<,001**	,465	-,149	,200	,456	,862	-,778	,199	**<,001**	,459
	Medicine	-,458	,223	**,040**	,633	-,138	,221	,532	,871	-,613	,219	**,005**	,542
	Education	-,387	,251	,123	,679	-,381	,246	,122	,683	-,636	,246	**,010**	,530
	Human Motricity	-,436	,218	**,045**	,647	-,293	,215	,172	,746	-,431	,215	**,045**	,650
Gender		,889	,153	**<,001**	2,432	,970	,154	**<,001**	2,639	,445	,151	**,003**	1,561
Enrolment		-,055	,055	,323	,947	-,006	,057	,909	,994	,007	,054	,901	1,007
Displacement		,181	,135	,178	1,199	,274	,137	**,046**	1,315	,068	,131	,606	1,070
Working Status		-,250	,149	,093	,779	-,176	,152	,247	,839	-,289	,146	**,047**	,749
Scholarship		-,037	,143	,795	,964	-,087	,146	,550	,917	,097	,140	,491	1,101
Constant		,979	,317	,002	2,662	,534	,319	,094	1,706	1,014	,311	,001	2,757

B: Regression Coefficient (Beta); S.E.: Standard Error; p: p-value; OR: Odds Ratio

Table 5
Binary logistic regression analyses of the relationship between independent variables and the occurrence of stress, anxiety, and depression among higher education students from Brazil.

Variable(s) entered		Anxiety				Stress				Depression			
		B	S.E.	*p.*	OR	B	S.E.	*p*	OR	B	S.E.	*p*	OR
Field Of Study	Psychology	-,739	,467	,114	,478	,014	,439	,975	1,014	-,098	,405	,809	,907
	Medicine	-,691	,521	,185	,501	-,036	,504	,942	,964	-,141	,458	,758	,868
	Education	1,914	1,118	,087	6,783	,741	,694	,286	2,098	1,091	,668	,102	2,977
	Human Motricity	,047	,504	,926	1,048	,498	,476	,295	1,646	,572	,440	,193	1,772
Gender		,968	,289	**,001**	2,633	1,068	,290	**,000**	2,911	,221	,289	,443	1,248
Enrolment		-,080	,072	,263	,923	-,063	,074	,394	,939	-,037	,068	,580	,963
Displacement		-,012	,240	,961	,988	,633	,264	**,017**	1,883	-,018	,226	,936	,982
Working Status		-,354	,240	,141	,702	-,128	,247	,605	,880	-,276	,227	,225	,759
Scholarship		,151	,225	,504	1,163	,120	,233	,607	1,127	,189	,213	,376	1,208
Constant		,882	,576	,126	2,416	,086	,559	,877	1,090	,615	,524	,241	1,849

B: Regression Coefficient (Beta); S.E.: Standard Error; p: p-value; OR: Odds Ratio

Table 6
Binary logistic regression analyses of the relationship between independent variables and the occurrence of stress, anxiety, and depression among higher education students from Portugal.

Variable(s) entered		Anxiety				Stress				Depression			
		B	S.E.	*p.*	OR	B	S.E.	*p*	OR	B	S.E.	*p*	OR
Field Of Study	Psychology	-,660	,232	**,004**	,517	-,029	,231	,899	,971	-,849	,235	**<,001**	,428
	Medicine	-,260	,253	,304	,771	-,143	,250	,568	,867	-,613	,254	**,016**	,542
	Education	-,579	,274	**,034**	,560	-,549	,271	**,043**	,577	-,916	,276	**,001**	,400
	Human Motricity	-,676	,253	**,007**	,509	-,621	,251	**,013**	,537	-,737	,255	**,004**	,479
Gender		,805	,185	**<,001**	2,238	,905	,185	**<,001**	2,471	,489	,183	**,007**	1,631
Enrolment		-,011	,093	,909	,989	,104	,094	,269	1,109	,116	,093	,213	1,123
Displacement		,335	,166	**,043**	1,399	,162	,166	,329	1,176	,144	,164	,383	1,154
Working Status		-,302	,205	,140	,739	-,241	,205	,240	,786	-,400	,204	**,049**	,670
Scholarship		-,093	,196	,636	,911	-,125	,197	,526	,883	,072	,196	,712	1,075
Constant		,023	,307	,940	1,023	-,393	,308	,202	,675	,294	,309	,341	1,341

B: Regression Coefficient (Beta); S.E.: Standard Error; p: p-value; OR: Odds Ratio

4. Discussion

The present study investigated the prevalence and potential risk factors for anxiety, stress and depression in a Brazilian sample and a Portuguese sample of higher education students. The prevalence rates of stress, anxiety and depression among higher education students in Portugal and Brazil reveal substantial psychological distress in both student populations. These findings align with existing literature that underscores the global nature of mental health challenges among university students (Pacheco et al., 2023) and with studies reporting similar prevalence rates of these students' mental health indicators (e.g., Bayram & Bilgel, 2008; Jiang et al., 2021).

Furthermore, the prevalence rate of anxiety, stress and depression found in our Portuguese and Brazilian samples is higher than those found in previous studies in Portugal (Laranjeira et al., 2023) and Brazil (Barbosa et al., 2023; Lopes & Nihei, 2021). The different results for the Portuguese sample might be explained by the difference in institutions analyzed: whereas Laranjeira et al. (2023) studied a polytechnic institution, our study focused on a sample from one university, where students can have more academic demands and pressures, potentially impacting their mental health. The different results for the Brazilian sample might be explained by the fact that the previous studies (Barbosa et al., 2023; Lopes & Nihei, 2021) were conducted in only one Brazilian state, while the present study included students from different states, which may have captured a more diverse range of experiences and stressors, reflecting the varied socioeconomic conditions, cultural factors, and educational environments across the country.

However, in our study, Brazilian students, compared to Portuguese,

reported a higher prevalence of stress, anxiety and depression. This might be due to a variety of factors, including cultural differences (e.g., norms and expectations), educational system variations (e.g., the duration of an undergraduate degree) and distinct societal pressures (e.g., economic disparities, social inequalities, access to mental health resources). In fact, gender emerged as a significant predictor of students' mental health: in both countries female students exhibited worse results in anxiety and stress, and in Portugal female students also showed worse results in depression. These results corroborate previous research findings, that also observed that in Türkiye and Australia respectively, female students had more anxiety and stress risks (Bayram & Bilgel, 2008) and more generalized anxiety risks (Farrer et al., 2016). One possible explanation is that women may face additional stressors, such as inequality and discrimination (Teelken & Deem, 2013; Unterhalter et al., 2022) or lack of recognition (Burke & Crozier, 2014).

Being displaced also has a harmful effect on student's mental health: in the Brazilian sample predicted stress and in the Portuguese sample predict anxiety. This finding corroborates a previous study with an Australian sample (Farrer et al., 2016), that observed that risk of generalized anxiety disorder was higher for students displaced. One possible explanation is that these students, living away from home for the first time, must face more challenges to adapt to the new context because they have additional demands such as new responsibilities regarding finances and time management, but are also deprived of previously accessible support (Fruehwirth et al., 2023).

Our study did not find a significant association between the year of enrolment and students mental health from Portugal nor Brazil. This result is different from those found in previous studies: Bayram and Bilgel (2008) identified first and second year Turkish students as exhibiting greater anxiety, stress and depression scores than others; Farrer et al. (2016) also identified first year Australian students as having a higher risk of depression; but, on the contrary, Fauzi et al. (2021) identified higher stress scores in Malaysian students of advanced years. One possible explanation may be that the academic pressure and challenges faced by the students in Portugal and Brazil were relatively consistent across different years of enrolment, leading to a lack of significant variation in mental health. Alternatively, in years with greater demands, these Universities may provide more resources (e.g. mentoring programs, psychological support) that allow students to face these demands. Future studies should analyse the requirements and resources dynamics throughout the course.

Similarly, no association was found between scholarships and students' mental health in either country. One possible explanation may be that if the scholarship did not address broader financial well-being (Gutter & Copur, 2011), it might not have had a significant impact on mental health (Hassan et al., 2021). Future studies could analyse financial well-being instead of analysing whether the student receives a scholarship. One additional possible explanation is that the students may have developed effective coping mechanisms or received sufficient support from other sources, irrespective of their year of enrolment or scholarship status, mitigating the potential negative impact of these variables on mental health (Hefner & Eisenberg, 2009; Ko et al., 2012).

On the other hand, this reinforces the observation that it is important to contextualize research as variations in cultural, educational, or socioeconomic factors can impact the generalizability of findings across diverse countries, field of study only predict Portuguese students' mental health nor Brazilian. In line with Bayram and Bilgel (2008), this study observed that social sciences fields (i.e., psychology and education) exhibited lower odds of psychological distress. However, the observation that medicine students exhibited lower odds of experiencing depression contradicts the higher odds of psychological distress for medical students reported in this previous study. Interestingly, in the present study Human Motricity students showed the best results in the sample, which might be explained by the assumption that they follow healthy lifestyle habits, namely, sports, and activities that promote mental health (Downs & Ashton, 2011).

In the same vein, working status emerged as a significant factor associated with depression in Portuguese students and working students exhibited lower odds of experiencing depression compared to their non-working counterparts. This counterintuitive finding may be indicative of potential protective factors associated with employment, such as financial stability or a sense of purpose, since these factors have a positive impact on mental health (Oliveros et al., 2022; Wang et al., 2016). Future studies could evaluate the working conditions of working students so that this relationship can be better understood.

4.1. Limitations and future directions

While this study contributes valuable insights into the mental health of higher education students in Portugal and Brazil, certain limitations should be acknowledged. The cross-sectional design prevents the establishment of causal relationships, and self-report measures may be susceptible to response bias. Future research could employ longitudinal designs and objective measures to enhance the robustness of findings. The Brazilian sample was recruited through informal networks, social networks and student associations, from five different regions of the country, including a variety of types of institutions and teaching modalities, whereas the Portuguese sample was more limited, targeting only one university, which may have introduced selection biases, possibly interfering with the differences observed between countries. Moreover, the disciplines that do not fall into the fields of study analyzed were not included in the analyses due to the impossibility of comparison between countries or due to high disparities between the number of students from each country. Additionally, cultural factors and institutional differences between Portugal and Brazil may contribute to variations in mental health outcomes and should be explored in greater depth.

4.2. Implications

The study's results underscore the importance of implementing targeted interventions and support strategies to address the mental health challenges faced by higher education students. Gender-sensitive mental health programs, support services for displaced students, and discipline-specific interventions tailored to the unique stressors of different academic fields may contribute to improved well-being. Collaborative efforts between universities, mental health professionals, and policymakers are essential to create a holistic and inclusive approach to supporting the mental health of students in diverse cultural and educational contexts. From a clinical perspective, specific programs addressing stress, anxiety, and depression in university students should be tested, as these disorders have a noteworthy prevalence in this population.

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CRediT authorship contribution statement

Carmona Laura: Writing – original draft, Formal analysis. **Costa Carlos:** Writing – review & editing, Resources, Investigation, Conceptualization. **Gascón Santiago:** Investigation, Writing – review & editing. **Ribeiro Graziela:** Writing – review & editing, Resources, Investigation, Conceptualization. **Chambel Maria José:** Writing – original draft, Resources, Investigation, Conceptualization.

Declaration of competing interest

The authors declare that they have no conflict of interest.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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