Profiles of mental illness in college students and associated factors: A latent class analysis

Jaqueline Galdino Albuquerque Perrelli [a,b,*], Rodrigo García-Cerde [a], Pollyanna Fausta Pimentel de Medeiros [a], Zila M. Sanchez [a]

[a] Department of Preventive Medicine, Universidade Federal de São Paulo, São Paulo, São Paulo, Brazil
[b] Department of Nursing, Universidade Federal de Pernambuco, Recife, Pernambuco, Brazil

ARTICLE INFO

ABSTRACT

Mental illness among university students poses a pressing challenge for educational institutions, urging the need for strategies that foster health and mitigate mental distress, with an emphasis on preventing suicide. Our study sought to discern the profiles of mental illness among college students and explore the factors associated with them. We examined data from 918 students at a Brazilian Federal Institute, utilizing Latent Class Analysis and multinomial regression for our analyses. We identified three distinct mental illness profiles: Anxiety with Low Suicide Risk; Mental Illness with Moderate Suicide Risk; and Mental Illness with High Suicide Risk. We observed a reduced association of these profiles with religious beliefs. Conversely, there was a heightened association with cisgender women, individuals identifying as LGBTQI+, those with learning disabilities, and victims of sexual violence. Our findings underscore the importance of tailored prevention and health promotion programs to enhance student well-being. There's a compelling need to devise mental health strategies tailored to the specific needs of the identified groups, particularly students from the LGBTQI + community, survivors of sexual abuse, and those grappling with learning disabilities.

1. Introduction

The increasing prevalence and severity of mental health problems among young people who enter higher or technical/professional education, right after high school, is a critical issue for educational institutions and the community in general (Kessler et al., 2007), particularly since most mental health disorders manifest themselves during this period (Duffy et al., 2019). Currently, there is a lack of information regarding the stressors that are present in educational institutions and the strategies that can be implemented to support the mental well-being of college students (Baik et al., 2019). As mentioned by other authors, limited research has been conducted in developing countries, such as Brazil, on the impacts of socio-cultural, economic, and educational factors on students entering higher education (Hernández-Torrano et al., 2020), in addition to insufficient information on the mental health profile of this population, particularly since the expansion of higher and technical/professional education in Brazil in the 2000s and beyond justifies this study.

The most commonly reported mental health issues affecting students are substance abuse, anxiety, and mood disorders (Auerbach et al., 2016; Pedrelli et al., 2015). Women, non-religious individuals, and members of the LGBTQI + community are particularly vulnerable to these conditions (Auerbach et al., 2018; King et al., 2021). In different countries, the prevalence of mental disorders such as anxiety varies significantly. For example, approximately 30% of Canadian institution students have reported suffering from an anxiety disorder (King et al., 2021), whereas only 10% of students from American institutions, including technical training and higher education, have reported experiencing such issues (Liu et al., 2019). Furthermore, a study conducted in 19 educational institutions worldwide, offering technical and higher education, revealed that anxiety disorders are prevalent among 16.4% of students (Auerbach et al., 2018).

The World Bank classifies Brazil as an upper-middle-income nation (World Bank, 2023), but the prevalence of mental disorders, especially anxiety, is higher than similar economic groups. The prevalence of anxiety among Brazilian university students was alarming at 37.7%

(Demenech et al., 2021). This is higher than the 29.8% observed among peers from other upper-middle-income countries and the 54.2% observed in lower-middle-income countries (Li et al., 2022). As a result, Brazil faces acute mental health challenges. There is a 28.5% prevalence of depression among Brazilian students, which is marginally lower than the global average of 30.8% for upper-middle-income countries and 42.5% for lower-middle-income countries. There was only one study from Latin America included in this broader study (Li et al., 2022), pointing to the need for more regional studies.

A particularly alarming aspect of this problem is the high rate of suicidal ideation and suicide attempts among youth. Globally, there are approximately 703,000 suicide deaths reported each year. The World Health Organization reports that suicide is the fourth leading cause of death for individuals aged 15 to 29 (World Health Organization, 2021b). Over the past twenty years, suicide rates have consistently increased across the Americas, with more than 97,000 suicides reported in 2019 (World Health Organization, 2021b; Lange et al., 2023) despite some noticeable variations across countries.

In Canada, one out of four university students has contemplated suicide, and 6% have attempted suicide (King et al., 2021). As for the United States, suicidal ideation and attempts have been reported at 24.3% and 9.3%, respectively (Liu et al., 2019). In Brazil, suicide rates have increased significantly among adolescents and young adults over the past decade. Specifically, for the age group of 20 to 29 years old, it has become the fourth most common cause of death (Brazil, 2024). Demenech et al. (2021) found that university students exhibit an overall prevalence of suicidal behavior of 9%. The results of another study indicate that, across various countries, the yearly rate of suicidal thoughts and the lifetime rate of suicide attempts among university students were 14.1% and 3.1%, respectively (Crispim et al., 2021). These findings indicate the urgent need for targeted mental health initiatives, including preventative and supportive measures, to address these distressing rates among students.

Considering the scarcity of studies originating from Latin America (Li et al., 2022) and the consequent lack of representation of this research in the region, it is evident that we need to deepen our knowledge of mental disorders within the context of higher education. There is a knowledge gap that may conceal critical factors that can affect the mental health of university students, such as socioeconomic inequality, stigma surrounding mental health, and limited access to psychological support services (Lund et al., 2018; Patel et al., 2010). This is especially relevant when it comes to the prevalence and recognition of these disorders among ethnic and racial minorities, members of the LGBTQIA + community, and those who are economically disadvantaged (Kirkbride et al., 2024). The study of mental disorders in higher education should be expanded beyond the North American and European axis, and should take into consideration the particularities of Latin America, particularly Brazil. As a result, policies and interventions can be developed in a manner that is more closely aligned with the local needs of students, while also gaining a broader and more representative global perspective. In order to formulate solutions that are more inclusive, it is necessary to consider diverse socioeconomic and cultural realities. Due to this, this study aimed to answer the following question: What is the mental health illness profile of students entering higher and technical education, and what are the associated factors?

To more robustly analyze the profile of mental illness among college students located in a region of greater social vulnerability in Brazil, Latent Class Analysis (LCA) was utilized. The technique is used to identify qualitatively different subgroups within populations based on their similar patterns of responses modeled with covariates (Lanza and Cooper, 2016; Weller et al., 2020). As opposed to techniques that focus on variables, LCA employs a person-centered analytical methodology, assuming that all individuals within a population exhibit the same patterns of association between variables of interest (Lanza and Cooper, 2016; Weller et al., 2020). The use of a person-based approach to characterize the illness profile results in a more robust classification that

could have significant clinical significance.

What differentiates LCA is the use of a person-centered analytical methodology, in contrast to analysis techniques that focus on variables which assume that all individuals within a population show the same pattern of association between variables of interest (Lanza and Cooper, 2016; Weller et al., 2020). The use of a person-based approach to characterize the illness profile leads to a more robust classification that may have significant clinical implications. Furthermore, it facilitates the development of strategies for promoting mental health among college students (Essau and de la Torre-Luque, 2019; Garcia-Cerde et al., 2021; Bornheimer et al., 2022; Bernanke et al., 2017). In this way, the factors that are associated with mental illness will be able to identify risk groups within each profile pre-established by the LCA, allowing greater precision in the planning of interventions within the educational environment.

In this study, conditions suggestive of anxiety, depression, suicidal ideation and suicide attempt were used as dependent variables in LCA, as these mental disorders are the most prevalent among college students (King et al., 2021; Liu et al., 2019; Auerbach et al., 2018; Demenech et al., 2021; Pacheco et al., 2017; Sheldon et al., 2021). Thus, the objective of this study is to identify mental illness profiles of college students at a Federal Institute of Education, Science and Technology or Brazilian Federal Institute (IF), through LCA, as well as to identify factors associated with these profiles.

2. Methods

2.1. Study design and sample

This is a cross-sectional study carried out with students from a FI located in the Brazilian northeast that works in secondary, technical and higher education training. It offers 78 courses, from high school to technical and graduate courses, distributed across 16 campuses and 17 Distance Learning centers. This research included only the subsequent technical level courses (after high school), technologist, bachelor's and licentiate degrees. In 2019, according to data from the institution, there were approximately 1850 students over 18 years of age enrolled in courses in these modalities and this number was the basis for estimating the sample of this study.

The sample was calculated considering the cluster sampling technique for finite population (sample universe – 1850 students), assuming the cluster design effect (deff). The calculations considered a sampling error of 5%, prevalence of the phenomenon of interest of 50%, design effect (deff) of 3.8, intraclass correlation coefficient $\rho = 0.20$, according to data previously estimated in the I National Survey on drug use among college students (Andrade et al., 2010). Thus, the initial estimate was 1208 participants. It was possible to collect 1041 instruments. The selection of classes for data collection took place through a simple draw, with the aid of Excel software and the Random command, based on a list made available by the institution's enrollment department, containing the name of each class and the respective course.

Participants met the following inclusion criteria: being 18 years of age or older and being in the classroom at the agreed time for data collection. A total of 123 students were excluded from the analysis for reasons such as: self-reported clinical and/or mental problems that made it impossible for them to participate in data collection; arriving late in class; form with missing or blot in the age variable and/or providing only the sociodemographic characterization data and/or without filling in the variables related to mental status assessment and/or with affirmative completion for the use of fictitious substances. Thus, after applying these exclusion criteria, the final study sample consisted of 918 students.

2.2. Data collection

After contacting the school authorities and teaching staff of the

institution, the research team was trained on the study theme, data collection instrument, participant approach, and coding to be included in the instruments after the collection was completed. After this stage, the pilot study was conducted with 30 participants to verify the administration time, understanding, and possible adjustments in the data collection instrument. Data collection took place from April to December 2019, in the classroom environment with the teacher's authorization.

2.3. Instrument and measurements

The data collection instrument was composed of sociodemographic variables (gender, age/age group, sexual orientation, race/ethnicity, religiosity, social class, marital status, children and who they lived with), academic variables (learning disabilities), situations of violence (sexual violence), lifestyle (physical activity and alcohol use) and mental distress (depressive and anxious symptoms) and suicidal ideation screening scales described below.

2.4. Composition of the mental illness profile

For the composition of the latent classes, conditions suggestive of anxiety, depression, suicidal ideation, and suicide attempt were used. As for screening for mental illness, the Self-Reporting Questionnaire (SRQ – 20) (Gonçalves et al., 2008) and the Kessler psychological stress scale, 10-item version (K10) (Kessler et al., 2003) were used. SRQ-20 is a self-administered instrument recommended by the World Health Organization (WHO) for screening for Common Mental Disorder (CMD) and/or mental illness. It shows validity and reliability suitable for use in the Brazilian population (Gonçalves et al., 2008). This is a questionnaire consisting of 20 items whose answers are dichotomous (yes/no). The final score results from the sum of each affirmative answer. The scores obtained are related to the probability of the presence of non-psychotic disorder (depressive, anxious and somatic symptoms), and range from 0 (no probability) to 20 (extreme probability). Furthermore, Cronbach's alpha coefficient for this particular version was high ($\alpha = 0.86$) (Gonçalves et al., 2008). SRQ-20 supported the identification of conditions suggestive of depression, so that the participant with a final score greater than or equal to 8 was considered as a condition suggestive of this pathology (Hanlon et al., 2015).

Additionally, K10 was used, which is a ten-item scale related to anxiety and depression symptoms experienced during the past four weeks. The items are scored on a five-point scale (5: Always; 4: Most of the time; 3: Occasionally; 2: A little of the time; 1: Never). The range of possible values is from 10 to 50. The original version of the scale was developed in English and demonstrated high internal consistency ($\alpha = 0.93$) (Kessler et al., 2003). The present scale enabled the identification of conditions suggestive of anxiety, starting at a score of 16 or greater (Andersen et al., 2011).

Suicidal ideation and attempted suicide were assessed using the Beck Suicidal Ideation Scale (BSI) (Beck and Steer, 1991; Cunha, 2001). This is a self-administered scale, validated in the Brazilian context, which detects the presence of suicidal ideation, previous suicide attempts, measuring their severity and extent of motivation, as well as the presence of suicidal behavior planning. BSI consists of 21 items that are scored on a three-point scale (0, 1 and 2). The scale was designed to allow the first five items to be used as a screening for suicidal ideation, and items 6 to 21 are related to the extent of this phenomenon. Suicidal ideation was considered present when the participant's response was different from zero in the group of statements 4 or 5 of the BSI, and the suicide attempt was identified from the statements of group 20 of that scale (Beck and Steer, 1991; Cunha, 2001).

2.5. Independent variables

The independent variables were: age, gender identity, religiosity,

social class score measured according to the Brazil Economic Classification Criteria, which assesses the purchasing power of consumer groups that are later distributed into classes (A, B1, B2, C1, C2, D and E) (ABEP, 2021), color/race (white, black, brown, yellow and indigenous – yes/no), marital status (with or without a partner), having children (yes/no), living alone (yes/no); academic context variables – reporting of learning disabilities (yes/no); variables related to lifestyle – use of alcohol in the last 30 days (yes/no), consumption of five or more doses of alcohol on the same occasion/binge drinking (yes/no), physical activity (yes/no); and situations of violence – having suffered sexual abuse (yes/no) (Lund et al., 2018; Patel et al., 2010; Sheldon et al., 2021; Andrade et al., 2010; Alegría et al., 2018).

2.6. Data analysis

The statistical analysis was performed in four stages, namely:

Stage 1. The participants' characteristics were described according to the independent variables mentioned above. Descriptive statistics were presented in percentages or means with their standard deviations.

Stage 2. An analysis of the profile of mental illness was carried out based on conditions suggestive of anxiety and depression, suicidal ideation and suicide attempt, using the LCA technique. It is a statistical procedure that seeks to group individuals according to similar patterns of responses, modeled with covariates. Furthermore, this technique makes it possible to estimate the probability of the participant belonging to each of the generated latent classes (Lanza and Cooper, 2016; Weller et al., 2020). The LCA model was adjusted based on the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), sample-size adjusted Bayesian Information Criterion (ssaBIC), Likelihood Ratio Test (Vuong-Lo-Mendell-Rubin - VLMR - LRT; Lo-Mendell-Rubin Adjusted - LMR adjusted - LRT), and entropy. The lower the values of AIC, BIC, and ssaBIC, the better the model fit. Significant p-values for the Likelihood Ratio Test indicate whether one model is statistically superior to another. To evaluate how well the latent classes discriminated individuals into groups, entropy was used. Values close to 1 indicate clear and very accurate classifications. In this study, the definition of the best latent class model was based on the lowest ssaBIC value, Likelihood Ratio Test, and entropy close to 1.0 (Lanza and Cooper, 2016; Weller et al., 2020). As we point out, entropy alone did not determine the number of latent classes. In order to assess the presence of local dependence in our LCA, we implemented a comprehensive approach utilizing the "Technical 10 Output" feature of Mplus. The procedure allowed us to examine the residual correlations between pairs of items (indicators) after accounting for latent class structure. In our evaluation, local dependence, which refers to correlations between items unaccounted for by latent class membership, was taken into account because it can indicate a violation of the assumptions of the LCA model. Using the "Technical 10 Output", we obtained univariate and bivariate statistics, including observed and estimated frequencies, standardized residuals (z-scores), and contributions to Pearson's Chi-square and Log-Likelihood. Standardized residuals provided us with a measure of the discrepancy between observed frequencies and those predicted by the model, standardized by the standard error. As a general rule, residual correlations between items within the range of −2 to 2 are considered non-significant, indicating that the residual correlations are not high enough to suggest local dependence. Our results indicate that local dependence is not a significant concern for the proposed LCA model. The standardized residuals for the bivariate comparisons between items were within an acceptable range of −2 to 2. As an example, in a comparison between the variables "depression" and "anxiety", the standardized residuals ranged from −0.002 to 0.007, indicating very low discrepancies between observed and predicted frequencies. In the bivariate comparisons, the Pearson Chi-square

and Log-Likelihood values were also low, supporting the model's adequacy with respect to the lack of significant local dependencies. Overall, the evaluation of local dependence through Mplus "Technical 10 Output" indicates that there are no residual correlations between items that are concerning in our LCA model. Based on the standardized residuals and Pearson Chi-square and Log-Likelihood values for bivariate comparisons, the model indicates that the identified latent class structure adequately captures the relationships between variables without significant indications of local dependence. According to us, this evaluation ensures the validity of the LCA model.

Stage 3. After identifying the best model of mental illness profiles (latent classes), which became the dependent variable, a descriptive and bivariate analysis was performed between the identified latent classes and the proposed independent variables, to determine which of them would be analyzed in the multinomial regression. Descriptive statistics are presented in percentages or means with their standard deviations. Bivariate analysis was performed using the chi-square test and ANOVA, according to the type of variable.

Stage 4. Subsequently, a multinomial logistic regression was performed to verify the association between latent classes and independent variables, which were selected from previous bivariate analyses and from the literature on factors associated with mental illness in young people (Lund et al., 2018; Patel et al., 2010; Sheldon et al., 2021; Andrade et al., 2010; Alegría et al., 2018). In order to reduce the number of comparisons, the variables of gender (cisgender man/cisgender woman) and sexual orientation (heterosexual/other sexual orientations) were dichotomized. In the case of the gender variable, due to the low prevalence of the other categories (one trans woman, one trans man and another unlisted gender) these responses were considered as missing. Participants who identified as homosexual, bisexual, pansexual and more of other sexual diversity were considered as the LGBTQI + community. Estimates are presented with odds ratios (OR) and their respective 95% confidence intervals and p-values. The significance level adopted was 5.0%. M-plus version 7 and Stata-SE version 17 software were used.

2.7. Ethics statement

To ensure ethical compliance and respect for the rights of the students, the study obtained approval from the Human Research Ethics Committee, supported by opinions No. 2,937,477 and No. 5,168,238. Before beginning the research, all participants who agreed to take part in the study signed the Informed Consent Form, assuring them of full knowledge and agreement with the procedures involved.

The students were informed about the research objectives and the estimated time of 60 min required to respond to the data collection instrument. Furthermore, the commitment to participant anonymity and their right to withdraw consent and participation at any time, without any consequences, was emphasized. It is essential to highlight that, during data collection, the research team, composed of a psychologist, a nurse, and two social workers with experience in mental health, was available to provide mental health support to any participant in need. If necessary, the participant would be referred to the psychology service of the institution, the locus of the research.

3. Results

3.1. Stage 1: descriptive analysis

Participants had a mean age of 24.1 years (± 7.8). The most frequent age group was ≤ 20 years. Most were cisgender, single, heterosexual, childless men who identified as brown-skinned. About religiosity, 32.8% have no religion. Socioeconomic classes B and C were the most frequent. Learning disabilities were reported by 13% of students. A percentage of 5.5% suffered sexual abuse at some point in their lives. Regarding

lifestyle, 41% reported physical activity, 36% had consumed alcohol in the last 30 days and 28% had binge drinking behavior. Other information is described in Table 1.

3.2. Stage 2: latent class analysis

The initial identification of percentiles of anxiety, depression, suicidal thoughts, and attempts was crucial to the execution of the LCA. The results of the study indicate that 61.7% (n = 566) of the participants exhibited signs of anxiety, and 35.3% (n = 324) showed signs of depression. In addition, 15.6% (n = 143) of the participants harbored suicidal thoughts, and 7.8% (n = 72) had attempted suicide.

Table 2 presents the results of fitting latent class models. Compared to the other models, the two- and three-class models demonstrated more satisfactory fit indices. The three-class model presents the best indices, presenting the lowest ssaBIC value (3245.826), p-values that are statistically significant in likelihood ratio tests, and an entropy value of 0.817. The two-class model, however, has a slightly higher ssaBIC (3253.932), statistically significant p-values, but a lower entropy (0.769). Although the other models displayed high values of entropy, they did not present statistically significant likelihood ratio tests. Based on the results of this analysis, the three-class model clearly stands out in spite of both models showing adequate statistical fit, as demonstrated by its lower ssaBIC and higher entropy.

As a measure of addressing local dependence issues in our LCA, we utilized Mplus "Technical 10 Output", which provides univariate and bivariate statistics, including standardized residuals and Pearson's Chi-square and Log-Likelihood contributions. As a result of the evaluation, all standardized residuals were within the acceptable range of -2 to 2, with the most significant discrepancy not exceeding a residual of -0.113, suggesting that the model does not suffer from local dependence. The findings of this study support the validity of the model in capturing the relationships between variables.

Fig. 1 shows the probability of students associated with each latent class of the three-class model, who exhibit signs of anxiety, depression, suicidal ideation, and suicide attempts, as well as the percentage of students in each class. The process involved screening for signs of anxiety and depression using predetermined cutoff scores based on the assessment tools used.

Anxiety with Low Risk of Suicide had the highest proportion of students (n = 573; 62.4%). The graph shows that for this group, the probability of a suggestive case of anxiety (35.6%) is significantly higher than the probability of a suggestive case of depression, suicidal ideation, or suicide attempt, which is much lower. Therefore, within this class of disorders, anxiety is much more prevalent than the other three and is not necessarily associated with an increased likelihood of depression or suicide. In the class named Mental Illness with Moderate Risk of Suicide (33.8%; n = 310), all students in this group presented anxious symptoms, given the probability of 100.0% for the suggestive case of anxiety, and a substantial majority exhibit depressive symptoms (probability = 79.5%). Furthermore, these students have lower, but still significant, probability of suicidal ideation (29.2%) and suicide attempt (10.1%). The final group of students with a high probability of anxious symptoms (96.5%), depressive symptoms (100.0%), suicidal ideation (100.0%), and suicide attempts (100.0%) represents Mental Illness with High Risk of Suicide, whose occurrence percentage was 3.8% (n = 35).

3.3. Stage 3: bivariate analysis

As shown in Table 3, bivariate analysis was performed between latent classes and sociodemographic, academic, situations of violence and lifestyle variables. There was a higher prevalence of ciswomen in the Mental Illness with High Suicide Risk class, in addition to younger students, with emphasis on the absence of participants over 30 years of age in this class.

Most students in the Anxiety with Low Suicide Risk group are

Table 1

Sociodemographic and academic characteristics, situations of violence and lifestyle of college students at a Federal Institute (n = 918).

Characteristics	*n*	%
Sociodemographic		
Gender		
Cisgender man	526	57.3
Cisgender woman	377	41.1
Trans man	1	0.1
Trans woman	1	0.1
Non-binary	0	0.0
Other	1	0.1
Missing	12	1.3
Age		
≤20 years	416	45.3
21–30 years	365	39.8
31–40 years	84	9.2
41–50 years	35	3.8
51–65 years	18	2.0
Sexual orientation		
Heterosexual	790	86.1
Homosexual	44	4.8
Bisexual	49	5.3
Pansexual	7	0.8
Other	2	0.2
Missing	26	2.8
Ethnicity		
Caucasian (white)	281	30.6
Afro Brazilian (black)	153	16.7
Pardo (brown)	464	50.5
Asian Brazilian (yellow)	11	1.2
Indigenous	5	0.5
Missing	4	0.4
Religion		
Yes	614	66.9
No	301	32.8
Missing	3	0.3
Socioeconomic status (score)		
Class A	37	4.0
Class B1	93	10.1
Class B2	316	34.4
Class C1	233	25.4
Class C2	172	18.7
Class D and E	67	7.3
Marital status		
Romantic partner	123	13.4
Single	791	86.2
Missing	4	0.4
To have children		
Yes	95	10.4
No	815	88.8
Missing	8	0.9
Live alone		
Yes	17	1.9
No	901	98.2
Academics		
Learning disabilities		
Yes	120	13.1
No	789	86.0
Missing	9	1.0
Violence Situations		
Sexual violence		
Yes	50	5.5
No	852	92.8
Missing	16	1.7
Lifestyle		
Sport practice		
Yes	376	41.0
No	529	57.6
Missing	13	1.4
Alcohol use in the last 30 days		
Yes	332	36.2
No	577	62.9
Missing	9	1.0
Binge drinking in the last 3 days		
Yes	259	28.2
No	643	70.1
Missing	16	1.7

*n: sample number.

heterosexual. On the other hand, in the group of people with Mental Illness with High Suicide Risk there was a higher prevalence of LGBTQI + people, being the largest proportion of the sample.

Being single was more prevalent in the Mental Illness with High Risk of Suicide class and less prevalent in the Anxiety with Low Risk of Suicide class. The opposite occurred with having children and having a religion, more prevalent in the Low Suicide Risk Anxiety class.

The prevalence of learning disabilities and having suffered sexual abuse increases significantly in the sequence of the three classes, being less prevalent in the Anxiety with Low Risk of Suicide class and more in the group of Mental Illness with High Suicide Risk.

3.4. Stage 4: multinomial logistic regression

The results of the adjusted multinomial logistic regression analysis (Table 4) showed that being a ciswoman (OR: 2.53; 95%CI: 1.83–3.49), self-declaring LGBTQI+ (OR: 2.79; 95%CI: 1.64–4.75), having difficulties (OR: 3.30; 95%CI: 2.08–5.24) and having suffered sexual violence (OR: 3.01; 95%CI: 1.37–6.62) were characteristics associated with participants' greater likelihood of belonging to the Mental Illness group with Moderate Suicide Risk, taking the Low Suicide Risk Anxiety group as a reference.

On the other hand, following a religion decreased the students' likelihood of belonging to the Mental Illness with Moderate Suicide Risk class by 47% (OR: 0.53; 95%CI: 0.38–0.74). As with this class, religion reduced students' likelihood of belonging to the group of Mental Illness with High Suicide Risk by 63% (95%CI: 0.17–0.84).

Having learning disabilities (OR: 6.55; CI: 2.70–15.91), self-declaring LGBTQI+ (OR: 6.83; CI: 2.79–16.73) and having been a victim of sexual violence (OR: 7.65; CI: 2.44–24.02) increased substantially students' likelihood of belonging to the mental illness class with high suicide risk, with a larger effect size for this category, compared to the mental illness class with moderate suicide risk.

4. Discussion

4.1. Predictors of mental illness profiles

This study was conducted in order to identify mental health profiles among students of a Brazilian FI using LCA and to investigate possible risk factors associated with mental illness. The purpose of LCA is not to diagnose disorders in isolated individuals, but rather to identify patterns of collective responses to indicators, such as anxiety, depression, suicidal ideation, and suicide attempts. As a result, it is possible to differentiate between subgroups within the student population based on the prevalence of these symptoms. The probabilities derived from belonging to each latent class do not necessarily indicate a universal presence of disorders within the class, but rather indicate the relative predisposition of each subgroup to specific symptoms.

Furthermore, the sample design was intended to cover a broad spectrum of students from the Federal Institute of Technology without pre-selection based on the presence or absence of mental illness symptoms. Therefore, the sample includes both students with suggestive signs of mental disorders as well as those without any disorders, reflecting the diversity of the student population. The probabilities reported for each class reflect the tendency of students in that class to present certain symptoms, not the presence of these symptoms in all individuals. As a result, the probability estimations provide a tool for understanding the relative prevalence and severity of mental health issues in each identified profile, without implying that all students suffer from mental health problems.

A total of three profiles were identified, namely: Anxiety with Low Suicide Risk, Mental Illness with Moderate Suicide Risk, and Mental

Table 2
Goodness-of-fit statistics for latent class models of mental illness among college students at a Federal Institute (n = 918).

models	FP	FC	Goodness-of-fit statistics					
			AIC	BIC	ssaBIC	VLMR-LRT	LMR adjusted LRT test	E
1 class	4	1.0000	3714.259	3733.547	3720.844			
2 class	9	1.0078	3239.115	3282.515	3253.932	<0.0001	<0.0001	0.769
3 class	14	1.0018	3222.777	3290.288	3245.826	<0.0001	<0.0001	0.817
4 class	19	1.0020	3229.701	3321.322	3260.981	0.0999	0.1043	0.838
5 class	24	0.9167	3238.528	3354.261	3278.040	0.3665	0.3738	0.851

*FP = Free parameters; **FC = Correction Factor; ***AIC = Akaike Information Criteria; ****BIC = Bayesian Information Criteria; *****ssABIC = sample size adjusted BIC; ******VLMR-LRT = Voung-Lo-Mendell-Rubin Likelihood Ratio LRT Test; *******LMR adjusted LRT test = Lo-Mendell-Rubin Adjusted LRT Test; ********E = Entropy.
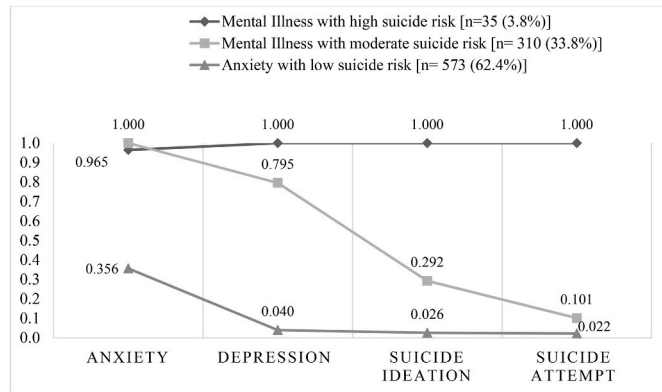
Fig. 1. Probabilities that students have anxiety, depression, suicidal ideation, and suicide attempts, along with their proportions.

Illness with High Suicide Risk. All profiles exhibited a suggestive picture of anxiety, with a higher probability observed in the two more severe profiles. Inferential analysis revealed that belonging to a mental illness class with moderate or high suicide risk was associated with cisgender women, self-declared LGBTQI + individuals, learning disabilities, and sexual violence victims, with the effect size being larger for those with a high suicide risk. Furthermore, following a religion was a protective factor in both classes, though its effect was greater in the class with a high suicide risk.

The findings on the profiles of mental illness are consistent with the international literature, which has shown a high prevalence of mental disorders in students who enter higher or professional education, with emphasis on anxiety and depressive disorders, in addition to suicidal thoughts and suicide attempts (Duffy et al., 2019; King et al., 2021; Liu et al., 2019; Demenech et al., 2021; Cuijpers et al., 2021). This alarming trend highlights the unique challenges faced by these individuals, including the transition to adulthood, academic stress, performance expectations, and issues of identity and belonging (Duffy et al., 2019). This study is unique in that it analyzes the subjects' profiles rather than evaluating isolated behaviors. This approach is significant because it acknowledges that mental disorders often coexist and are intertwined in a complex web of causes and effects. This view is supported by the literature, which shows that one mental disorder can increase the risk of others, creating patterns of comorbidity that require integrated treatment approaches (Plana-Ripoll et al., 2019). The authors of this study argue that students exhibiting anxiety and psychological disorders are more likely to also exhibit different mental disorders (Cuijpers et al., 2021), supporting the hypothesis of this study based on the likelihood that the student would belong to different psychological profiles. In this way, our study focuses on illness profiles rather than specific actions in order to gain a deeper understanding of mental health by taking into account the biological, psychological, and social dimensions of mental health.

The Moderate and High Risk of Suicide profiles, in the occurrence of,

respectively, medium and high percentages of suicidal ideation and suicide attempt also find support in the literature when stating that the suicidal act is strongly associated with previous suicide attempts, suicidal ideation, mental disorders, mainly Depression, and, to a lesser extent, shows a relationship with Anxiety and other disorders (Bachmann, 2018; World Health Organization, 2019). There is a broad spectrum of psychological vulnerabilities that can influence suicidal behavior, indicating a need for a comprehensive approach when assessing suicide risk. The multidimensional perspective recognizes suicide as a complex and multifactorial phenomenon, rather than the result of a single factor (Large et al., 2022; World Health Organization, 2021a,b). The early identification of students with these risk profiles allows for the allocation of resources and the development of personalized care plans that are not only designed to treat the present symptoms but also to reduce the risk of future suicide attempts. Moreover, understanding how depression, anxiety, and other disorders contribute to the risk of suicide emphasizes the importance of an integrated and expanded approach to mental health care, which considers both the underlying psychological conditions as well as the specific risk factors for suicide (Henry, 2021; World Health Organization, 2021a,b).

In this study, being a ciswoman was associated with a greater chance of belonging to the profiles of greater severity of mental illness, specifically those with a greater suicide risk. Gender has been considered a factor associated with the occurrence of mental disorders, in which women are more likely to have these disorders (Patel et al., 2010; Otten et al., 2021; Carpena et al., 2020; Bommersbach et al., 2022) and to make more suicide attempts, compared to men (Bachmann, 2018; World Health Organization, 2019; Otten et al., 2021; Carpena et al., 2020; Bommersbach et al., 2022). Cisgender women are more likely to suffer from mental disorders as a result of a combination of factors, including gender discrimination, violence, social pressures, and a heavier load of household duties. As a result of these stressors, mental health conditions such as depression and anxiety can worsen, which may increase the risk of suicide (Carpena et al., 2020; Dantas et al., 2023). Moreover, the higher incidence of suicide attempts among women may be attributable to differences in the methods used, the availability of support networks, and the willingness to seek assistance (Bommersbach et al., 2022; Freeman et al., 2017). According to studies, while men are more likely to use lethal methods in completed suicides, women are more likely to attempt suicide, emphasizing the need for gender-based preventative interventions (Carpena et al., 2020; Dantas et al., 2023; Freeman et al., 2017).

Continuing, students who recognized themselves as LGBTQI+, with learning disabilities and/or who suffered sexual abuse were more likely to belong to the Mental Illness with High Suicide Risk class. Students who identify as LGBTQI + face unique challenges that may aggravate their risk of mental distress and suicidal behavior. A hostile environment can be created by social stigma and prejudice, often rooted in institutions and everyday interactions. This can lead to feelings of isolation and rejection. Additionally, constant exposure to bullying, threats, and other forms of aggression contributes to an increased level of stress experienced by these students (Liu et al., 2019; Przedworski et al., 2015;

Table 3
Descriptive and bivariate analysis of sociodemographic and academic characteristics, situations of violence and lifestyle according to the latent classes of mental illness identified among college students at a Federal Institute (n = 918).

Characteristics	Total	Anxiety with Low Suicide Risk	Mental Illness with Moderate Suicide Risk	Mental Illness with High Suicide Risk	p-value
	$n = 918$	$n = 573$	$n = 310$	$n = 35$	
	n (%) or mean ± SD	n (%) or mean ± SD	n (%) or mean ± SD	n (%) or mean ± SD	
Sociodemographic					
Gender					<0.001***
Cisgender man	526 (57.3%)	383 (66.8%)	131 (42.3%)	12 (34.3%)	
Cisgender woman	377 (41.1%)	180 (31.4%	175 (56.5%)	22 (63.0%	
Trans man	1 (0.1%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	
Trans woman	1 (0.1%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	
Non-binary	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Other	1 (0.1%)	0 (0.0%)	1 (0.3%)	0 (0.0%)	
Missing	12 (1.3%)	8 (1.4%)	3 (1.0%)	1 (2.9%)	
Age	24.1 ± 7.8	25.0 ± 8.8	22.6 ± 5.9	21.3 ± 2.6	<0.001****
≤20 years	416 (45.3%)	247 (43.1%)	153 (49.4%)	16 (45.7%)	
21–30 years	365 (39.8%)	221 (38.6%)	125 (40.3%)	19 (54.3%)	
31–40 years	84 (9.2%)	59 (10.3%)	25 (8.1%)	0 (0.0%)	
41–50 years	35 (3.8%)	31 (5.4%)	4 (1.3%)	0 (0.0%)	
51–65 years	18 (2.0%)	15 (2.6%)	3 (1.0%)	0 (0.0%)	
Sexual orientation					<0.001***
Heterosexual	790 (86.1%)	531 (92.7%)	240 (77.4%)	19 (54.3%)	
Homosexual	44 (4.8%)	19 (3.3%)	20 (6.5%)	5 (14.3%)	
Bisexual	49 (5.3%)	10 (1.8%)	30 (9.7%)	9 (25.7%)	
Pansexual	7 (0.8%)	1 (0.2%)	6 (1.9%)	0 (0.0%)	
Other	2 (0.2%)	1 (0.2%)	1 (0.3%)	0 (0.0%)	
Missing	26 (2.8%)	11 (1.9%)	13 (4.2%)	2 (5.7%)	
Ethnicity					0.462***
Caucasian (white)	281 (30.6%)	169 (29.5%)	103 (33.2%)	9 (25.7%)	
Afro Brazilian (black)	153 (16.7%)	93 (16.2%)	54 (17.4%)	6 (17.1%)	
Pardo (brown)	464 (50.5%)	295 (51.5%)	150 (48.5%)	19 (54.3%)	
Asian Brazilian (yellow)	11 (1.2%)	10 (1.8%)	1 (0.3%)	0 (0.0%)	
Indigenous	5 (0.5%)	3 (0.5%)	1 (0.3%)	1 (2.9%)	
Missing	4 (0.4%)	3 (0.5%)	1 (0.3%)	0 (0.0%)	
Religion					<0.001***
Yes	614 (66.9%)	417 (72.8%)	182 (58.7%)	15 (42.9%)	
No	301 (32.8%)	154 (26.9%)	127 (41.0%)	20 (57.1%)	
Missing	3 (0.3%)	2 (0.4%)	1 (0.3%)	0 (0.0%)	
Socioeconomic status (score)	28.5 ± 8.8	28.7 ± 8.9	28.4 ± 8.6	26.6 ± 9.7	0.374****
Marital status					0.015***
Romantic partner	123 (13.4%)	94 (16.4%)	26 (8.4%)	3 (8.6%)	
Single	791 (86.2%)	476 (83.1%)	283 (91.3%)	32 (91.4%)	
Missing	4 (0.4%)	3 (0.5%)	1 (0.3%)	0 (0.0%)	
To have children					0.020***
Yes	95 (10.4%)	74 (12.9%)	20 (6.5%)	1 (2.9%)	
No	815 (88.8%)	494 (86.2%)	287 (92.6%)	34 (97.1%)	
Missing	8 (0.9%)	5 (0.9%)	3 (1.0%)	0 (0.0%)	
Live alone					0.624***
Yes	17 (1.9%)	12 (2.1%)	5 (1.6%)	0 (0.0%)	
No	901 (98.2%)	561 (97.9%)	305 (98.4%)	35 (100.0%)	
Academics					
Learning disabilities					<0.001***
Yes	120 (13.1%)	49 (8.6%)	59 (19.0%)	12 (34.3%)	
No	789 (86.0%)	520 (90.8%)	246 (79.4%)	23 (65.7%)	
Missing	9 (1.0%)	4 (0.7%)	5 (1.6%)	0 (0.0%)	
Violence Situations					
Sexual violence					<0.001***
Yes	50 (5.5%)	11 (1.9%)	31 (10.0%)	8 (22.9%)	
No	852 (92.8%)	552 (96.3%)	275 (88.7%)	25 (71.4%)	
Missing	16 (1.7%)	10 (1.8%)	4 (1.3%)	2 (5.7%)	
Lifestyle					
Sport practice					0.063***
Yes	376 (41.0%)	255 (44.5%)	109 (35.2%)	12 (34.3%)	
No	529 (57.6%)	311 (54.3%)	195 (62.9%)	23 (65.7%)	
Missing	13 (1.4%)	7 (1.2%)	6 (1.9%)	0 (0.0%)	
Alcohol use in the last 30 days					0.142***
Yes	332 (36.2%)	196 (34.2%	118 (38.1%)	18 (51.4%)	
No	577 (62.9%)	371 (64.7%)	190 (61.3%)	16 (45.7%)	
Missing	9 (1.0%)	6 (1.1%)	2 (0.7%)	1 (2.9%)	
Binge drinking in the last 30 days					0.335***

Table 3 (*continued*)

Characteristics	Total	Anxiety with Low Suicide Risk	Mental Illness with Moderate Suicide Risk	Mental Illness with High Suicide Risk	p-value
	$n = 918$	$n = 573$	$n = 310$	$n = 35$	
	n (%) or mean ± SD	n (%) or mean ± SD	n (%) or mean ± SD	n (%) or mean ± SD	
Yes	259 (28.2%)	151 (26.4%)	94 (30.3%)	14 (40.0%)	
No	643 (70.1%)	411 (71.7%)	211 (68.1%)	21 (60.0%)	
Missing	16 (1.7%)	11 (1.9%)	5 (1.6%)	0 (0.0%)	

*n: sample number.
**SD: standard deviation.
***Chi-square test.
****One-way ANOVA test.

Table 4
Crude and adjusted results of the multinomial logistic regression model evaluating the association between mental illness profiles and sociodemographic, academic, situations of violence and student lifestyle characteristics (n = 918).

Variables	Mental Illness with Moderate Suicide Risk vs. Anxiety with Low Suicide Risk Unadjusted			Mental Illness with High Suicide Risk vs. Anxiety with Low Suicide Risk Unadjusted			Mental Illness with Moderate Suicide Risk vs. Anxiety with Low Suicide Risk Adjusted			Mental Illness with High Suicide Risk vs. Anxiety with Low Suicide Risk Adjusted		
	cOR	95% CI	p-value	cOR	95% CI	p-value	aOR	95% CI	p-value	aOR	95% CI	p-value
Gender												
Cisgender man	1			1			1			1		
Cisgender woman	2.84	[2.13; 3.79]	<0.001	3.90	[1.89; 8.06]	<0.001	2.53	[1.83; 3.49]	<0.001	2.65	[1.17; 6.00]	0.020
Age	0.95	[0.93; 0.98]	<0.001	0.91	[0.84; 0.98]	0.016	0.97	[0.95; 1.00]	0.069	0.91	[0.82; 1.02]	0.092
Sexual orientation												
Heterosexual	1			1			1			1		
LGBTQI+	4.07	[2.56; 6.46]	<0.001	12.62	[5.79; 27.52]	<0.001	2.79	[1.64; 4.75]	<0.001	6.83	[2.79; 16.73]	<0.001
Religion	0.53	[0.40; 0.71]	<0.001	0.28	[0.14; 0.55]	<0.001	0.53	[0.38; 0.74]	<0.001	0.37	[0.17; 0.84]	0.017
Romantic partner	0.47	[0.29; 0.74]	<0.001	0.47	[0.14; 1.58]	0.225	0.77	[0.41; 1.45]	0.419	1.20	[0.21; 6.94]	0.835
To have children	0.47	[0.28; 0.78]	0.004	0.20	[0.03; 1.46]	0.111	0.95	[0.47; 1.94]	0.887	0.97	[0.10; 9.78]	0.981
Learning disabilities	2.55	[1.69; 3.83]	<0.001	5.54	[2.60; 11.80]	<0.001	3.30	[2.08; 5.24]	<0.001	6.55	[2.70; 15.91]	<0.001
Sexual violence	5.66	[2.80; 11.42]	<0.001	06.16	[5.94; 43.43]	<0.001	3.01	[1.37; 6.62]	0.006	7.65	[2.44; 02.24]	<0.001

*cOR: crude odds ratio; **aOR: adjusted odds ratio; ***95% CI: 95% confidence intervals.

Hottes et al., 2016; Evans-Polce et al., 2020). As a result, it is increasingly difficult for individuals to find safe and welcoming spaces in which they can freely express their identity without fear of retaliation or judgment (Smith et al., 2022).

The results of this study also demonstrated an association between the Mental Illness Profile and a high risk of suicide and learning difficulties. Especially in individuals with learning disabilities, mental disorders can negatively impact not only class attendance but also academic performance and social interaction (Richardson et al., 2012). Furthermore, learning difficulties can increase the risk of developing mental disorders (Richardson et al., 2012; Zakopoulou et al., 2014). In the absence of adequate support, the continuous effort to meet academic demands can result in persistent feelings of inadequacy and frustration (Francis et al., 2019). Having emotional difficulties may be a significant risk factor for mental disorders (Cristofani et al., 2023; Arthur, 2003).

A positive association was demonstrated between the profiles of mental illness with moderate and high suicide risk and the occurrence of sexual violence, with emphasis on the more severe profile, whose effect size was twice as large, compared to the profile of mental illness with moderate suicide risk. Sexual violence is associated with several mental health problems, which include suicidal behavior and drug abuse, which causes problems in all dimensions of functioning in the subject's life (Oram, 2019). In this sense, younger and LGBTQI + women make up the group of people most likely to be victims of sexual harassment and/or abuse (King et al., 2021; Auerbach et al., 2018; Oram, 2019). According to data from the World Health Organization, at least one out of every three women aged 15–49 years has suffered physical and/or sexual violence inside and/or outside the home (World Health Organization, 2021a,b). In this study, with the exception of the youngest, LGBTQI + women and students were at greater risk of being in the profiles of greater mental illness.

Further, this study found that students who adhered to a religion were less likely to belong to classes that had increased severity of mental illness. Including religion in mental health care may assist youth in finding coping strategies that can reduce the impact of stress and encourage adoption of a healthier lifestyle, while increasing self-esteem and well-being (Monteiro et al., 2020). In addition, religious faith and/or spirituality are associated with lower rates of depression, suicide attempts, and suicide completions. A limited amount of evidence exists regarding anxiety, and the results are mixed (Lucchetti et al., 2021). There is already evidence in Brazil that religious practice can prevent drug use and aid in the recovery of drug users, who are often co-occurring with mental illness (Sanchez et al., 2008). It must be noted, however, that religious belief can also result in negative health outcomes, such as discrimination and social isolation, especially among religious or gender minority groups (Wolff et al., 2016). Young LGBTQIA + adults who mature in religious settings are more likely, compared with other young LGBTQIA + adults, to exhibit suicidal thoughts and, more specifically, chronic suicidal thoughts and suicide attempts (Gibbs and Goldbach, 2015).

To address the severity of mental disorders among college students, which markedly point to a high prevalence of anxiety and risk of suicide in all profiles, interventions such as mindfulness and emotional and social skills training, with a focus on reducing anxiety levels, suicide risk, increased self-efficacy, self-esteem, resilience and students' self-regulation skills (Yang et al., 2020; Galante et al., 2021), should be part of the curriculum of Brazilian higher education institutions. Furthermore, it is necessary to implement strategies to help students with learning disabilities, such as diversification of teaching strategies, encouragement of self-regulatory learning, individualized monitoring to

establish learning goals aimed at developing skills and reducing anxiety (Richardson et al., 2012), in addition to training the teaching staff to identify these students and forward them to screening and early diagnosis.

The choice of LCA was based on its superior ability to reveal latent subgroups within complex data sets (Weller et al., 2020; Valentini et al., 2021; Lardier et al., 2022; Essau and de la Torre-Luque, 2019; Garcia-Cerde et al., 2021; Bornheimer et al., 2022; Bernanke et al., 2017), such as the varied mental health states of the study population. Using this methodology, we were able to identify distinct profiles of mental disorders that would have otherwise been missed by more traditional statistical approaches. A crucial aspect of LCA was its ability to address the inherent diversity within our sample, enabling a meticulous and in-depth exploration that uncovered an array of psychological patterns among our students. This level of detail is critical to the development of targeted mental health interventions and policies that cater to the specific needs of each subgroup identified (Valente et al., 2018; Essau and de la Torre-Luque, 2019; Garcia-Cerde et al., 2021; Bornheimer et al., 2022; Bernanke et al., 2017). The straightforward interpretability of LCA results, combined with its versatility across a variety of research domains, made it an ideal fit for our purposes. The capability of LCA to handle a wide range of data types and to address a wide range of research questions allowed for a comprehensive examination of mental illness profiles and their associated factors within the educational context.

4.2. Practical implications

The present study identified possible predictors of the most severe profiles of mental illness, including a high suicide risk group, and point to the prioritization that should be given to some groups, such as self-declared LGBTQI+, victims of sexual abuse, and those with learning disabilities. These results are important to support the planning and implementation of prevention and health promotion programs for student well-being. However, for these interventions to achieve the expected results, it is necessary for educational institutions to know the profile of their students and develop their programs for the prevention of mental illness based on the results found and the best available evidence, always suggesting the use of internationally validated programs.

4.3. Limitations

Although the study has potential to identify risk profiles, its design is cross-sectional and does not allow for causal inference, the use of a self-report method to measure some variables, and a small sample size prevents the study from generalizing the results to the population of Brazilian university students. In future studies, it is recommended that variables be measured using reliable and validated instruments, especially those aspects that were measured through self-report, which may introduce measurement biases. Furthermore, it is recommended that population-based research be conducted with students from technical and higher education institutions, both public and private, representing the Brazilian territory, in order to identify the mental illness profile of this audience, using valid and reliable instruments applicable to the Brazilian context, and to determine the factors that contribute to its prevalence.

4.4. Conclusion

Three profiles were identified, namely: Anxiety with Low Suicide Risk, Mental Illness with Moderate Suicide Risk and Mental Illness with High Suicide Risk. It was observed that the picture suggestive of anxiety was universal and high in all profiles, with greater probability in the two most severe profiles. In the inferential analysis, belonging to the mental illness classes with moderate and high suicide risk was associated with cisgender women and self-declared LGBTQI+, learning disabilities, and

having suffered sexual violence, with a larger effect size in the high suicide risk class. In the same sense, following a religion was a protective factor for belonging to both classes, whose protective effect was greater in the high suicide risk class.

Ethics approval and consent to participate

All subjects have provided written informed consent. The study was approved by the Ethics Committee of Research with human beings, according to opinions No. 2,937,477 and No. 5,168,238.

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

CRediT authorship contribution statement

Jaqueline Galdino Albuquerque Perrelli: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Rodrigo García-Cerde:** Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Pollyanna Fausta Pimentel de Medeiros:** Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Writing – original draft. **Zila M. Sanchez:** Conceptualization, Formal analysis, Methodology, Software, Supervision, Writing – original draft, Writing – review & editing.

Declaration of competing interest

The authors declare no conflicts of interest.

References

Alegría, M., NeMoyer, A., Falgàs Bagué, I., Wang, Y., Alvarez, K., 2018. Social determinants of mental health: where we are and where we need to go. Curr. Psychiatr. Rep. 20 (11), 95. https://doi.org/10.1007/s11920-018-0969-9.

Andersen, L.S., Grimsrud, A., Myer, L., Williams, D.R., Stein, D.J., Seedat, S., 2011. The psychometric properties of the K10 and K6 scales in screening for mood and anxiety disorders in the South African Stress and Health study. Int. J. Methods Psychiatr. Res. 20 (4), 215–223. https://doi.org/10.1002/mpr.351.

Andrade, A.G.D., Duarte, P.C.A.V., Oliveira, L.G.D., 2010. I Levantamento Nacional sobre Uso de Álcool, Tabaco e Outras Drogas entre Universitários das 27 Capitais Brasileiras. Brasília, Secretaria Nacional de Políticas sobre Drogas. https://cetadobserva.ufba.br/sites/cetadobserva.ufba.br/files/634.pdf. (Accessed 26 March 2024).

Arthur, A.R., 2003. The emotional lives of people with learning disability. Br. J. Learn. Disabil. 31 (1), 25–30. https://doi.org/10.1046/j.1468-3156.2003.00193.x.

Associação Brasileira de Empresas de Pesquisa (ABEP), 2021. Critério de classificação econômica Brasil. Associação Brasileira de Empresas de Pesquisa (ABEP). https://www.abep.org/criteriobrasil.aspx. (Accessed 26 March 2024).

Auerbach, R.P., Alonso, J., Axinn, W.G., Cuijpers, P., Ebert, D.D., Green, J.G., Hwang, I., Kessler, R.C., Liu, H., Mortier, P., Nock, M.K., Pinder-Amaker, S., Sampson, N.A., Aguilar-Gaxiola, S., Al-Hamzawi, A., Andrade, L.H., Benjet, C., Caldas-de-Almeida, J. M., Demyttenaere, K., Florescu, S., de Girolamo, G., Gureje, O., Haro, J.M., Karam, E. G., Kiejna, A., Kovess-Masfety, V., Lee, S., McGrath, J.J., O'Neill, S., Pennell, B.-E., Scott, K., ten Have, M., Torres, Y., Zaslavsky, A.M., Zarkov, Z., Bruffaerts, R., 2016. Mental disorders among college students in the World health organization World mental health surveys. Psychol. Med. 46, 2955–2970. https://doi.org/10.1017/S0033291716001665.

Auerbach, R.P., Mortier, P., Bruffaerts, R., Alonso, J., Benjet, C., Cuijpers, P., Demyttenaere, K., Ebert, D.D., Green, J.G., Hasking, P., Murray, E., Nock, M.K., Pinder-Amaker, S., Sampson, N.A., Stein, D.J., Vilagut, G., Zaslavsky, A.M., Kessler, R.C., WHO WMH-ICS Collaborators, 2018. WHO World mental health surveys international college student Project: prevalence and distribution of mental disorders. J. Abnorm. Psychol. 127 (7), 623–638. https://doi.org/10.1037/abn0000362.

Bachmann, S., 2018. Epidemiology of suicide and the psychiatric perspective. Int. J. Environ. Res. Publ. Health 15 (7), 1425. https://doi.org/10.3390/ijerph15071425.

Baik, C., Larcombe, W., Brooker, A., 2019. How universities can enhance student mental wellbeing: the student perspective. High Educ. Res. Dev. 38 (4), 674–687. https://doi.org/10.1080/07294360.2019.1576596.

Beck, A.T., Steer, R.A., 1991. Manual for the Beck Scale for Suicide Ideation. Psychological Corporation.

Bernanke, J., Galfalvy, H.C., Mortali, M.G., Hoffman, L.A., Moutier, C., Nemeroff, C.B., Stanley, B.H., Clayton, P., Harkavy-Friedman, J., Oquendo, M.A., 2017. Suicidal ideation and behavior in institutions of higher learning: a latent class analysis. J. Psychiatr. Res. 95, 253–259. https://doi.org/10.1016/j.jpsychires.2017.09.003.

Bommersbach, T.J., Rosenheck, R.A., Petrakis, I.L., Rhee, T.G., 2022. Why are women more likely to attempt suicide than men? Analysis of lifetime suicide attempts among US adults in a nationally representative sample. J. Affect. Disord. 311, 157–164. https://doi.org/10.1016/j.jad.2022.05.096.

Bornheimer, L.A., Czyz, E., Koo, H.J., Verdugo, J.L., Eisenberg, D., Zheng, K., Pistorello, J., Albucher, R.C., Coryell, W., Favorite, T., King, C.A., 2022. Suicide risk profiles and barriers to professional help-seeking among college students with elevated risk for suicide. J. Psychiatr. Res. 152, 305–312. https://doi.org/10.1016/j.jpsychires.2022.06.028.

Carpena, M.X., Costa, F.D.S., Martins-Silva, T., Xavier, M.O., Loret de Mola, C., 2020. Why Brazilian women suffer more from depression and suicidal ideation: a mediation analysis of the role of violence. Brazilian Journal of Psychiatry 42, 469–474. https://doi.org/10.1590/1516-4446-2019-0572.

Crispim, M.O., Santos, C.M.R., Frazão, I.S., Frazão, C.M.F.Q., Albuquerque, R.C.R., Perrelli, J.G.A., 2021. Prevalence of suicidal behavior in young university students: a systematic review with meta-analysis. Rev. Latino-Am. Enferm. 29, e3495 https://doi.org/10.1590/1518-8345.5320.3495.

Cristofani, P., Di Lieto, M.C., Casalini, C., Pecini, C., Baroncini, M., Pessina, O., Gasperini, F., Lang, M.B.D., Bartoli, M., Chilosi, A.M., Milone, A., 2023. Specific learning disabilities and emotional-behavioral difficulties: phenotypes and role of the cognitive profile. J. Clin. Med. 12 (5), 1882. https://doi.org/10.3390/jcm12051882.

Cuijpers, P., Smit, F., Aalten, P., Batelaan, N., Klein, A., Salemink, E., Spinhoven, P., Struijs, S., Vonk, P., Wiers, R.W., de Wit, L., Gentili, C., Ebert, D.D., Bruffaerts, R., Kessler, R.C., Karyotaki, E., 2021. The associations of common psychological problems with mental disorders among college students. Front. Psychiatr. 12, 573637 https://doi.org/10.3389/fpsyt.2021.573637.

Cunha, J.A., 2001. Manual da versão em português das Escalas Beck. Casa do Psicólogo.

Dantas, E.S.O., Meira, K.C., Bredemeier, J., Amorim, K.P.C., 2023. Suicídio de mulheres no Brasil: necessária discussão sob a perspectiva de gênero. Ciência Saúde Coletiva 28 (5), 1469–1477. https://doi.org/10.1590/1413-81232023285.16212022.

Demenech, L.M., Oliveira, A.T., Neiva-Silva, L., Dumith, .S.C., 2021. Prevalence of anxiety, depression and suicidal behaviors among Brazilian undergraduate students: a systematic review and meta-analysis. J. Affect. Disord. 282, 147–159. https://doi.org/10.1016/j.jad.2020.12.108.

Duffy, A., Saunders, K.E., Malhi, G.S., Patten, S., Cipriani, A., McNevin, S.H., MacDonald, E., Geddes, J., 2019. Mental health care for university students: a way forward? Lancet Psychiatr. 6 (11), 885–887. https://doi.org/10.1016/S2215-0366(19)30275-5.

Essau, C.A., de la Torre-Luque, A., 2019. Comorbidity profile of mental disorders among adolescents: a latent class analysis. Psychiatr. Res. 278, 228–234. https://doi.org/10.1016/j.psychres.2019.06.007.

Evans-Polce, R.J., Kcomt, L., Veliz, P.T., Boyd, C.J., McCabe, S.E., 2020. Alcohol, tobacco, and comorbid psychiatric disorders and associations with sexual identity and stress-related correlates. Am. J. Psychiatr. 177 (11), 1073–1081. https://doi.org/10.1176/appi.ajp.2020.20010005.

Francis, G.L., Duke, J.M., Fujita, M., Sutton, J.C., 2019. "It's a constant fight:" experiences of college students with disabilities. Journal of Postsecondary Education and Disability 32 (3), 247–262.

Freeman, A., Mergl, R., Kohls, E., Székely, A., Gusmao, R., Arensman, E., Koburger, N., Hegerl, U., Rummel-Kluge, C., 2017. A cross-national study on gender differences in suicide intent. BMC Psychiatr. 17, 1–11. https://doi.org/10.1186/s12888-017-1398-8.

Galante, J., Stochl, J., Dufour, G., Vainre, M., Wagner, A.P., Jones, P.B., 2021. Effectiveness of providing university students with a mindfulness-based intervention to increase resilience to stress: 1-year follow-up of a pragmatic randomised controlled trial. J. Epidemiol. Community Health 75 (2), 151–160. https://doi.org/10.1136/jech-2020-214390.

Garcia-Cerde, R., Valente, J.Y., Sanchez, Z.M., 2021. Attitudes are associated with the drug use profiles of middle school adolescents: a latent class analysis. Psychiatr. Res. 295, 113592 https://doi.org/10.1016/j.psychres.2020.113592.

Gibbs, J.J., Goldbach, J., 2015. Religious conflict, sexual identity, and suicidal behaviors among LGBT young adults. Arch. Suicide Res. 19 (4), 472–488. https://doi.org/10.1080/13811118.2015.1004476.

Gonçalves, D.M., Stein, A.T., Kapczinski, F., 2008. Avaliação de desempenho do Self-Reporting Questionnaire como instrumento de rastreamento psiquiátrico: um estudo comparativo com o Structured Clinical Interview for DSM-IV-TR [Performance of the Self-Reporting Questionnaire as a psychiatric screening questionnaire: a comparative study with Structured Clinical Interview for DSM-IV-TR]. Cad. Saúde Pública 24 (2), 380–390. https://doi.org/10.1590/s0102-311x2008000200017.

Hanlon, C., Medhin, G., Selamu, M., Breuer, E., Worku, B., Hailemariam, M., Lund, C., Prince, M., Fekadu, A., 2015. Validity of brief screening questionnaires to detect depression in primary care in Ethiopia. J. Affect. Disord. 186, 32–39. https://doi.org/10.1016/j.jad.2015.07.015.

Henry, M., 2021. Suicide prevention: a multisectorial public health concern. Prev. Med. 152, 106772 https://doi.org/10.1016/j.ypmed.2021.106772.

Hernández-Torrano, D., Ibrayeva, L., Sparks, J., Lim, N., Clementi, A., Almukhambetova, A., Nurtayev, Y., Muratkyzy, A., 2020. Mental health and well-being of university students: a bibliometric mapping of the literature. Front. Psychiatr. 11, 1226. https://doi.org/10.3389/fpsyg.2020.01226.

Hottes, T.S., Bogaert, L., Rhodes, A.E., Brennan, D.J., Gesink, D., 2016. Lifetime prevalence of suicide attempts among sexual minority adults by study sampling strategies: a systematic review and meta-analysis. Am. J. Publ. Health 106 (5), e1–e12. https://doi.org/10.2105/AJPH.2016.303088.

Kessler, R.C., Barker, P.R., Colpe, L.J., Epstein, J.F., Gfroerer, J.C., Hiripi, E., Howes, M.J., Normand, S.L., Manderscheid, R.W., Walters, E.E., Zaslavsky, A.M., 2003. Screening for serious mental illness in the general population. Arch. Gen. Psychiatr. 60 (2), 184–189. https://doi.org/10.1001/archpsyc.60.2.184.

Kessler, R.C., Amminger, G.P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., Ustun, T.B., 2007. Age of onset of mental disorders: a review of recent literature. Curr. Opin. Psychiatry 20 (4), 359–364. https://doi.org/10.1097/YCO.0b013e32816ebc8c.

King, N., Pickett, W., McNevin, S.H., Bowie, C.R., Rivera, D., Keown-Stoneman, C., Harkness, K., Cunningham, S., Milanovic, M., Saunders, K., Goodday, S., Duffy, A., U-Flourish Student Well-Being and Academic Success Research Group, 2021. Mental health need of students at entry to university: baseline findings from the U-flourish student well-being and academic success study. Early intervention in psychiatry 15 (2), 286–295. https://doi.org/10.1111/eip.12939.

Kirkbride, J.B., Anglin, D.M., Colman, I., Dykxhoorn, J., Jones, P.B., Patalay, P., Pitman, A., Soneson, E., Steare, T., Wright, T., Griffiths, S.L., 2024. The social determinants of mental health and disorder: evidence, prevention and recommendations. World psychiatry : official journal of the World Psychiatric Association (WPA) 23 (1), 58–90. https://doi.org/10.1002/wps.21160.

Brazil. Ministério da Saúde, Secretaria de Vigilância em Saúde e Ambiente. (2024). Boletim epidemiológico - Volume 55, nº 04. Secretaria de Vigilância em Saúde e Ambiente. https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/boletins/epidemiologicos/edicoes/2024/boletim-epidemiologico-volume-55-no-04.pdf/view.

Lange, S., Cayetano, C., Jiang, H., Tausch, A., Oliveira E Souza, R., 2023. Contextual factors associated with country-level suicide mortality in the Americas, 2000–2019: a cross-sectional ecological study. Lancet Regional Health. Americas 20, 100450. doi:10.1016/j.lana.2023.100450.

Lanza, S.T., Cooper, B.R., 2016. Latent class analysis for developmental research. Child Development Perspectives 10 (1), 59–64. https://doi.org/10.1111/cdep.12163.

Lardier, D.T., Zuhl, M.N., Holladay, K.R., Amorim, F.T., Heggenberger, R., Coakley, K.E., 2022. A latent class analysis of mental health severity and alcohol consumption: associations with COVID-19-related quarantining, isolation, suicidal ideations, and physical activity. Int. J. Ment. Health Addiction 1–24. https://doi.org/10.1007/s11469-021-00722-9.

Large, M.M., Soper, C.A., Ryan, C.J., 2022. Suicide risk assessment. Lancet Psychiatr. 9 (12), 938–939. https://doi.org/10.1016/S2215-0366(22)00314-5.

Li, X., Mu, F., Liu, D., Zhu, J., Yue, S., Liu, M., Liu, Y., Wang, J., 2022. Predictors of suicidal ideation, suicide attempt and suicide death among people with major depressive disorder: A systematic review and meta-analysis of cohort studies. J. Affect. Disord. 302, 332–351. https://doi.org/10.1016/j.jad.2022.01.103.

Liu, C.H., Stevens, C., Wong, S.H., Yasui, M., Chen, J.A., 2019. The prevalence and predictors of mental health diagnoses and suicide among US college students: implications for addressing disparities in service use. Depress. Anxiety 36 (1), 8–17. https://doi.org/10.1002/da.22830.

Lucchetti, G., Koenig, H.G., Lucchetti, A.L.G., 2021. Spirituality, religiousness, and mental health: a review of the current scientific evidence. World journal of clinical cases 9 (26), 7620–7631. https://doi.org/10.12998/wjcc.v9.i26.7620.

Lund, C., Brooke-Sumner, C., Baingana, F., Baron, E.C., Breuer, E., Chandra, P., Haushofer, J., Herrman, H., Jordans, M., Kieling, C., Medina-Mora, M.E., Morgan, E., Omigbodun, O., Tol, W., Patel, V., Saxena, S., 2018. Social determinants of mental disorders and the Sustainable Development Goals: a systematic review of reviews. Lancet Psychiatr. 5 (4), 357–369. https://doi.org/10.1016/S2215-0366(18)30060-9.

Monteiro, D.D., Reichow, J.R.C., Sais, E.F., Fernandes, F.S., 2020. Espiritualidade/religiosidade e saúde mental no brasil: uma revisão. Boletim - Academia Paulista de Psicologia 40 (98), 129–139.

Oram, S., 2019. Sexual violence and mental health. Epidemiol. Psychiatr. Sci. 28 (6), 592–593. https://doi.org/10.1017/S2045796019000106.

Otten, D., Tibubos, A.N., Schomerus, G., Brähler, E., Binder, H., Kruse, J., Ladwig, K.H., Wild, P.S., Grabe, H.J., Beutel, M.E., 2021. Similarities and differences of mental health in women and men: a systematic review of findings in three large German cohorts. Front. Public Health 9, 553071. https://doi.org/10.3389/fpubh.2021.553071.

Pacheco, J.P., Giacomin, H.T., Tam, W.W., Ribeiro, T.B., Arab, C., Bezerra, I.M., Pinasco, G.C., 2017. Mental health problems among medical students in Brazil: a systematic review and meta-analysis. Rev. Bras. Psiquiatr. 39 (4), 369–378. https://doi.org/10.1590/1516-4446-2017-2223.

Patel, V., Lund, C., Hatherill, S., Plagerson, S., Corrigall, J., Funk, M., Flisher, A.J., 2010. Mental disorders: equity and social determinants. In: Blas, E., Kurup, A.S. (Eds.),

Equity, Social Determinants and Public Health Programmes. World Health Organization, Geneva, pp. 115–134.

Pedrelli, P., Nyer, M., Yeung, A., Zulauf, C., Wilens, T., 2015. College students: mental health problems and treatment considerations. Acad. Psychiatr. 39 (5), 503–511. https://doi.org/10.1007/s40596-014-0205-9.

Plana-Ripoll, O., Pedersen, C.B., Holtz, Y., Benros, M.E., Dalsgaard, S., de Jonge, P., Fan, C.C., Degenhardt, L., Ganna, A., Greve, A.N., Gunn, J., Iburg, K.M., Kessing, L. V., Lee, B.K., Lim, C.C.W., Mors, O., Nordentoft, M., Prior, A., Roest, A.M., Saha, S., McGrath, J.J., 2019. Exploring Comorbidity Within Mental Disorders Among a Danish National Population. JAMA Psychiatry 76 (3), 259–270. https://doi.org/10.1001/jamapsychiatry.2018.3658.

Przedworski, J.M., VanKim, N.A., Eisenberg, M.E., McAlpine, D.D., Lust, K.A., Laska, M. N., 2015. Self-reported mental disorders and distress by sexual orientation: results of the Minnesota college student health Survey. Am. J. Prev. Med. 49 (1), 29–40. https://doi.org/10.1016/j.amepre.2015.01.024.

Richardson, M., Abraham, C., Bond, R., 2012. Psychological correlates of university students' academic performance: a systematic review and meta-analysis. Psychol. Bull. 138 (2), 353–387. https://doi.org/10.1037/a0026838.

Sanchez, Z.M., De Oliveira, L.G., Nappo, S.A., 2008. Religiosity as a protective factor against the use of drugs. Subst. Use Misuse 43 (10), 1476–1486. https://doi.org/10.1080/10826080802183288.

Sheldon, E., Simmonds-Buckley, M., Bone, C., Mascarenhas, T., Chan, N., Wincott, M., Gleeson, H., Sow, K., Hind, D., Barkham, M., 2021. Prevalence and risk factors for mental health problems in university undergraduate students: a systematic review with meta-analysis. J. Affect. Disord. 287, 282–292. https://doi.org/10.1016/j.jad.2021.03.054.

Smith, J., Robinson, S., Khan, R., 2022. Transgender and non-binary students' experiences at UK universities: a rapid evidence assessment. Equity Educ. Soc. 1 (1), 18–31. https://doi.org/10.1177/27526461211068518.

Valente, J.Y., Cogo-Moreira, H., Swardfager, W., Sanchez, Z.M., 2018. A latent transition analysis of a cluster randomized controlled trial for drug use prevention. J. Consult. Clin. Psychol. 86 (8), 657–665. https://doi.org/10.1037/ccp0000329.

Valentini, F., Baptista, M.N., Hauck-Filho, N., 2021. Typological profiles of depression of college students: latent classes and controlling for response bias of the Baptista depression short-scale (EBADEP-short). Paidéia (ribeirão Preto) 31, e3129. https://doi.org/10.1590/1982-4327e3129.

Weller, B.E., Bowen, N.K., Faubert, S.J., 2020. Latent class analysis: a guide to best practice. J. Black Psychol. 46 (4), 287–311. https://doi.org/10.1177/0095798420930.

Wolff, J.R., Himes, H.L., Soares, S.D., Miller Kwon, E., 2016. Sexual minority students in non-affirming religious higher education: mental health, outness, and identity. Psychology of Sexual Orientation and Gender Diversity 3 (2), 201–212. https://doi.org/10.1037/sgd0000162.

2023 World Bank. 2023. Data for Brazil, Upper Middle Income. https://data.worldbank.org/?locations=BR-XT.

World Health Organization (WHO), 2019. World Health Statistics 2019: Monitoring Health for the SDGs, Sustainable Development Goals. World Health Organization. https://www.who.int/publications/i/item/9789241565707. (Accessed 26 March 2024).

World Health Organization (WHO), 2021b. Violence against Women Prevalence Estimates, 2018: Global, Regional and National Prevalence Estimates for Intimate Partner Violence against Women and Global and Regional Prevalence Estimates for Non-partner Sexual Violence against Women. World Health Organization. https://www.who.int/publications/i/item/9789240022256. (Accessed 26 March 2024).

World Health Organization (WHO), 2021a. Live Life: an Implementation Guide for Suicide Prevention in Countries. World Health Organization. https://iris.who.int/bitstream/handle/10665/341726/9789240026629-eng.pdf?sequence=1. (Accessed 26 March 2024).

Yang, X., Liu, D., Wang, Y., Chen, Y., Chen, W., Yang, C., Zhang, P., Ding, S., Zhang, X., 2020. Effectiveness of Zhong-Yong thinking based dialectical behavior therapy group skills training versus supportive group therapy for lowering suicidal risks in Chinese young adults: a randomized controlled trial with a 6-month follow-up. Brain and behavior 10 (6), e01621. https://doi.org/10.1002/brb3.1621.

Zakopoulou, V., Mavreas, V., Christodoulides, P., Lavidas, A., Fili, E., Georgiou, G., Dimakopoulos, G., Vergou, M., 2014. Specific learning difficulties: a retrospective study of their co morbidity and continuity as early indicators of mental disorders. Res. Dev. Disabil. 35 (12), 3496–3507. https://doi.org/10.1016/j.ridd.2014.07.040.