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The Prevalence of Depression, Anxiety, and Stress among Students at the University of Buea and Their Correlation with Academic Performance

Cyrille Duquesne Nkouonlack[1,2,3*], Tesita Asong Atemlefac[1], Nongmoh Marodine Tendonglefac[1], Nkoke Clovis[1,2], Teuwafeu Denis[1,2], Nfor Claudia Fufi[1], Arnuld Sergio Mofaw[1], Naiza Monono[1,4], Alfred Kongnyu Njamnshi[3,5]

[1]Department of Internal Medicine and Paediatrics, Faculty of Health Sciences, University of Buea, Southwest Region, Cameroon
[2]Buea Regional Hospital, Buea, Southwest Region, Cameroon
[3]Brain Research Africa Initiative (BRAIN), Yaoundé, Cameroon
[4]Limbe Regional Hospital, Limbe, Southwest Region, Cameroon
[5]Neuroscience Laboratory, Faculty of Medicine and Biomedical Sciences, The University of Yaoundé 1, Yaoundé, Cameroon
Email: *nkouonlack.dc@ubuea.cm

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Abstract

Introduction: Depression, anxiety, and stress are major sources of distress for university students and negatively influence their academic achievement and psychosocial well-being. This study aimed to investigate the prevalence and factors associated with depression, anxiety, and stress at the University of Buea. **Materials and methods**: A cross-sectional study was conducted from February 2023 to April 2023. Participants' levels of depression, anxiety, and stress were measured using the DASS-21 questionnaire, while academic performance was assessed through their GPA. Factors significantly associated with depression, anxiety, and stress were determined via logistic regression analyses with a significance threshold of $P < 0.05$. **Results**: 1095 students from the Buea University were recruited. Sixty-four per cent of the students were female, and the mean age was 22.1 ± 3.99 years. The prevalence of anxiety was 40.3%, followed by depression (28.8%), and stress was 9.2%. Students at the PhD level (AOR = 2.79, P = 0.018) and higher levels of education (AOR = 8.25, P = 0.025) were more likely to be depressed. Female university students were more likely to be anxious (AOR = 1.55, P = 0.002) and stressed (AOR = 1.87, P = 0.012) than their male counterparts were. Financial constraints and insufficient income were associated with depression and anxiety, respectively. University students who did not live in conflict-affected areas and those who had not witnessed any

traumatic event were less likely to express symptoms of depression, anxiety, and stress. Most of those who were depressed, anxious, and stressed had a GPA range between 2.5 and 2.9. **Conclusion**: The prevalence of depression, anxiety, and stress among university students in Buea is high, and occurs in about half of the students. Factors associated include female sex, advanced levels of study, traumatic experiences, and residing in conflict-affected regions. These mental health conditions negatively impact academic performance, underscoring the urgent need for targeted interventions focused on mental well-being.

Keywords

Depression, Anxiety, Stress, University Students, Academic Performance

1. Introduction

Depression, anxiety, and stress are significant contributors to the global disease burden (GBD Collaborators, 2022). The 2019 Global Burden of Disease report underscores the persistent nature of this challenge, indicating no substantial global reduction in its impact since 1990, which continues to rank among the top ten causes of global burden (GBD Collaborators, 2022). Between 1990 and 2019, the global impact of mental disorders, as measured by disability-adjusted life years (DALYs), saw a substantial increase (GBD Collaborators, 2022). Systematic reviews and meta-analyses have recently emphasized the considerable effect of the COVID-19 pandemic on the mental health of populations across the globe, with high levels of anxiety and depression in the general population, demanding careful consideration (Chekole & Abate, 2021). Furthermore, the World Health Organization highlights the profound mental health burden in conflict zones, estimating that approximately one in five individuals in these settings grapples with conditions such as depression, anxiety, or stress at any given time (Charlson et al., 2019).

Globally, mental health among university students has been a cause of concern as it impacts academic performance and student well-being. Most studies have demonstrated a bidirectional association between mental health and education. (Esch et al., 2014). Cross-national data indicate that mental health issues are prevalent in university settings (Auerbach et al., 2018), and typically exceed those observed in the general population (Ibrahim et al., 2013). Several studies have highlighted the significant occurrence of mental health problems, such as depression, anxiety, and stress, among students in university settings (Chautrakarn et al., 2024; Lopes & Nihei, 2021; Ochnik et al., 2021; Simegn et al., 2021; Talarowska et al., 2023). For example, in an online study of university students in Ethiopia, more than half of the students presented with depression, anxiety, or stress (Simegn et al., 2021). Depression, anxiety, and stress share a common set of risk factors across both developed and developing countries. These include psychological, academic, biological, lifestyle, social, and financial elements (Mofatteh, 2021; Ochnik et al.,

2021; Oducado & Estoque, 2021). Both settings affect students' academic performance in universities (Chautrakarn et al., 2024; Oduwaiye et al., 2017).

In Cameroon, mental health problems are similar to those worldwide, with high prevalence in different groups of the population (Ngwa et al., 2024). During the COVID pandemic, in particular, high rates of depression, anxiety, and stress were recorded in the population (Emmanuel Njingu et al., 2021; Siewe Fodjo et al., 2021). A study conducted among University students at the University of Dschang during the COVID pandemic showed significantly high rates of stress, anxiety, and depression among students (Mboua et al., 2021). An earlier study showed high levels of depression among medical students in Cameroonian universities, but reported no association with self-reported academic performance (Ngasa et al., 2017). However, despite the challenges of lockdowns and other COVID control measures among its huge population of over 33000 students, the extent of stress, anxiety, and depression within this student group remains unknown, as no studies have investigated it. In addition, sociopolitical instability and armed conflict in the anglophone regions of Cameroon has created a fearful atmosphere and insecurity, potentially leading to poor mental health among students at the University of Buea (Ngenge, 2022; Ngwa et al., 2024). Information about the impact of these conditions on mental health is scarce. This study sought to investigate the presence of symptoms indicative of depression, anxiety, and stress among University of Buea students within a given context, to pinpoint related determinants, and to establish their effects on academic performance. The results of this study can guide the development of mental health and well-being programs and policies for university students in Cameroon.

2. Materials and Methods

2.1. Study Design, Setting and Study Population

A cross-sectional study was conducted over a 3-month period between February 3, 2023, and April 30, 2023, among students at the University of Buea in Cameroon. The University of Buea is geographically positioned in Buea, the capital of the Southwest Region, a part of Cameroon's Anglophone zone that currently faces acute socio-political crises. The university has an average population of over 33,000 students distributed across 11 faculties and schools.

2.2. Inclusion Criteria

The study population comprised all enrolled students at the University of Buea, regardless of their specific study program.

2.3. Exclusion Criteria

Students enrolled at the Higher Technical Teachers Training College in Kumba, an institution of the University of Buea located outside Buea, were excluded. We also excluded students who refused to provide consent and those with incomplete

questionnaires.

2.4. Sample Size

To calculate sample size, we used Cochran's formula for cross-sectional studies.

$$n_i = \frac{Z^2 \cdot P(1-P)}{d^2}$$

where n is the sample size, P is the expected proportion in the population, q is $1-P$, d is the margin of error set at 0.05, and Z is the standard normal variant at a 95% confidence interval (standard value 1.96). We tolerated an absolute error (d) of 5%.

The maximum sample size was obtained using an expected prevalence of depression of 31.9%, which was obtained from research carried out on students of the Faculty of Letters and Social Sciences of the University of Dschang (Mboua et al., 2021).

Therefore,

$$n_i = \frac{(1.96)^2 \times 0.319(1-0.319)}{0.05^2}$$

$$n_i = \frac{3.8416 \times 0.319 \times 0.681}{0.0025}$$

$$n_i = \frac{0.834545}{0.0025}$$

$$n_i = 334$$

We took a non-response rate of 10%, 10/100 (333) = 33.

This resulted in a minimal sample size (n = 333 + 33 = 367 students).

2.5. Sampling and Participant Enrollment

We performed a multi-staged cluster sampling method using four different steps. A convenient random sampling method was used to select university faculty (FLPS, FSMS, FE, FS, FAVM, COT, and FHS). A probability proportional to size was used to select the number of participants from each faculty member. Proportionate to size was used to select the number of students for each cycle of study (undergraduate, master's, and PHD). Lastly, a convenience sampling method was used to select the departments and the different years of study (1st to 7th year).

2.6. Data Collection

Data were collected on sociodemographic, academic, socioeconomic, and lifestyle characteristics. The DASS-21 scale (Medvedev, 2023) was used to screen for depression, anxiety, and stress among students, whereas the University of Buea GPA grading system was used to evaluate academic performance. The questionnaires were pre-tested on 35 students at a private university. Furthermore, to ensure most students participated, and to increase the sample size, a snowball sampling method was used to recruit participants online using a well-structured Google

form shared with students via social media platforms. The Google form carried same information as printed questionnaires, including sociodemographic, academic, socio-economic, lifestyle factors and the DASS-21 scale.

Students who satisfied the inclusion criteria were deemed eligible to participate in the study and were subsequently recruited. 1150 participants were recruited, of which 164 were online responses and 986 were on-site responses. Fifty-five incomplete questionnaires were excluded. All participant information was coded, and confidentiality was maintained throughout the study. Depression, anxiety, and stress were evaluated using the DASS-21, a free, self-report tool that is quick to administer and score (Henry & Crawford, 2005). This tool is reliable and valid for measuring individual scores for depression, anxiety, and stress, and provides an overall score for general mental health (Gomez, 2016; Medvedev, 2023). This scale categorizes depression, anxiety, and stress into different levels of severity, including normal, mild, moderate, severe, and extremely severe. (Gomez, 2016).

Academic performance was evaluated using self-reported Cumulative Grade Point Averages (CGPAs) from the preceding academic semester. These CGPAs were subsequently categorized into distinct performance levels: First Class (3.6 - 4.0), second class Upper (3.0 - 3.5), second class Lower (2.5 - 2.9), and Third Class (below 2.5).

This study further investigated the potential associations between several variable categories and the prevalence of depression, anxiety, and stress among university students. The examined variables included socio-demographic characteristics (age, sex, relationship status), academic parameters (level of education encompassing undergraduate, master's, and doctoral studies, specific program of study, faculty affiliation, and academic year), socioeconomic indicators (employment status, income level), and lifestyle factors (alcohol consumption, smoking habits, and history of traumatic experiences).

2.7. Statistical Methods

The raw dataset was initially managed and curated using Epidata v. 6.0. The data were subsequently transferred to the Statistical Package for the Social Sciences (SPSS) version 25 for statistical analysis. Descriptive statistical methods were used to analyze the data. Frequencies and percentages were calculated for categorical variables and are presented graphically as bar and pie charts. Continuous variables were summarized using measures of central tendency (mean and median) and measures of dispersion (standard deviation and interquartile range), which were selected based on the distributional characteristics of each variable. To delineate potential associations with depression, anxiety, and stress, Chi-square and Fisher's exact tests were used. Variables exhibiting a significance level of $P \leq 0.2$ in these bivariate analyses were subsequently incorporated into multivariate logistic regression models. This analytical method was used to determine the independent predictors of the conditions. The results are expressed as odds ratios (ORs) and

their respective 95% confidence intervals (CIs). The threshold for statistical significance was set a priori at $P < 0.05$.

2.8. Ethical Considerations

Ethical review and formal approval for this study were obtained from the Institutional Review Board of the Faculty of Health Sciences, University of Buea (IRB Number: 2023/1917-01/UB/SG/IRB/FHS), complemented by administrative authorization from the Regional Delegation of Public Health in the Southwest Region.

This study adhered to the principles outlined in the Declaration of Helsinki regarding research involving human subjects. Comprehensive informed written consent was a prerequisite for participation, obtained directly from adult subjects and from the legal guardians of minor participants who also provided their explicit assent. The voluntary nature of participation was underscored, guaranteeing the unencumbered right to withdraw without prejudice

3. Results

The total number of students that fulfilled our inclusion criteria was 1150, with 164 responding online and 986 onsite. We excluded 55 incomplete questionnaires were excluded. Therefore, 1095 students were included, giving a response rate of 14.3% online and 85.7% onsite. The oversampling ensured more comprehensive data collected, and allowed for an increase in precision of our estimates, and generalisability of findings.

A participant recruitment flowchart is shown in Figure 1.

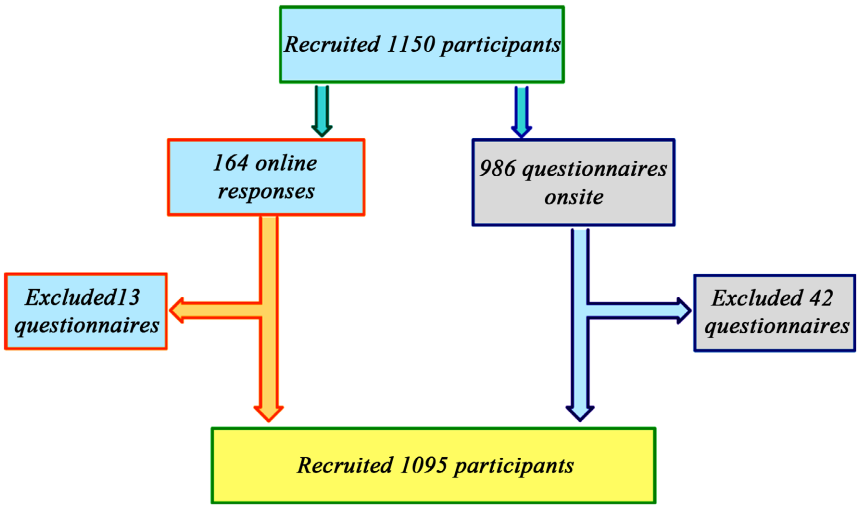

Figure 1. Participant recruitment flow chart.

3.1. Baseline Sociodemographic Characteristics of Participants

Baseline sociodemographic characteristics of the participants are presented in Table 1.

Table 1. Sociodemographic characteristics of study participants.

Variable	Categories	Frequency	Percent
Age range	15 - 20	449	41
	21 - 25	518	47.3
	26 - 30	94	8.6
	>30	34	3.1
Sex	Female	702	64.1
	Male	393	35.9
Relationship status	Single	861	78.6
	In a relationship	167	15.3
	Married	62	5.7
	Separated/Divorced	5	0.5
Cycle of study	Undergraduate	873	79.7
	Masters	191	17.4
	PHD	31	2.8
Extracurricular activity	None	625	57.1
	Sports	227	20.7
	Choir	89	8.1
	Others	88	8
	Academic club activities	19	1.7
Years of Study	1st year	420	38.4
	2nd year	422	38.5
	3rd year	146	13.3
	4th year	41	3.7
	5th year	30	2.7
	6th year	22	2
	7th year	14	1.3
CGPA of previous semester	<2	52	4.7
	2 - 2.4	171	15.6
	2.5 - 2.9	383	35
	3.0 - 3.4	356	32.5
	3.5 - 4.0	133	12.1

Continued

Personal Income	Intermediate	352	32.1
	Not sufficient	547	50
	Sufficient	196	17.9
Sponsor	Family	951	86.8
	Self	117	10.7
	Scholarship	17	1.6
	Loans	10	0.9
Traumatic experiences	Accident	29	2.6
	Dead of a family member or loved one	214	19.5
	Gunshot	274	25
	I don't know	68	6.2
	Kidnapping	24	2.2
	None	342	31.2
	Others (domestic violence, physical abuse, internally displaced, chronically ill)	23	2.1
	Rape	29	2.6
	Robbery	92	8.4
Living in conflict areas	NO	244	22.3
	YES	851	77.7
Alcohol in take	NO	643	58.7
	YES	452	41.3
Smoking	NO	1075	98.2
	YES	20	1.8

Of the 1095 participants, 702 (64.1%) were female, and 393/1095 (35.9%) were male. The average age of the participants was 22.1 ± 3.99 (SD). Most of the students were single (78.6%). Of the seven faculties of the University of Buea selected for this study, the FLPS group was the most populated (26.7%). Most students were undergraduates (79.7%). Most of the participants from the first and second years of the study 38.4% and 38.5%, respectively, (57.1%) were involved in extracurricular activities, (35.0%) had a GPA range between 2.5 - 2.9.

A significant proportion of the student population has experienced financial constraints, with 50% reporting insufficient income. The student body was largely defined by familial financial support (86.8%) and full-time academic dedication (90.2%), and was further characterized by a notable prevalence of self-employ-

ment among over half of the students (56.8%).

According to this study, 41.3% drank alcohol, and 1.8% smoked cigarettes. Many students (62.6%) had traumatic experiences, with the three most common traumatic experiences being gunshots (25%), the death of a loved one (19.5%), and robbery (8.4%). Up to 77.7% of students lived in armed conflict areas.

3.2. Prevalence of Depression, Anxiety, and Stress among Study Participants

Based on the findings, 28.8% of the students had depression, 40.3% had anxiety, and 9.2% had stress. Regarding the severity of symptoms associated with depression, anxiety, and stress, 18.3%, 15.1%, and 7.5% of the participants exhibited mild symptoms, respectively. Moderate symptoms were observed in 9.7%, 19.1%, and 0% of participants, respectively. Severe symptoms were present in 0.7%, 5.8%, and 1.7% of participants, respectively. Finally, extremely severe symptoms were reported in 0%, 0.4%, and 0% of participants with depression, anxiety, and stress, respectively (Figure 2).

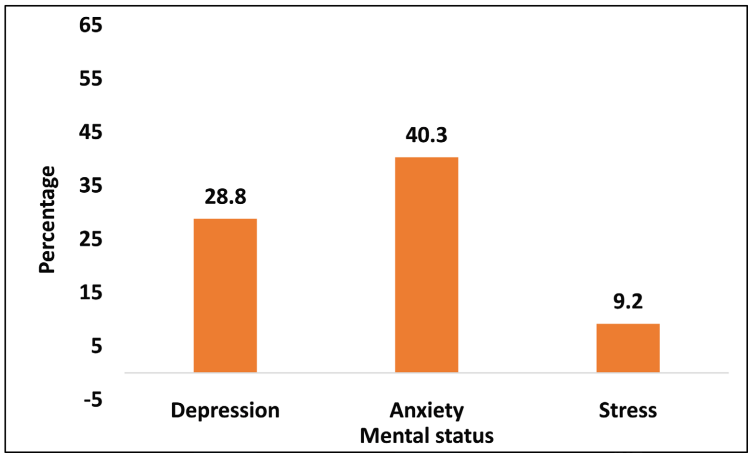

Figure 2. Prevalence of depression, anxiety, stress among students in University of Buea.

Regarding the co-occurrence of depression, anxiety, and stress, 18.2% of the participants had anxiety symptoms alone, 6.5% had only depressive symptoms, 0.9% had only stress symptoms, 15.3% had anxiety and depression symptoms, 0.2% had both depressive and stress symptoms, 1.4% had anxiety, and 6.8% had anxiety, depression, and stress symptoms (Figure 3).

3.3. Factors Associated with Depression among Study Participants

A logistic regression model was used to identify the factors independently associated with depression. We found that students at the PhD level were 2.79 times more likely to be depressed than undergraduates (AOR = 2.79, P = 0.018), while students in their sixth year of medical school were more than 8.25 times (AOR = 8.25, P = 0.025) more likely to be depressed than those in their final year. Students who did not participate in extracurricular activities were 0.63 times less likely to

experience depression (AOR = 0.63, P = 0.032). In contrast, students who received financial support from other sources, family, or scholarships were (AOR = 11.21, P = 0.001; AOR = 2.55, P = 0.001; AOR = 3.75, P = 0.023) times more likely to experience depression than those who were self-sponsored. Additionally, the likelihood of full-time students experiencing depression was 0.57 times less than that of part-time students (AOR = 0.94, P = 0.027) (Table 2).

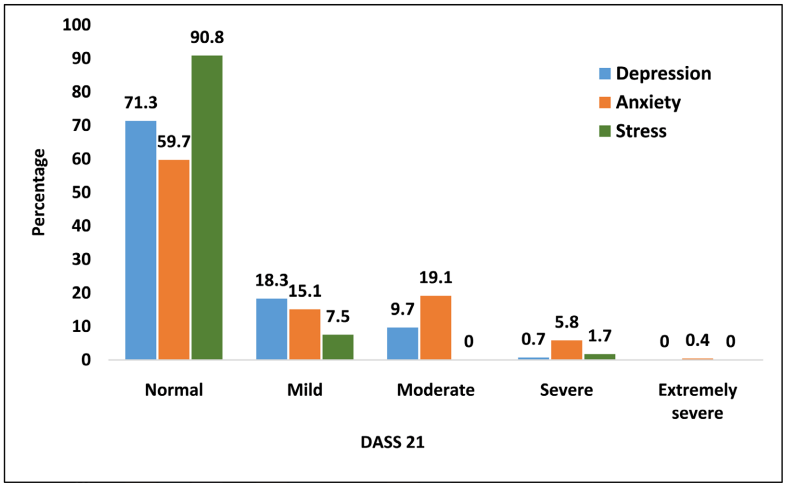

Figure 3. Prevalence and severity of depression, anxiety and stress among students in University of Buea.

Table 2. Multivariate analysis of factors associated with depression.

Variable	Categories	AOR	95% CI		Sig.
			Lower	Upper	
Faculty	CT	0.31	0.12	0.77	0.012
	FHS	0.76	0.45	1.30	0.321
	FAVM	0.81	0.47	1.39	0.434
	FE	1.36	0.83	2.25	0.222
	FLPS	1.02	0.68	1.52	0.926
	FS	0.83	0.50	1.36	0.451
	FSMS	1			
Level of Degree	Masters	0.83	0.55	1.25	0.38
	PHD	2.79	1.20	6.50	0.018
	Undergrad	1			
Year of Study	1st year	2.94	0.57	15.23	0.198
	2nd year	1.99	0.38	10.33	0.414
	3rd year	3.10	0.59	16.31	0.182

Continued

	4th year	2.50	0.42	14.69	0.311
	5th year	2.99	0.49	18.04	0.233
	6th year	8.25	1.31	51.92	0.025
	7th year	1			
Are you involve in any extracurricular activities	Academic club activities	0.98	0.35	2.77	0.971
	Arts	1.14	0.57	2.29	0.712
	Choir	1.30	0.75	2.23	0.348
	None	0.68	0.48	0.97	0.032
	Others	1.08	0.61	1.91	0.783
	Sports	1			
GPA in the last semester	<2	2.0	1.0	4.1	0.053
	2 - 2.4	1.3	0.8	2.2	0.359
	2.5 - 2.9	1.2	0.7	1.9	0.489
	3.0 - 3.4	0.7	0.4	1.1	0.120
	3.5 - 4.0	1			
Who sponsors your studies	Family	2.55	1.46	4.47	0.001
	Others	11.21	2.57	48.96	0.001
	Scholarship	3.75	1.20	11.77	0.023
	Self	1			
What type of student are you	Full time student	0.57	0.35	0.94	0.027
	Part time student	1			

3.4. Factors Associated with Anxiety among Study Participants

Table 3 presents the factors that contribute to anxiety.

Table 3. Multivariate analysis factors associated with anxiety.

Variables	Categories	AOR	95% CI		Sig.
			Lower	Upper	
Faculty	CT	0.46	0.22	0.96	0.038
	FHS	0.51	0.33	0.79	0.003
	FAVM	0.66	0.40	1.08	0.095
	FE	1.64	1.04	2.58	0.033
	FLPS	1.00	0.71	1.42	0.982

Continued

	FS	0.75	0.48	1.17	0.203
	FSMS	1			
Sponsor	Family	1.67	1.09	2.57	0.019
	Others	1.86	0.50	6.96	0.359
	Scholarship	2.66	0.88	8.00	0.082
	Self	1			
Gender	Female	1.55	1.18	2.04	0.002
	Male	1			
Personal income	Intermediate	0.92	0.63	1.34	0.645
	Not sufficient	1.51	1.06	2.14	0.023
	Sufficient	1			
Smoking	NO	0.3	0.1	0.9	0.022
	YES	1			
Living in conflict area	NO	0.63	0.46	0.87	0.004
	YES	1			

CT = College of Technology, FHS = Faculty of Health Sciences, FE = Faculty of Education, FS = Faculty of Sciences, FAVM = Faculty of agriculture and Veterinary medicine, FLPS = Faculty of Law and Political sciences, FSMS = Faculty of Social and management sciences.

Compared to students from FSMS, those attending CT and FHS were 0.46 (AOR = 0.46, P = 0.038) and 0.51 (AOR = 0.51, P = 0.003) times less likely to experience anxiety, respectively. In contrast, students from FE were 1.64 (AOR = 1.64, P = 0.033) times more prone to anxiety than their FSMS counterparts. Students who relied on a family member as their sponsor were 1.67 times more likely to experience anxiety than those who were self-sponsored (AOR = 1.67, P = 0.019). Females were 1.55 (AOR = 1.55, P = 0.002) times more anxious than males, while students who reported their income as sufficient were 1.51 (AOR = 1.51, P = 0.023) times more likely to have anxiety than those who reported that their income was sufficient. Students who did not smoke cigarettes and those who had never resided in a conflict area were 0.3 times (AOR = 0.3, P = 0.022) and 0.63 times (AOR = 0.63, P = 0.004) less likely to have anxiety, respectively, than those who smoked cigarettes and had lived in a conflict area.

3.5. Factors Associated with Stress among the Study Participants

The factors associated with stress among study participants are listed in Table 4.

Female students were found to have a 1.87 times higher likelihood of experiencing stress than male students (AOR = 1.87, P = 0.012). Additionally, students with a GPA below 2 were 2.95 times more likely to experience stress than those

with a GPA ranging from 3.5 to 4.0 (2.95, P = 0.016). Moreover, students who had not undergone a traumatic experience were 0.43 times less likely to experience stress (AOR = 0.43, P = 0.001) than those who had faced such an experience.

Table 4. Multivariate analysis risk factors of stress.

Variables	Categories	AOR	95% CI		Sig.
			Lower	Upper	
Cycle of study	Masters	1.66	0.98	2.84	0.062
	PHD	1.72	0.47	6.29	0.410
	Undergrad	1			
Gender	Female	1.87	1.15	3.04	0.012
	Male	1			
GPA in the last semester	2 - 2.4	0.90	0.42	1.91	0.782
	2.5 - 2.9	0.61	0.31	1.19	0.146
	3.0 - 3.4	0.59	0.30	1.16	0.125
	3.5 - 4.0	1			
Sponsor	Family	2.12	0.88	5.11	0.094
	Others	5.64	0.94	34.03	0.059
	Scholarship	0.88	0.10	8.20	0.912
	Self	1			
Traumatic experiences	NO	0.43	0.26	0.71	0.001
	YES	1			

3.6. Impact of Depression, Anxiety, and Stress on the Academic Outcomes of the Study Participants

The relationships between depression, anxiety, stress, and academic outcomes were examined to assess their impact on academic performance. As shown in Table 5, a significant correlation was identified between depression (χ^2 = 15.74, P = 0.003), stress (χ^2 = 15.67, P = 0.004), and poor academic performance. Figure 4 illustrates that most participants experiencing depression, anxiety, and stress had a Grade Point Average (GPA) ranging from 2.5 to 2.9.

4. Discussion

This is one of the first studies on the prevalence and risk factors of depression, anxiety, and stress among students at the University of Buea after the outbreak of the COVID pandemic and the ongoing armed conflict. The prevalence of depression, anxiety, and stress symptoms using the DASS-21 tool was 28.8%, 40.3%, and

9.2%, respectively. Female sex, financial constraints, being in a higher year of study, and having experienced a traumatic situation or living in a conflict area were associated with negative mental health outcomes. Students exhibiting symptoms of depression, anxiety, and stress tend to have poor academic performance.

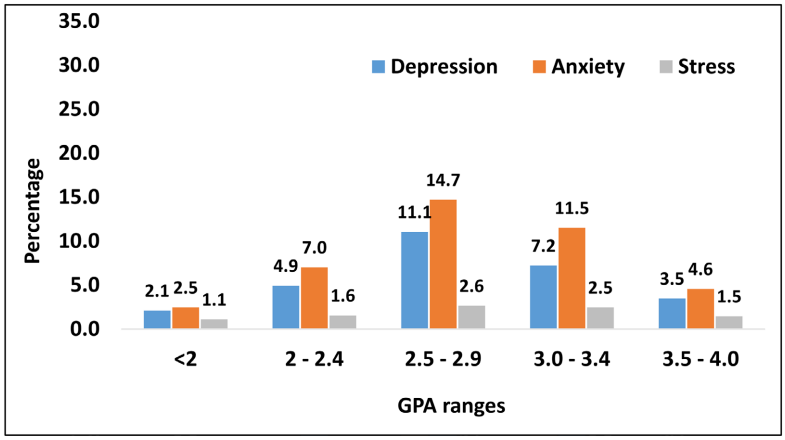

Figure 4. Association between depression, anxiety and stress and GPA.

Table 5. Association between depression, anxiety, stress and academic performance.

GPA levels	Depression				Anxiety				Stress			
	No	%	Yes	%	No	%	Yes	%	No	%	Yes	%
<2	29	2.6	23	2.1	25	2.3	27	2.5	40	3.7	12	1.1
2 - 2.4	117	10.7	54	4.9	94	8.6	77	7.0	154	14.1	17	1.6
2.5 - 2.9	262	23.9	121	11.1	222	20.3	161	14.7	354	32.3	29	2.6
3.0 - 3.4	277	25.3	79	7.2	230	21.0	126	11.5	329	30.0	27	2.5
3.5 - 4.0	95	8.7	38	3.5	83	7.6	50	4.6	117	10.7	16	1.5
Total	780	71.2	315	28.8	654	59.7	441	40.3	994	90.8	101	9.2
Chi-square	15.736				8.958				15.67			
P-value	0.003				0.062				0.004			

Our findings are comparable to high prevalence rates of Depression, anxiety and stress reported among university students in other regions of Cameroon and other African countries, such as Ethiopia and Uganda, (Mboua et al., 2021; Najjuka et al., 2021; Simegn et al., 2021). Similarly, high rates of stress, anxiety and depression have been reported up to three years after the COVID pandemic in Greek university students (Kavvadas et al., 2023). All these studies show a greater susceptibility of depression, anxiety and stress symptoms among female university students. Higher prevalence rates of anxiety were also reported among female college students during the COVID-19 pandemic in Spain compared to Cameroon (Emmanuel Njingu et al., 2021; Mboua et al., 2021; Ramón-Arbués et al., 2020). However,

a longitudinal study examining gender differences in depression, anxiety, and stress among college students in China reported that female students suffered from significantly higher levels of anxiety than their male counterparts, and no gender differences were found when compared to the general population (Gao et al., 2020). Biological and social factors can explain these gender differences in depression, anxiety, and stress found in our study and other international studies. For example, hormonally induced causes have been shown to double the prevalence of anxiety and depression in females compared to males (Kundakovic & Rocks, 2022).

The prevalence of symptoms of depression on screening identified in this study was 28.8%, which is lower than the 31.9% reported in a previous investigation conducted during the resumption of classes following the COVID-19 pandemic among students at the Faculty of Letters and Social Sciences at the University of Dschang in Cameroon (Mboua et al., 2021). However, compared to our study's 40.3% anxiety and 9.2% stress levels, the anxiety and stress levels in this study were comparatively lower at 29.5% and 2.4%, respectively. The observed discrepancies may be attributed to the fact that their study was limited to students from a single faculty member. By contrast, the current research encompasses a diverse range of students from multiple faculties. The findings of this study were notably lower than the rates of depression, anxiety, and stress of 80.7%, 98.4%, and 77.9%, respectively, reported in an online study conducted among university students in Uganda during the COVID-19 pandemic (Najjuka et al., 2021). Furthermore, these rates were lower than the prevalence rates of 44.6%, 63.5%, and 35% for depression, anxiety, and stress, respectively, reported in Nigeria (Aluh et al., 2020). The discrepancies observed in our study can be attributed to its timing, as it was conducted after the COVID-19 pandemic, unlike other investigations that were conducted during the pandemic.

Postgraduate students are more likely to suffer from depression, anxiety, and stress compared to undergraduates. In our study, university students at the PhD level and final year medical students were more likely to be depressed compared to undergraduates. A recent systematic review and meta-analysis of 32 studies have shown that depression, anxiety, and stress are highly prevalent among PhD students (Satinsky et al., 2021). Our findings add to this evidence and others that have indicated that university students with advanced levels of education, as well as medical students in their clinical years, exhibit higher levels of depression than those in lesser years of study (Najjuka et al., 2021; Ngasa et al., 2017). In contrast, studies among nursing students in Cameroon showed that undergraduate nursing students were more depressed (Njim et al., 2020). These findings however differ from those of Aristotle University of Thessaloniki students in Greece were stress, anxiety and depression were higher among undergraduates (Kavvadas et al., 2023). The differences could be related to other factors such as socioeconomic differences between the two settings. Our study showed that undergraduates sponsored by their families or those on scholarships were less likely to present with symptoms of depression, anxiety and stress, which could further explain the differences between

our findings and those reported in the literature. Similarly, at the University of Dschang in Cameron, depression and stress was shown to be more prevalent among university students who sponsored their education (Mboua et al., 2021).

Living in a conflict-affected environment and having traumatic experiences related to conflict have been associated with stress, anxiety, and depression (Charlson et al., 2019; Madoro et al., 2021). More than three-quarters of Buea University students were living in a conflict-affected area at the time of this study, and more than sixty per cent had suffered traumatic experiences, such as gunshots and the death of loved ones due to armed conflict and robbery. A recent study showed that universities were at a higher risk of insecurity due to the ongoing armed conflict in the Anglophone region of Cameroon (Ngenge, 2022). In this study, we found that university students who did not live in conflict-affected areas and had never experienced any conflict-related traumatic situations were less likely to be depressed or stressed, which suggests that ongoing socio-political armed conflict in the study area may contribute to the high rates of depression, anxiety and stress. Studies from other African have identified high prevalence of mental health disorders in regions affected by conflict (Madoro et al., 2021; McMullen et al., 2012; Mohammead et al., 2024). However, we found that the prevalence of anxiety, depression, and stress was lower than the 18.9% for anxiety, 30.0% for depression, and 22.3% for stress obtained in a post-armed conflict and era of COVID in Colombia (Gómez-Restrepo et al., 2023), and even lower than the 46.3%, 52%, and 28.6% observed during COVID in Ethiopia, and the 59.4% prevalence of mental distress among students from conflict-affected settings in a recent study in Ethiopia (Madoro et al., 2021; Simegn et al., 2021). The differences could be due to different study designs, socioeconomic contexts, and the nature of armed conflict and its associated effects and perceptions differ across countries. Furthermore, the DASS-21 tool is a screening tool and not a diagnostic tool, and such cannot formally diagnose all cases of mental health disorders as in the other studies. Exposure to different types of traumatic events as observed during our study, is likely to increase the prevalence of depression, anxiety, and stress among university students.

The levels of depression, anxiety, and stress among university students exert an indirect influence on their academic engagement and performance, owing to the emotional and cognitive effects associated with these conditions (Sinval et al., 2025). Our findings suggest that depression, anxiety, and stress were significantly associated with lower GPAs ranging from 2 to 2.5 among University of Buea students. These results are similar to the poor academic performance related to depression among medical students in Cameroon reported in a previous study. (Ngasa et al., 2017) and the significant association of depression, anxiety, and stress with the academic performance of undergraduate students in Nigeria (Aluh et al., 2020; Oduwaiye et al., 2017) and in other countries like Syria (Jamil et al., 2022). Singal and collaborators have shown that although depression and anxiety directly predict GPA, there are several other aspects of university students' academic lives, such as academic engagement and dropout intentions, influenced by these mental

health problems (Sinval et al., 2025). The ongoing armed conflict in the Anglophone regions of Cameroon may have influenced the academic performance of students at the University of Buea (Ngenge, 2022). However, other factors such as study habits, time management skills, and socioeconomic factors, which also influence academic performance, were not studied.

Strengths and Limitations

However, it is crucial to consider certain limitations when interpreting the findings of this study. Depression, anxiety, and stress were assessed using the DASS-21 questionnaire, a concise and efficient screening instrument. The scale is valid and reliable in diverse settings in the post-COVID era (Ali et al., 2021) and has high-quality as a screening tool, but is not a clinical diagnostic tool (Lee et al., 2019). Participants are susceptible to information recall and response biases, which can affect the accuracy of the results. Secondly, the cross-sectional design of this study limits our ability to infer causal relationships. Moreover, this study was conducted within a single university context, where the dual impact of the COVID-19 pandemic and armed conflict is evident. Several other factors could have influenced our findings, although none of the academic factors were explored. Furthermore, our study does not adequately address potential confounding variables such as study habits, sleep quality, social support, and socioeconomic background. These limitations may limit the generalizability of our findings to other universities in the country.

Notwithstanding these limitations, this study significantly enhances our understanding of the current prevalence of depression, anxiety, and stress among university students in Cameroon, with a particular focus on the University of Buea. A large sample of students, stratified by subject area in different faculties and levels of study, was used. The findings of this study will be useful for policymakers in planning interventions and the development of guidelines and policies for mental health and wellbeing for university students of Buea and the broader Cameroonian education system.

Further research could improve the current study's limitations by using a wider national sample and a longitudinal design, more rigorous clinical diagnostic tools, and evaluating other variables, such as study habits, sleep quality, and biological factors that influence mental health and academic performance.

5. Conclusion

The current research revealed high levels of depression, anxiety, and stress among students at the University of Buea. Risk factors associated with these symptoms include female gender, advanced levels of study, prior trauma, and residence in conflict-affected areas. To the best of our knowledge, this study is the first to examine the mental health of students at the University of Buea following the COVID-19 pandemic and amid sociopolitical conflict. The findings highlight the urgent need for targeted mental health interventions, especially for female university students.

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Data Availability

All relevant data are presented in the paper and its Supporting Information files.

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Conflicts of Interest

The authors have no competing interests to declare.

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