Original

Brain Fag syndrome and its Associations: A Study among Students of Bayero University Kano

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Abstract

Background: Brain Fag Syndrome (BFS), first identified among students in Western Nigeria, has sparked debate regarding its classification and links to anxiety and depression. This study, conducted at Bayero University Kano, explores the prevalence and associations of BFS among third-year undergraduates using a descriptive cross-sectional approach.

Method: The study involved 700 third-year undergraduate students at Bayero University Kano, selected through multistage sampling. Data was collected quantitatively via a structured questionnaire covering socio-demographics, validated scales, and an open-ended section on stimulant use. An introductory cover letter assured participants of anonymity. Data analysis, conducted using IBM SPSS Statistics, incorporated descriptive and inferential statistical tests to reveal associations and patterns.

Result: The study found a 67.2% prevalence of BFS among Bayero University students, highlighting its significance as a psychological concern in this academic environment. Contrary to conventional expectations, a negative association between BFS and study-related anxiety was observed, suggesting a more complex relationship. No significant link was found between the syndrome and stimulant use. However, BFS was positively associated with somatic symptoms and school burnout. The prevalence of BFS was also influenced by faculty-specific and course-specific factors.

Conclusion: Brain Fag Syndrome extends beyond academic difficulties, involving anxiety, somatic symptoms, and burnout. Tailored interventions are essential to support affected students. The unexpected negative link to test anxiety requires further exploration. Recognizing the cognitive, emotional, and somatic dimensions of BFS is crucial for providing holistic support to students, given the syndrome's impact on academic performance.

Keywords: Brain Fag Syndrome, Prevalence, Anxiety, Somatic Symptoms, School Burnout, Academic Performance.

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Introduction

Brain Fag Syndrome (BFS), initially identified among Western Nigerian students by Prince, is linked to academic challenges.[1] Subsequent scholars, such as Ola, Morakinyo, Adewuya, Peltzer, and Cherian, have recognized it as a disorder with a unique syndromic composition.[2,3] Anumonye and Guinness compared it to somatization, highlighting its underlying anxiety components.[4,5] Ayorinde further challenged the notion of BFS as a 'culture-bound' syndrome, suggesting it is more accurately described as a variant of anxiety consistent with the ICD-10 framework.[6,7]

Research by Peltzer, Cherian, and Cherian revealed high scores on a self-report questionnaire, suggesting that BFS could be characterized as a depressive or mixed anxiety/depressive disorder.[3] Ola and Igbokwe provided a more detailed categorization of its symptoms, which they grouped into cognitive impairments, sleep-related issues, specific somatic complaints, and other somatic disturbances.[8] Cognitive impairments include difficulties with comprehension and concentration, often accompanied by physical discomfort during study efforts. Sleep-related complaints consist of extreme tiredness and persistent sleepiness, even with adequate rest.

Ayorinde also noted that the term 'Brain Fag' had historical use in 19th-century Britain, opposing its classification as a purely culture-bound syndrome.[9] Despite extensive research, BFS prevalence varies significantly, with rates reported between 20.4% to 40.9% among Nigerian students and 6% to 34% among South African students.[1,3,10] Various theories, such as "forbidden knowledge" and "psychophysiological" models, attempt to explain its aetiology, though no conclusive answers have been found.[1,11]

Anxiety during studies is known to negatively impact academic success, being linked to learning difficulties, stress, and psychostimulant use.[11-14] Burnout, which significantly affects students in LMIC universities, impairs academic performance and overall well-being.[15,16] Specifically, Nigerian medical students experience high levels of burnout due to academic demands, financial pressures, and relationship stress.[17] Additionally, undergraduates in Northern Nigeria face burnout from academic overload and challenging living conditions.[18]

Somatic symptoms associated with burnout, such as fatigue and pain, are prevalent and share characteristics with BFS.[19-21] While psychological distress and burnout are common among first-year college students, their specific impact on academic performance can vary.[22] Previous research has explored the prevalence, implications, and debates surrounding the differentiation between burnout and depression, as well as the impact of somatic complaints among university students, emphasizing the need for comprehensive support.[17-20]

Despite the complexities in classifying BFS and attempts to recognize it as a distinct syndromic entity, its historical evolution highlights its linguistic and cultural significance.[2,23] This study aims to comprehensively explore BFS among BUK undergraduates, investigating its prevalence, correlation with test anxiety, links to psycho-stimulant use, association with somatic symptoms, and its relationship with school burnout. Additionally, this research seeks to contribute to the ongoing debates about the nosology of BFS, examining claims of its distinct classification. The goal is to provide valuable insights into the intricate nature of BFS and its impact on the academic experiences of undergraduates at Bayero University Kano (BUK).

Method

Study Site

The research was conducted at Bayero University in Kano, Kano State, Nigeria, situated along Kano-Gwarzo Road, approximately 12.8 kilometres from Kano town. The university comprises 18 faculties and 87 departments, with an estimated undergraduate student population of thirty-five thousand.[24]

Study Design

A descriptive and cross-sectional design was employed to select participants from the undergraduate student body at Bayero University Kano.

Study Participants

The study utilized a multistage random sampling technique to select participants from the cohort of 3rd-year undergraduate students at Bayero University Kano. The focus on 3rd-year students was based on the expectation that the manifestation of Brain Fag Syndrome, Burnout Syndrome, or somatic symptoms would be more noticeable at this stage of their academic journey. This choice was supported by Yunusa et al.'s assertion that this cohort, having completed at least two years of university education, represents a critical midpoint in their academic and socioeconomic experiences within the university system, making them the most representative of the overall undergraduate population.[25] This rationale aligns with Adayonfo and Akhigbe's study on Brain Fag Syndrome among university undergraduates, which specifically targeted 300-level students for similar reasons.[12] Yunusa et al. also emphasized that the 300-level is a crucial "make/break" year for students, further justifying the focus on this cohort. Students who chose not to provide consent were excluded from participation.[25]

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Sample Size Determination

The sample size, determined at a 99% confidence level and a 5% confidence interval, initially yielded 664 respondents. This number was increased to 700 to enhance statistical power and account for potential attrition. The sample size was calculated using the formula:

$$n = \frac{Z^2.p.(1-p)}{E^2}$$

where Z is the Z-score at 99% confidence level (approximately 2.576), p is the estimated proportion of the population with the characteristic of interest (set at 0.5 for maximum variance), and E is the margin of error (0.05 in this case).

Sampling Techniques

A multistage sampling technique was employed to select a representative sample of 625 respondents from the 3rd-year undergraduate student population. Faculties and departments were randomly chosen through balloting, and 3rd-year students within selected departments were sampled using a proportional ratio, aligning with the assumption that these students exhibit a higher drive to study and a greater tendency to use stimulants.[12, 25]

Methods of Data Collection

Structured self-administered questionnaires were utilized for data collection, covering socio-demographic information, the Brain Fag Syndrome Scale (BFSS), the Westside Test Anxiety Scale, the Somatic Symptom Scale-8, and an open-ended question on stimulant use. The questionnaire encompassed five sections, and trained research assistants facilitated its administration.

Data Analysis Technique

IBM SPSS Statistics version 19 was employed for data analysis. Descriptive statistics, including means and standard deviations, were used for numerical values, and inferential tests, such as bivariate, multivariate, and regression analysis, were performed where applicable.[26] The chi-square test was utilized to assess associations. The introductory cover of the questionnaire emphasized the survey's purpose, and response anonymity, and provided instructions for honest responses. Pretesting was conducted among 3rd-year students not part of the main survey.

Ethical Considerations

The study adhered to ethical guidelines, including obtaining informed consent from participants, ensuring participant anonymity, and maintaining the confidentiality of collected data. Ethical approval from Aminu Kano's ethics committee was obtained before initiating data collection.

Results

The study findings are presented as follows:

Table 1 provides a snapshot of the socio-economic and demographic profile of the 625 students. The majority fall within the 20-30 age range, with 66.1%. Gender distribution is nearly equal, comprising 53.6% male and 46.4% female students. The major ethnic groups include Hausa (35.8%), Yoruba (32.3%), Igbo (13.1%), and Other (18.7%). Most students are single (79.0%), with varied birth positions, predominantly second-born (35.8%). Family structures are mainly monogamous (68.2%), followed by polygamous (25.6%) and divorced families (6.2%). Family income per month varies, with the majority falling in the 100,000 and above category (43.5%).

Table 1: Socio-economic and demographic table of the students

Variables	Frequency	Percent
Age (Last Birthday)		
Below 20 years	114	18.2
20-30 years	413	66.1
31-40 years	91	14.6
41-50 years	3	0.5
Above 50 years	4	0.6
Total	625	100.0
Sex		
Male	335	53.6
Female	290	46.4
Total	625	100.0
Ethnicity		
Hausa	224	35.8
Yoruba	202	32.3
Igbo	82	13.1
Other	117	18.7
Total	625	100.0
Relationship Status		
Single	494	79.0
Married	108	17.3
Divorced	11	1.8
Widow	12	1.9
Total	625	100.0
Birth Position		
First Born	176	28.2
Second Born	224	35.8
Third Born	115	18.4
Fourth Born	110	17.6
Total	625	100.0
Type of Home		
Monogamous	426	68.2
Polygamous	160	25.6
Parents Divorced	39	6.2
Total	625	100.0
Family Income Per Month (N)		
10,000 - 20,000	63	10.1
20,000 - 50,000	127	20.3
50,000 - 100,000	163	26.1

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Variables	Frequency	Percent
100,000 and above	272	43.5
Total	625	100.0

Fig 1 presents the prevalence of Brain Fag Syndrome among 625 undergraduate students. Out of the total, 32.8% reported no signs of Brain Fag Syndrome, while 67.2% experienced symptoms indicative of Brain Fag.

Figure 1: Prevalence of Brain Fag Syndrome among Undergraduate Students

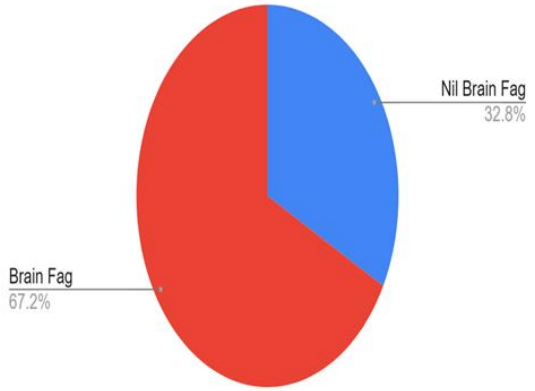

Figure 2 illustrates the relationship between Brain Fag Syndrome and different levels of anxiety among undergraduate students. There exists a robust negative correlation of -.473 between Brain Fag Syndrome and test anxiety. This implies that an increase in Brain Fag Syndrome corresponds to a decrease in test anxiety. This correlation is statistically significant with a p-value of less than .001.

Figure 2: Crosstabulation of Brain Fag Syndrome and Levels of Anxiety among Undergraduate Students

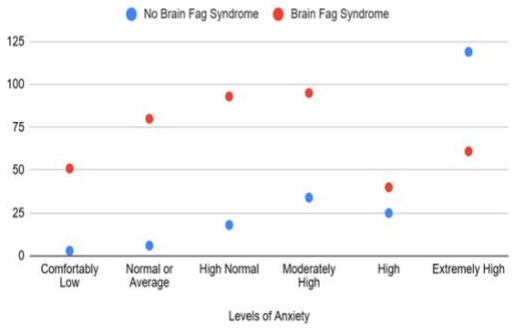

Table 2 presents the association between Brain Fag Syndrome and different dimensions of school burnout among undergraduate students. The dimensions include exhaustion, cynicism, and inadequacy. The chi-square test was used to examine the statistical significance of these associations, revealing highly significant p-values of less than .001 for each dimension, indicating a substantial relationship between Brain Fag Syndrome and school burnout.

Table 2: Brain Fag Syndrome (BFS) and School Burnout Dimensions

Dimensions of Burnout	No BFS	BFS	χ^2	df	P-value
Exhaustion	205	420	56.215	15	<.001
Cynicism	205	420	81.654	19	< .001
Inadequacy	205	420	57.566	10	< .001

Table 3 presents a correlational analysis exploring the relationships between Brain Fag Syndrome and other psychological factors, including Test Anxiety, Burnout, and Somatic Symptoms, among undergraduate students. The Pearson Correlation coefficients reveal significant associations, indicating that Brain Fag Syndrome is negatively correlated with Test Anxiety and positively correlated with Burnout and Somatic Symptoms. All correlations are statistically significant ($p < 0.05$), suggesting interconnectedness between Brain Fag Syndrome and the examined psychological factors in the study participants.

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Table 3: Correlational Analysis between Brain Fag Syndrome and other Psychological Factors in Undergraduate Students

Variables		Brain Fag Syndrome	Test Anxiety	Burnout	Somatic Symptoms
Brain Fag Syndrome	Pearson Correlation	1	-.473**	.285**	.254**
	Sig. (2-tailed)		.000	.000	.000
	N	625	625	625	625
Test Anxiety	Pearson Correlation	-.473**	1	-.220**	-.275**
	Sig. (2-tailed)	.000		.000	.000
	N	625	625	625	625
Burnout	Pearson Correlation	.285**	-.220**	1	.384**
	Sig. (2-tailed)	.000	.000		.000
	N	625	625	625	625
Somatic Symptoms	Pearson Correlation	.254**	-.275**	.384**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	625	625	625	625

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 3 explores the association between Brain Fag Syndrome and stimulant use in undergraduate students. The Chi-square test indicates no significant correlation ($X2 = 0.795$, $df = 1$, $p = 0.373$), suggesting that the presence or absence of Brain Fag Syndrome is not significantly related to the use of stimulants in the study participants.

Figure 3: Relationship between brain fag syndrome and stimulant use

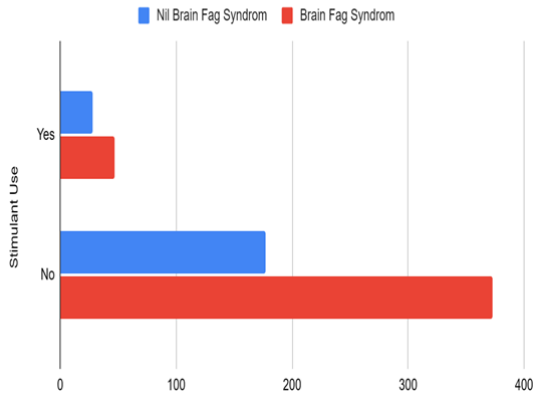

Figure 4 illustrates the relationship between Brain Fag Syndrome and levels of somatic symptoms among undergraduate students. The crosstabulation examines different levels of somatic symptoms (medium, high, and very high) in students with and without Brain Fag Syndrome. The chi-square test indicates a highly significant association ($p < .001$), emphasizing a substantial correlation between Brain Fag Syndrome and varying degrees of somatic symptoms.

Figure 4: Crosstabulation of Brain Fag Syndrome and Levels of Somatic Symptoms among Undergraduate Students

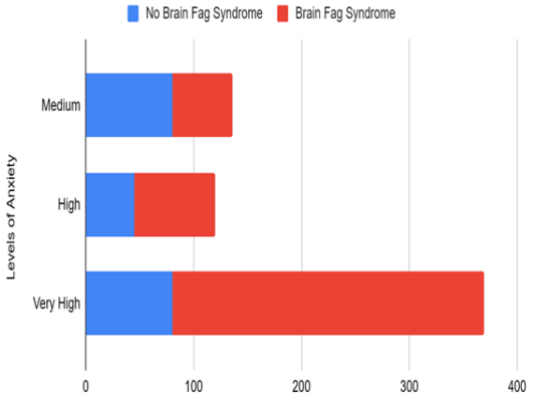

Table 4 presents the cross-tabulation analysis of Brain Fag Syndrome (BFS) by students' faculty of study. The Chi-square test indicates a significant association between BFS and students' faculty of study ($X^2 = 26.615$, $df = 6$, $p = 0.001$). The distribution of BFS varies across different faculties, suggesting an association between BFS prevalence and the academic disciplines studied by the participants. Specifically, BFS appears to be more prevalent in certain faculties, such as Life Sciences (13.76%) and Computer Science (11.68%), compared to others.

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Table 4: Cross-tabulation Analysis of Brain Fag Syndrome by Students' Faculty of Study

Faculty of Study	Not Selected (%)	Selected (%)	Total (%)	X2	df	p-value
Basic Medical Science	36(5.76)	52 (8.32)	88 (14.08)	26.615	6	.001
Engineering	21 (3.36)	30 (4.80)	51 (8.16)			
Agriculture	33 (5.28)	61 (9.76)	94 (15.04)			
Education	37 (5.92)	56 (8.96)	93 (14.88)			
Life Sciences	23 (3.68)	86 (13.76)	109 (17.44)			
Social and Management Sciences	41 (6.56)	62 (9.92)	103 (16.48)			
Computer Science	14 (2.24)	73 (11.68)	87 (13.92)			
Total	**205 (32.80)**	**420 (67.20)**	**625 (100.00)**			

Table 5 displays the cross-tabulation analysis of Brain Fag Syndrome (BFS) by students' course of study. The Chi-square test reveals a statistically significant association between BFS and students' course of study ($X^2 = 63.968$, df = 23, $p < 0.001$). The table illustrates the distribution of BFS prevalence across various academic courses, indicating differences in the prevalence rates among different fields of study. Notably, certain courses, such as Cyber Security (19.5%), Agriculture (18.6%), and Biochemistry (10.5%), exhibit higher percentages of BFS compared to others.

Table 5: Cross-tabulation Analysis of Brain Fag Syndrome by Students' Course of Study

Course of study	Not Selected (%)	Selected (%)	Total	X^2	df	p-value
				63.968	23	.000
Chemistry	10 (4.9%)	14 (6.7%)	24 (3.8%)			
Biology	4 (2.0%)	15 (7.1%)	19 (3.0%)			
Botany	4 (2.0%)	19 (9.0%)	23 (3.7%)			
Mathematics	0 (0.0%)	1 (0.5%)	1 (0.2%)			
Physics	4 (2.0%)	10 (4.8%)	14 (2.2%)			
Dentistry	1 (0.5%)	1 (0.5%)	2 (0.3%)			
Anatomy	30 (14.6%)	29 (13.8%)	59 (9.4%)			
Economics	9 (4.4%)	33 (15.7%)	42 (6.7%)			
Biochemistry	4 (2.0%)	22 (10.5%)	26 (4.2%)			
Zoology	2 (1.0%)	27 (12.9%)	29 (4.6%)			
Lib. and Infor. Science	19 (9.3%)	31 (14.8%)	50 (8.0%)			
Agriculture	19 (9.3%)	39 (18.6%)	58 (9.3%)			
Forestry and Wildlife	2 (1.0%)	7 (3.3%)	9 (1.4%)			
Fisheries and Aquaculture	11 (5.4%)	9 (4.3%)	20 (3.2%)			
Food Science and Tech.	1 (0.5%)	6 (2.9%)	7 (1.1%)			
Information and Media Studies	2 (1.0%)	3 (1.4%)	5 (0.8%)			
History	0 (0.0%)	1 (0.5%)	1 (0.2%)			
Cyber Security	6 (2.9%)	41 (19.5%)	47 (7.5%)			
Banking and Finance	30 (14.6%)	25 (11.9%)	55 (8.8%)			
Electrical Engineering	6 (2.9%)	6 (2.9%)	12 (1.9%)			
Petrochemical Engineering	5 (2.4%)	11 (5.2%)	16 (2.6%)			
Civil Engineering	10 (4.9%)	13 (6.2%)	23 (3.7%)			
Education Biology	18 (8.8%)	25 (11.9%)	43 (6.9%)			
Software Engineering	8 (3.9%)	32 (15.2%)	40 (6.4%)			
Total	205 (100.0%)	420 (100.0%)	625 (100.0%)			

Figure 5 presents the cross-tabulation analysis of Brain Fag Syndrome (BFS) by students' academic performance, measured in Cumulative Grade Point Average (CGPA) points. The Chi-square test indicates a significant association between BFS and CGPA points ($X^2 = 20.966$, df = 4, $p < 0.001$). Students with CGPA

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in the ranges of 1.1-2 (15.0%) and 2.1-3 (22.86%) show a higher selection for BFS, suggesting that moderate academic performance is associated with higher incidences of BFS. The group with a CGPA of 3.1-4 has the highest percentage of students not selected for BFS (51.71%) and a significant portion selected (42.38%), indicating a mixed association where good academic performance correlates with both lower and higher BFS incidence. Students with the highest CGPA range of 4.1-5 have a relatively lower percentage of BFS (18.09%), which might suggest that higher academic achievers are less prone to BFS. The lowest CGPA range of 0-1 shows minimal association with BFS, with only 1.67% selected.

Figure 5: Cross-tabulation Analysis of Brain Fag Syndrome by Students' Academic Performance (CGPA points)

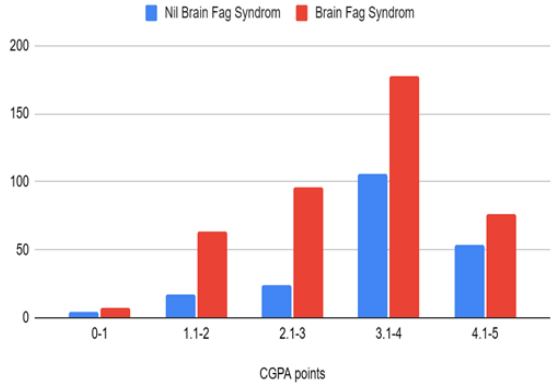

Table 6 shows the correlation between academic performance as measured by CGPA and Brain Fag Syndrome. The correlation analysis indicates a significant negative relationship between Academic Performance (CGPA) and Brain Fag Syndrome. The Pearson correlation coefficient is -0.151 with a significance level of 0.000, suggesting that higher academic performance is associated with a lower likelihood of experiencing Brain Fag Syndrome.

Table 6: Correlation Analysis between Academic Performance (CGPA) and Brain Fag Syndrome

Variables	Academic Performance (CPGA)	Brain Fag Syndrome
Academic Performance (CGPA)	Pearson Correlation	1
	Sig. (2-tailed)	
	N	625
Brain Fag Syndrome	Pearson Correlation	-0.151**
	Sig. (2-tailed)	0.000
	N	625

Note: **Correlation is significant at the 0.01 level (2-tailed).

Table 7 presents findings from a logistic regression analysis examining Brain Fag Syndrome and various predictor factors. In the logistic regression analysis, Test Anxiety significantly predicts Brain Fag Syndrome ($p < 0.001$, Exp(B) = 0.520), indicating a 48.0% decrease in the odds of Brain Fag Syndrome for each one-unit increase in Test Anxiety. Somatic Symptoms also significantly predict Brain Fag Syndrome ($p < 0.001$, Exp(B) = 1.640), suggesting a 64.0% increase in the odds of Brain Fag Syndrome for each one-unit increase in Somatic Symptoms. Burnout Syndrome is also a significant predictor ($p = 0.003$, Exp(B) = 1.035), indicating a 3.5% increase in the odds of Brain Fag Syndrome for each one-unit increase in Burnout Syndrome. However, Academic Performance does not significantly predict Brain Fag Syndrome ($p = 0.605$, Exp(B) = 0.945).

Table 7: Logistic Regression Analysis of Brain Fag Syndrome with Predictor Factors

	Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Academic Performance	-.057	.110	.268	1	.605	.945
	Test Anxiety	-.654	.072	82.851	1	.000	.520
	Somatic Symptoms	.495	.128	14.934	1	.000	1.640
	Burnout Syndrome	.035	.012	8.527	1	.003	1.035
	Constant	.669	.806	.689	1	.407	1.952

a. Variable(s) entered on step 1: Academic Performance, Test Anxiety, Somatic Symptoms, Burnout Syndrome.

Discussion

This study aimed to explore the prevalence of Brain Fag Syndrome (BFS) among undergraduate students at Bayero University Kano and its association with various psychological variables. Our findings reveal a nuanced understanding of BFS and its implications for student well-being.

Our investigation found a substantial prevalence of BFS among Bayero University Kano students, with 67.2% of

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participants exhibiting symptoms of the syndrome. This high prevalence underscores the significance of BFS as a psychological concern within the academic setting.[1] Contrary to previous assertions suggesting the potential extinction of BFS, our findings challenge this notion, emphasizing the importance of considering local factors in understanding the syndrome's prevalence.[2,3,23]

One unexpected finding was the negative correlation between BFS and test anxiety. While conventional wisdom suggests a positive association between BFS and academic stress, our study's results contradict this notion. This unforeseen correlation prompts a re-evaluation of theoretical frameworks, challenging previous research linking BFS primarily with academic stress.[8,10,11,12,23]

Moreover, our investigation revealed significant associations between BFS and somatic symptoms, burnout, and academic performance. Students experiencing BFS reported elevated levels of physical complaints and emotional exhaustion, highlighting the complex interplay between cognitive and emotional dimensions. [3,4,5,11] Lower academic performance was also correlated with higher susceptibility to BFS, suggesting academic consequences associated with the syndrome.[11]

Additionally, variations in BFS prevalence across faculties and courses indicate the influence of academic environments on its development. [10,11,27,28] This underscores the need to consider faculty-specific and course-specific factors when developing interventions and support mechanisms for affected students.

While our study provides valuable insights into BFS among university students, it is not without limitations. The cross-sectional design limits causal inference, and future longitudinal studies are needed to explore the dynamics of BFS over time.[9].

Conclusion

BFS presents a significant mental health concern among university students, impacting their academic performance and overall well-being. Our findings challenge conventional understandings of BFS and highlight the need for tailored interventions addressing its multifaceted nature. Ongoing research is essential to deepen our understanding of BFS and develop effective strategies for supporting affected students.

Declarations

Ethical Consideration: The study adhered to ethical guidelines, which included obtaining informed consent from participants, ensuring their anonymity, and maintaining the confidentiality of the collected data. Ethical approval was obtained from the Aminu Kano Teaching Hospital Ethics Committee (NHREC/28/01/2020/AKTH/EC/3299) before initiating data collection.

Authors' Contribution:
All authors contributed equally at every stage of the research, including the conceptualization of the study, data collection, data analysis, interpretation of results, and manuscript preparation.

Conflict of interest: The authors declare that there is no conflict of interest regarding the research, authorship, and/or publication of this article.

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