IBOM MEDICAL JOURNAL
Vol.17 No.1 | January - April, 2024 | Pages 29 - 41
www.ibommedicaljournal.org

Prevalence of brain fag syndrome and its correlation with stimulant use and socio-economic/demographic characteristics among university undergraduate students in Nigeria

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Abstract

Background: Brain Fag Syndrome (BFS) is a culture-bound syndrome characterized by cognitive and somatic symptoms, commonly reported among African students. This study aimed to determine the prevalence of BFS among Nigerian university students and examine its associated factors.
Methods: A cross-sectional survey was conducted among undergraduate students from a university in the northwest region of Nigeria. The study utilized a self-administered questionnaire to collect data on socio-demographic characteristics, stimulant use, course of study, and academic performance. The presence of BFS was assessed using standardized diagnostic criteria.
Results: The study included a total of 625 participants, in their young adulthood. The prevalence of BFS among Nigerian university students was found to be 62.7%. The majority of affected students were aged 20-30, male, and from the Hausa ethnic group. No significant association was found between stimulant use and BFS. However, there was a significant relationship between the course of study and the occurrence of BFS. Academic performance (CGPA) showed a weak negative association with BFS. Other socio-demographic factors such as age, gender, ethnicity, relationship status, birth position, type of home, and family income did not predict the occurrence of BFS.
Conclusion: The high prevalence highlights the need for attention to mental health issues among this population. The results emphasize the importance of considering the course of study and academic performance when studying BFS. Further research is warranted to explore the underlying mechanisms and develop effective interventions for students affected by BFS.

Keywords: Brain Fag Syndrome, prevalence, factors, Nigerian university students, stimulant use, academic performance

Introduction

Mental health problems among university students have become an issue of international concern[1]. Within this context, brain fag syndrome, a culture-specific syndrome mainly reported in sub-Saharan Africa, including Nigeria, has gained attention. However, Brain fag syndrome is a culture-bound syndrome that faces challenges in gaining full nosological acceptance[2].
Brain fag syndrome is characterized by cognitive, somatic, and psycho-behavioral symptoms such as headache, fatigue, and concentration difficulties, often associated with academic stress[3]. The prevalence of BFS ranges from 22.0% to 40.2% in Nigerian studies[4] and 17% to 25% in South African studies[5]. Correlates of BFS include low socioeconomic status, neuroticism, faulty study habits, use of psychostimulants, level of cultural orientation, and physiological factors[6]. Predictors of BFS include poor academic performance and the belief of

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DOI: 10.61386/imj.v17i1.373

needing to catch up on lost sleep7.

University life presents various challenges, including academic pressure, social adjustments, and increased responsibilities[8], which can contribute to mental health issues among students. Brain fag syndrome, first described in the 1960s, has been frequently reported among Nigerian students and is considered a distinct manifestation of psychological distress related to academic stressors[9].

Previous research has identified various factors that may contribute to the development of brain fag syndrome. Prince[10] was among the first to identify and list the symptoms of brain fag syndrome among students of Western Nigerian descent. Other researchers have further explored the syndrome's symptoms and proposed various interpretations of its etiology[4,5]. A case series report on the clinical presentations of Brain Fag syndrome among Nigerian undergraduate students claimed that the syndrome is characterized by primary memory problems and secondary manifestations such as depression, anxiety, and somatic complaints[11]. Furthermore, a study suggested that the syndrome of brain fag may be a broader expression of psychological distress resulting from societal pressures exceeding individual coping capacities[12]. From a historical context, it was claimed that "Brain Fag" was a syndrome associated with mental exhaustion and overstudy in 19th-century Britain, which led to concerns about the impact of the excessive study on the mental well-being of brain workers[13].

Previous studies have highlighted the association between brain fag syndrome and stimulant use[14]. Regarding stimulant use, a study found a high prevalence (42.9%) of BFS and stimulant use among undergraduate students at the University of Benin[15]. Another study investigated brain fag syndrome in a cross-sectional study on 3rd and 4th-year students at the University of Abuja, finding a prevalence of 36% among the students and those facing financial difficulties[16].

In terms of socio-economic and demographic factors, a study examined the causes of mental health issues related to education in Africa and identified factors such as financial implications of education, fear of envy and bewitchment, parenting during the pre-school years, academic ability, and attributes of the school[17]. Another study investigated the pattern and predictors of brain fag syndrome among senior secondary school students in Calabar, Nigeria, and found significant associations with various socio-demographic factors[18]. Furthermore, a study examined the prevalence of brain fag syndrome among Nigerian university students and its relationship with personality and psychosocial factors, revealing a high prevalence of BFS in the study population[19].

Based on the varying findings in both correlations and predictors of brain fag syndrome, it can be said that BFS is a complex phenomenon influenced by multiple factors.

Understanding the relationship between brain fag syndrome and stimulant use is essential for developing targeted interventions and prevention strategies. Additionally, socio-economic and demographic factors can significantly impact students' mental health. Factors such as family income, parental education level, and living conditions may influence the prevalence and severity of brain fag syndrome[20]. Exploring the association between socio-economic/demographic characteristics and brain fag syndrome can provide insights into the contextual factors that contribute to its occurrence and guide intervention efforts.

This study holds both theoretical and practical significance. Theoretically, it contributes to the growing body of knowledge on brain fag syndrome, a culture-specific syndrome that has received limited attention in academic research. By exploring the prevalence and correlates of brain fag syndrome among Nigerian university students, this study expands our understanding of the impact of academic stress on mental health within a specific cultural context. Practically, the findings from this study can inform the development of targeted interventions to address brain fag syndrome.

Therefore, the primary objectives of this research study are as follows: (1) to determine the prevalence of brain fag syndrome among university undergraduate students at Bayero University, Kano, Nigeria. (2) to explore the relationship between brain fag syndrome and stimulant use, and (3) to investigate the association between brain fag syndrome and socio-economic and demographic factors. In line with these objectives, the following null hypotheses are proposed:

Hypothesis 1: There is no significant difference in the prevalence of brain fag syndrome between students who have the syndrome and those who do not.

Hypothesis 2: There is no significant association between brain fag syndrome and stimulant use among university undergraduate students.

Hypothesis 3: There is no significant association between brain fag syndrome and socio-economic and demographic factors among university undergraduate students.

By achieving these objectives and testing these null hypotheses, this study aims to conduct a prevalence study of brain fag syndrome and examine its correlation with stimulant use, as well as socio-economic and demographic characteristics among university undergraduate students in Nigeria, thereby contributing to the existing knowledge on the syndrome prevalence and its underlying correlates.

Method

Study Design:

The study employed a cross-sectional research design to assess the prevalence of brain fag syndrome, its correlation with stimulant use, and its association with socio-economic and demographic factors among university undergraduate students in Nigeria.

Study Site:

The study was conducted at Bayero University in Kano, Nigeria.

Participants:

According to the history of Bayero University Kano, the university's undergraduate population is 35000, and the sample size was calculated using the undergraduate student population at a 99% confidence level and 5% confidence interval. This gave a sample size of 653, but this was increased to 700 to increase the power of the study, and to take care of possible attritions.

The participants were randomly selected from the population of 3rd-year undergraduate students at the university. A representative sample of 625 respondents, making 89.3% of the proposed sample size, was selected using a multistage sampling technique. Seven faculties out of the 18 faculties in the university were randomly chosen. From each selected faculty, one department was randomly selected. Finally, respondents in their 3rd year from each department were selected using simple balloting. The choice of 3rd-year students was based on previous studies indicating that they are halfway through their university education and experience a higher drive to study and potential use of stimulants[15,21].

Data Collection Instruments:

A structured self-administered questionnaire was used to collect quantitative data. The questionnaire consisted of three sections addressing the research objectives. The first section collected socio-demographic and economic characteristics, including age, gender, ethnicity, study course, relationship status, academic performance (Cumulative Grade Point Average), birth position, type of home, and family income per month. The second section included the Brain Fag Syndrome Scale (BFSS), a 7-item scale validated to identify brain fag syndrome symptoms[22]. The last part of the questionnaire included an open-ended question about stimulant use to enhance studies.

Data Collection Procedure:

Trained research assistants administered the questionnaires to the participants. They explained the study's purpose, emphasized confidentiality and anonymity, and provided instructions for completing the questionnaire. A pretesting of the questionnaire was conducted with a small sample of 3rd-year undergraduate students to ensure clarity and validity.

Data Analysis:

Collected data were analyzed using the IBM SPSS Statistics software. Descriptive statistics, such as frequencies and percentages, were used to analyze the prevalence of brain fag syndrome and stimulant use. Bivariate and multivariate statistical analyses, including chi-square tests and logistic regression, were performed to explore the relationship between brain fag syndrome, stimulant use, and socio-economic/demographic factors. The significance levels and confidence intervals were reported accordingly.

Ethical Considerations:

The study complied with 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.

Limitations:

The study was limited by potential biases inherent in self-reported data and the generalizability of findings due to its focus on one university and region.

Results

Table 1 provides a socio-economic and demographic overview of the student population under study. It presents information on several variables, including age, sex, ethnicity, relationship status, birth position, type of home, and family income per month. For the variable "Age (Last Birthday)," the table shows that the majority of

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	.5
Above 50 years	4	.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
100,000 and above	272	43.5
Total	625	100.0

Table 2: Summary of Students' Faculty of Study, Academic Performance, and Course of Study

Faculty of Study, Academic Performance, Course of Study	**Frequency**	**Percent**
Faculty of Study		
Basic Medical Science	88	14.1
Engineering	51	8.2
Agriculture	94	15.0
Education	93	14.9
Life Sciences	109	17.4
Social and Management Sciences	103	16.5
Computer Science	87	13.9
Total	625	100.0
Academic Performance (CGPA)		
0-1 point	11	1.8
1.1-2 point	80	12.8
2.1-3 point	120	19.2
3.1-4 point	284	45.4
4.1-5 point	130	20.8
Total	625	100.0
Course of Study		
Chemistry	24	3.8
Biology	19	3.0
Botany	23	3.7
Mathematics	1	.2
Physics	14	2.2
Dentistry	2	.3
Anatomy	59	9.4
Economics	42	6.7
Biochemistry	26	4.2
Zoology	29	4.6
Lib. and Infor. Science	50	8.0
Agriculture	58	9.3
Forestry and Wildlife	9	1.4
Fisheries and Aquaculture	20	3.2
Food Science and Tech.	7	1.1
Information and Media Studies	5	.8
History	1	.2
Cyber Security	47	7.5
Banking and Finance	55	8.8
Electrical Engineering	12	1.9
Petrochemical Engineering	16	2.6
Civil Engineering	23	3.7
Education Biology	43	6.9
Software Engineering	40	6.4
Total	625	100.0

Table 3: Association between Students with and without Brain Fag Syndrome

Brain Fag Syndrome	Frequency	Percent	X2	Df	p-value
Not Selected	205	32.8	147.920	1	0.0001
Selected	420	67.2			
Total	625	100.0			

students (66.1%) are in the age range of 20-30 years, followed by those below 20 years (18.2%). There are smaller percentages of students in older age categories. In terms of "Sex," the table indicates that the student population is relatively balanced, with 53.6% being male and 46.4% female. The "Ethnicity" variable reveals that the largest ethnic group among the students is Hausa (35.8%), followed by Yoruba (32.3%), with Igbo and other ethnicities comprising smaller percentages. Regarding "Relationship Status," the majority of students (79.0%) are single, while smaller percentages are either married, divorced, or widowed. In terms of "Birth Position," the table shows that the second-born position is the most common (35.8%), followed by the first-born (28.2%), with third-born and fourth-born positions having lower percentages. The "Type of Home" variable reveals that the majority of students live in monogamous homes (68.2%), with a smaller percentage living in polygamous homes or homes where parents are divorced. Finally, the table displays "Family Income Per Month (N)" and shows the distribution of students across different income brackets, with the highest percentage falling into the "100,000 and above" income category (43.5%).

Table 2 provides a summary of students' characteristics, including their faculty of study, academic performance (CGPA), and course of study: Basic Medical Science is the largest faculty, accounting for 14.1% of students. Agriculture, Life Sciences, and Social and Management Sciences are also prominent faculties. The distribution across faculties reflects the diversity of academic interests among students. The majority of students fall within the CGPA range of "3.1-4 point," representing 45.4% of the total."2.1-3 point" and "1.1-2 point" CGPA ranges have significant percentages of 19.2% and 12.8%, respectively.

There are smaller percentages of students in the "0-1 point" and "4.1-5 point" CGPA ranges.

This distribution showcases various levels of academic achievement among students. Anatomy is the most common course of study, with 9.4% of students. Several courses, such as Agriculture, Social and Management Sciences, and Cyber Security, also have notable percentages. Some courses, including Mathematics, Dentistry, and History, have smaller representations. The diversity of courses reflects the wide array of academic disciplines within the student population.

Table 3 presents the association between students with and without Brain Fag Syndrome: 32.8% of the students were not selected for Brain Fag Syndrome (205 students). 67.2% of the students were selected for Brain Fag Syndrome (420 students). The Chi-squared test showed a significant association between Brain Fag Syndrome and student selection ($X2 = 147.920$, $df = 1$, $p < 0.0001$). The total number of students included in the analysis is 625.

Table 4 provides the frequency and percentage of Stimulant Use for study enhancement among the students: 12.0% of the students reported using stimulants for study enhancement (75 students). 88.0% of the students did not use stimulants for study enhancement (550 students). The total number of students included in the analysis is 625.

Table 5 explores the relationship between Brain Fag Syndrome and Stimulant Use. Among those who selected Stimulant Use, 4.48% had Brain Fag Syndrome, while among those who did not select Stimulant Use, 7.52% had Brain Fag Syndrome. When considering the entire dataset, 12.0% of the participants had Brain Fag Syndrome, and 88.0% did not. The chi-squared test (X2) was performed, resulting in a statistic of 0.795 with 1 degree of freedom (df), and a significance level (p-value) of 0.373.

Table 6 presents the results of a binary logistic

Table 4: Frequency and Percentage of Stimulant Use for Study Enhancement among the Students

Stimulant Use	Frequency	Percent
Yes	75	12.0
No	550	88.0
Total	625	100.0

Table 5: Relationship between brain fag syndrome and stimulant use

Stimulant Use	Not Selected (%)	Selected (%)	Total (%)	X^2	df	p-value
				.795	1	.373
Yes	28(4.48)	47(7.52)	75(12.0)			
No	177(28.32)	373(59.68)	550(88.0)			
Total	205(32.8)	420(67.2)	625(100.0)			

Table 6: Binary Logistics Analysis Between Brain Fag Syndrome and Stimulant use

Variables	B	S.E	Wald	Df	sig	Exp(B)
Stimulant use	.227	.256	.792	1	.373	1.255
Constant	.290	.486	.357	1	.550	1.337

Table 7: Frequency and Distribution of Study Enhancers Used by the Students

Study Enhancers	Frequency	Percent
None	557	89.1
Alabuku	3	.5
Cigarette	4	.6
Coffee	23	3.7
Energy drink	30	4.8
Kolanut	6	1.0
Nescafe	1	.2
Tramadol	1	.2
Total	625	100.0

analysis examining the relationship between Brain Fag Syndrome and Stimulant use. The key findings are as follows: Stimulant use has a coefficient (B) of 0.227, a standard error (S.E) of 0.256, and a Wald statistic of 0.792. The significance level (Sig) is 0.373, and the exponentiated coefficient (Exp(B)) is 1.255. The constant in the analysis has a coefficient (B) of 0.290, a standard error (S.E) of 0.486, and a Wald statistic of 0.357. The significance level (Sig) is 0.550, and the exponentiated constant (Exp(B)) is 1.337.

Table 7 presents the frequency distribution of enhancers used by the participants. The data were collected from a sample of 625 participants. The majority of participants (89.1%) reported not using any enhancers. Among the specific enhancers mentioned, Energy drink was the most commonly used, with 4.8% of participants using it to enhance their studies. Coffee followed closely, with 3.7% of participants reporting their use. Other enhancers, such as Alabuku, Cigarette, Kolanut, Nescafe, and Tramadol, had lower frequencies ranging from 0.2% to 1.0%. These findings highlight the prevalence of enhancer usage among the participants, with coffee and energy drinks being the preferred choices.

Table 8 displays the results of a cross-tabulation analysis of Brain Fag Syndrome by students' Faculty of Study. In the Faculty of Basic Medical Science, 5.76% were not selected for Brain Fag Syndrome, and 8.32% were selected. For the Faculty of Engineering, 3.36% were not selected, and 4.80% were selected. In the Faculty of Agriculture, 5.28% were not selected, and 9.76% were selected. Among students in the Faculty of Education, 5.92% were not selected, and 8.96%

Table 8: 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 9: Cross-tabulation Analysis of Brain Fag Syndrome by Students' Age

Age	Not Selected (%)	Selected (%)	Total (%)	X2	Df	p-value
Below 20 years	37 (5.9)	77 (12.3)	114 (18.2)	.371	4	.985
20-30 years	134 (21.4)	279 (44.6)	413 (66)			
31-40 years	32 (5.1)	59 (9.4)	91 (14.5)			
41-50 years	1 (0.2)	2 (0.3)	3 (0.5)			
Above 50 years	1(0.2)	3 (0.5)	4 (0.7)			
Total	205 (32.8)	420 (67.2)	625 (100.00)			

Table 10: Cross-tabulation Analysis of Brain Fag Syndrome by Students' Sex

Sex	Not Selected (%)	Selected (%)	Total (%)	X2	Df	p-value
Male	115 (18.4)	220 (35.2)	335(53.6)	.765	1	.382
Female	90 (14.4)	200 (32.0)	290(46.4)			
Total	205 (32.8)	420(67.2)	625 (100.0)			

Table 11: Cross-tabulation Analysis of Brain Fag Syndrome by Students' ethnicity

Ethnicity	Not Selected (%)	Selected (%)	Total (%)	X2	Df	p-value
Hausa	75 (33.3)	149 (66.5)	224 (35.8)	2.038	3	.565
Yoruba	69 (34.2)	133 (65.8)	202 (32.3)			
Igbo	29 (35.4)	53 (64.6)	82 (13.1)			
Other	32 (27.4)	85 (72.6)	117 (18.7)			
Total	205 (32.8)	420 (67.2)	625 (100.0)			

were selected. In the Faculty of Life Sciences, 3.68% were not selected, and 13.76% were selected. For the Faculty of Social and Management Sciences, 6.56% were not selected, and 9.92% were selected. In the Faculty of Computer Science, 2.24% were not selected, and 11.68% were selected. The Chi-square test resulted in a p-value of .001, indicating a significant association between students' Faculty of Study and Brain Fag Syndrome.

Table 9 presents a cross-tabulation analysis of Brain Fag Syndrome by students' age. The findings are as follows: Among students below 20 years, 5.9% were not selected for Brain Fag Syndrome, and 12.3% were selected. For students aged 20-30 years, 21.4% were not selected, and 44.6% were selected. In the 31-40 years age group, 5.1% were not selected, and 9.4% were selected. For students aged 41-50 years, 0.2% were not selected, and 0.3% were selected. In the above 50 years age group, 0.2% were not selected, and 0.5% were selected.

The Chi-square test resulted in a p-value of .985, indicating no significant association between students' age and Brain Fag Syndrome.

Table 10 displays a cross-tabulation analysis of Brain Fag Syndrome by students' sex. The results reveal that: Among males, 18.4% were not selected for Brain Fag Syndrome, while 35.2% were selected. For females, 14.4% were not selected, and 32.0% were selected for Brain Fag Syndrome. The Chi-square test resulted in a p-value of .382, indicating no significant association between students' sex and Brain Fag Syndrome.

Table 11 presents a cross-tabulation analysis of Brain Fag Syndrome by students' ethnicity. The findings show that: Among the Hausa ethnic group, 33.3% were not selected, while 66.5% were selected for Brain Fag Syndrome. For the Yoruba ethnic group, 34.2% were not selected, and 65.8% were selected. In the Igbo ethnic group, 35.4% were not selected, and 64.6% were selected. Among other ethnicities, 27.4% were not selected, and 72.6% were selected. The Chi-square test yielded a p-value of .565, indicating no significant association between ethnicity and Brain Fag Syndrome.

Table 12 presents the results of a cross-tabulation analysis, examining the relationship between Brain Fag Syndrome (BFS) and students' course of study. The table displays the distribution of students across various courses of study and shows the percentage of students who were either selected for BFS or not selected. It also provides the Chi-square statistic (X2), degrees of freedom (df), and the corresponding p-value (p). The p-value helps assess the statistical significance of the relationship

Table 12: Cross-tabulation Analysis of Brain Fag Syndrome by Students' Course of Study

Course of study	Not Selected (%)	Selected (%)	Total	X2	df	p-value
Chemistry	10 (4.9%)	14 (6.7%)	24 (3.8%)	63.968	23	.000
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%)			

Table 13: Cross-tabulation Analysis of Brain Fag Syndrome by Students' Relationship Status

Relationship Status	Not Selected(%)	Selected(%)	Total (%)	X2	df	p-value
Single	162 (26%)	332(53%)	494 (79%)	1.172	3	.760
Married	37 (6%)	71 (11%)	108 (17%)			
Divorced	2 (0.3%)	9 (1.4%)	11 (1.8%)			
Widow	4 (0.6%)	8 (1.3%)	12 (1.9%)			
Total	205 (33%)	420(67%)	625(100%)			

Table 14: Cross-tabulation Analysis of Brain Fag Syndrome by Students' Academic Performance (CGPA points)

CGPA points	Not Selected (%)	Selected (%)	Total (%)	X2	df	p-value
0-1	4(1.95)	7(1.67)	11(1.76)	20.966	4	.000
1.1-2	17 (8.29)	63 (15.0)	80 (12.8)			
2.1-3	24 (11.71)	96 (22.86)	120 (19.2)			
3.1-4	106 (51.71)	178 (42.38)	284 (45.44)			
4.1-5	54 (26.34)	76 (18.09)	130 (20.8)			
Total	205 (32.8)	420 (67.2)	625 (100.0)			

Table 15: Cross-tabulation Analysis of Brain Fag Syndrome by Students' Birth Position

Birth Position	Not Selected (%)	Selected (%)	Total (%)	X2	Df	p-value
First Born	51(8.16)	125(20.00)	176(28.16)	6.162	3	.104
Second Born	86 (13.76)	138(22.08)	224(35.84)			
Third Born	31(4.96)	84(13.44)	115(18.40)			
Fourth Born	37(5.92)	73(11.68)	110(17.60)			
Total	205(32.80)	420(67.20)	625(100.00)			

Table 16: Cross-tabulation Analysis of Brain Fag Syndrome by Students' Type of Home

Type of Home	Not Selected (%)	Selected (%)	Total (%)	X2	df	p-value
Monogamous	147(23.52)	279(44.64)	426(68.16)	1.827	2	.401
Polygamous	46(7.36)	114(18.24)	160(25.60)			
Parents Divorced	12(1.92)	27(4.32)	39(6.24)			
Total	205(32.80)	420(67.20)	625(100.00)			

Table 17: Cross-tabulation Analysis of Brain Fag Syndrome by Students' Family Income Per Month(N)

Family Income Per Month(N)	Not Selected (%)	Selected (%)	Total (%)	X^2	df	p-value
10,000 - 20,000	27(13.2)	36(16.3)	63(10.1)	3.830	3	.280
20,000 - 50,000	43(21.0)	84(38.0)	127(20.3)			
50,000 - 100,000	53(25.9)	110(49.5)	163(26.1)			
100,000 and above	82(40.0)	190(42.9)	272(43.5)			
Total	205(100.0)	420(100.0)	625(100.0)			

Table 18: Regression Analysis of Brain Fag Syndrome on Students' Socioeconomic and Demographic Factors, Faculty of Study, Academic Performance, and Course of Study

Variables	B	S.E	Wald	df	Sig	Exp(B)
Faculty of Study	.099	.035	7.944	1	.005	1.104
Age (Last Birthday)	-.022	.147	.023	1	.879	.978
Sex	.163	.181	.807	1	.369	1.177
Ethnicity	.063	.081	.593	1	.441	1.065
Course of Study	-.034	.014	6.139	1	.013	.966
Relationship Status	-.075	.165	.208	1	.648	.927
Academic Performance (CGPA)	-.316	.097	10.492	1	.001	.729
Birth Position	-.028	.085	.109	1	.742	.972
Type of Home	.159	.152	1.100	1	.294	1.172
Family Income Per Month (N)	.129	.087	2.164	1	.141	1.137
Constant	1.131	.691	2.679	1	.102	3.100

between the course of study and the occurrence of BFS among students. In this case, the table indicates that there is a statistically significant association between the course of study and BFS (p = 0.000), suggesting that students' choice of course of study is a significant predictor of BFS

Table 13 presents the results of a cross-tabulation analysis, examining the relationship between Brain Fag Syndrome (BFS) and students' relationship status. The table displays the distribution of students into different relationship status categories and shows the percentage of students who were either selected for BFS or not selected. Additionally, it provides the Chi-square statistic (X2), degrees of freedom (df), and the corresponding p-value (p). The p-value helps assess the statistical significance of the relationship between relationship status and the occurrence of BFS among students. In this case, the table indicates that there is no statistically significant association between relationship status and BFS (p = 0.760), suggesting that students' relationship status is not a significant predictor of BFS.

Table 14 presents the results of a cross-tabulation analysis, examining the relationship between Brain Fag Syndrome (BFS) and students' academic performance, as measured by Cumulative Grade Point Average (CGPA) points. The table displays the distribution of students into different CGPA point ranges and shows the percentage of students who were either selected for BFS or not selected. Additionally, it provides the Chi-square statistic (X2), degrees of freedom (df), and the corresponding p-value (p). The p-value helps assess

the statistical significance of the relationship between academic performance (CGPA points) and the occurrence of BFS among students. The table suggests that there is a statistically significant association between CGPA points and BFS ($p < 0.001$), indicating that academic performance is related to the likelihood of experiencing BFS symptoms.

Table 15 presents the results of a cross-tabulation analysis examining the relationship between Brain Fag Syndrome (BFS) and students' birth position. The table provides the percentage of students who were selected for BFS and not selected for BFS, categorized by their birth position. The chi-square test was used to assess the association between birth position and BFS. The chi-square statistic (X2) was calculated to be 6.162 with 3 degrees of freedom (df), resulting in a p-value of 0.104. The significance level (p-value) of 0.104 suggests that there is no statistically significant association between birth position and BFS among the students. In other words, the results do not provide enough evidence to conclude that birth position is a significant factor influencing the occurrence of BFS.

Table 16 displays a cross-tabulation analysis of Brain Fag Syndrome based on students' type of home. It shows the distribution of students among different types of home and their corresponding selection status for Brain Fag Syndrome. The chi-square test (X2) was employed to assess the statistical significance of the relationship between type of home and Brain Fag Syndrome.

Table 17 presents a cross-tabulation analysis of Brain Fag Syndrome based on students' family income per month. The table provides information on the distribution of students across different income brackets and their selection status for Brain Fag Syndrome. Significant associations between family income and Brain Fag Syndrome were assessed using the chi-square test (X2).

Table 18 presents the results of a regression analysis assessing the impact of various factors on Brain Fag Syndrome among students. The table includes coefficients (B), standard errors (S.E), Wald statistics, degrees of freedom (df), significance levels (Sig), and exponentiated coefficients (Exp(B)) for each variable. Key variables, such as Faculty of Study, Course of Study, and Academic Performance, showed significant associations with Brain Fag Syndrome.

Discussion

The primary objective of this research study was to determine the prevalence of brain fag syndrome among Nigerian university undergraduate students. Additionally, the study aimed to examine the relationship between brain fag syndrome and stimulant use as well as its association with socio-economic and demographic factors.

Findings revealed that the majority of students were aged 20–30, male, and from the Hausa ethnic group. Most students were single and belonged to the highest-income group. The largest faculties were life sciences and social and management sciences, and common fields of study included anatomy and library and information science.

While a significant proportion of students met the criteria for brain fag syndrome, no strong association was found between stimulant use and the syndrome. Notably, brain fag syndrome was significantly related to the choice of course of study and academic performance. However, variables such as age, gender, ethnicity, relationship status, birth position, type of home, and family income did not significantly predict the occurrence of brain fag syndrome.

The study aims to contribute to the existing knowledge on brain fag syndrome's prevalence among Nigerian university students and shed light on its underlying factors.

The slightly higher male population and the predominance of the Moslem Hausa ethnic stock in the study are reflective of the general characteristics of the students' population (personal communication, 2022).

The prevalence, pattern, and predictors of brain fag syndrome (BFS) among senior secondary school (SS) pupils in Calabar, Nigeria, were explored by Essien et al. in their study[18]. The researchers reported a prevalence of BFS among students of 20.4%. However, this prevalence was much lower than the prevalence of 67.2% found in the current study, which focused on university undergraduates from the northwest of Nigeria. The researchers from the prior study identified female gender and unmarried parents as important sociodemographic predictors of BFS, although these factors were not found to be significant in the present study. The

researchers recommended further research to better understand BFS and develop effective treatments[18].

In a pooled analysis of multiple research studies conducted by Adayonfo and Akhigbe[15], Fatoye[19], and Uchendu, Chikezie, & Morakinyo[16], the prevalence, factors, and implications of brain fag syndrome among Nigerian university students were examined. The combined sample size across the studies was 3,100, providing a comprehensive understanding of BFS. The aggregated findings revealed a prevalence rate ranging from 36% to 42.9% among university students, lower than what was found in this study. Significant associations were found between BFS and neuroticism, psychoticism, general psychological distress, and stimulant use, particularly among males[15,19,16]. Students with BFS reported higher levels of financial strain, poor physical health, and study difficulties[15,16]. These findings emphasized the importance of addressing stimulant use and psychosocial factors in preventing and managing BFS [15,19,16].

Comparing the aggregated findings with the present study, the earlier studies found a prevalence of BFS among university students ranging from 36% to 42.9%[15,19,16]. They highlighted significant associations between BFS and neuroticism, psychoticism, general psychological distress, and stimulant use[15,19,16]. In contrast, the present study found a higher prevalence of 62.7% among undergraduate students but did not find a significant association between stimulant use and BFS. Although a small percentage of the students at Bayero University in Kano used study enhancers, these were mainly coffee and caffeinated energy drinks. Uchendu, Chikezie, and Morakinyo[16] claimed that the students at the University of Abuja commonly used coffee and kola nut to help with their studies, despite not finding a significant relationship between study difficulties and having brain fag syndrome. The differences in methodology, site, participant selection, and data analysis techniques between the studies could have influenced the outcomes.

The present study explored variables such as age, gender, ethnicity, relationship status, income level, and course of study. It found that most students affected by BFS were aged between 20 and 30, with a slightly higher male proportion in contrast to what was found in the study by Uchendu, Chikezie, and Morakinyo[16], where female students were more represented than males in the study, though that was reflective of the undergraduate students' characteristics at the university.

The study also identified a relationship between the course of study and BFS, suggesting that certain fields may be more susceptible to the syndrome. Uchendu, Chikezie, and Morakinyo[16] conducted a study on the prevalence of brain fog syndrome (BFS) among university students in Nigeria. They utilized the University College London study difficulty questionnaire and found that study difficulty was present in 53.8% of the population. However, no significant association was found between study difficulty and BFS in general. Interestingly, 25.7% of the students experienced both study difficulty and BFS. In contrast, the present study employed students' cumulative grade point average (CGPA) to assess academic performance and identified a weak negative relationship between BFS and academic performance. Additionally, the study revealed a significant positive relationship between the course of study and BFS, which was not mentioned in previous studies by Adayonfo and Akhigbe[15] and Uchendu, Chikezie, and Morakinyo[16], respectively.

However, birth position, relationship status, and type of home did not show significant associations. The analysis revealed a weak positive association between academic performance (CGPA) and BFS. Regression analysis supported the relationship between the faculty of study and BFS, while other variables like age, gender, ethnicity, and family income did not emerge as significant predictors. Fatoye[19] found no significant difference between the university student's level of study and having brain fag syndrome.

Adayonfo and Akhigbe[15] conducted a study at the University of Benin in Nigeria, which revealed a high prevalence of BFS and stimulant use among undergraduate students. The study demonstrated a significant association between BFS and stimulant use. Moreover, it identified a correlation between general psychiatric morbidity and BFS. Based on the findings of the combined studies, addressing stimulant use and psychosocial factors is vital in preventing and managing BFS[15,19,16].

While stimulant use has been linked to BFS in

previous studies, the present study did not find a significant association between stimulant use and BFS. However, a small proportion of students reported using stimulants for study enhancement, indicating their presence for academic purposes among some students. The study acknowledged potential limitations, such as self-report measures and the cross-sectional design, which limit the establishment of causal relationships. Methodological differences with previous research should also be considered when interpreting the results.

To further enhance the understanding of BFS and its predictors, future research could consider longitudinal designs, diverse samples, standardized diagnostic criteria, and qualitative methods. By critically evaluating methodologies, sample sizes, and generalizability, researchers can ensure reliable conclusions applicable to the Nigerian context. This critical scrutiny emphasizes the need for further research to establish robust causal relationships and explore underlying mechanisms, enabling the development of effective interventions and support strategies for students affected by BFS.

The present study aimed to determine the prevalence of brain fag syndrome (BFS) among Nigerian university undergraduate students and investigate its associations with various factors, including stimulant use and socio-economic and demographic variables. The study found a high prevalence of BFS among the participants, with the majority of students meeting the criteria for the syndrome.

Hypothesis 1 stated that there would be no significant difference in the prevalence of BFS between students who have the syndrome and those who do not. However, the study's findings indicated that a significant proportion of students met the criteria for BFS, suggesting that the hypothesis is not supported. This highlights the importance of recognizing and addressing BFS as a significant issue among Nigerian university students.

Hypothesis 2 proposed that there would be no significant association between BFS and stimulant use among university undergraduate students. Although the study found a small proportion of students reporting stimulant use for study enhancement, there was no significant association between stimulant use and BFS. This contrasts with previous studies that have shown an association between BFS and stimulant use. The discrepancy could be attributed to differences in methodology, sample selection, or cultural factors.

Hypothesis 3 suggested that there would be no significant association between BFS and socio-economic and demographic factors. However, the study did not find significant associations between BFS and variables such as age, gender, ethnicity, relationship status, birth position, type of home, and family income. These findings indicate that BFS may affect students from various backgrounds and demographic characteristics equally.

The study's findings also revealed certain significant associations between BFS and other factors. The choice of course of study was significantly related to BFS, suggesting that certain fields may be more susceptible to the syndrome. Additionally, the study identified a weak negative relationship between BFS and academic performance, as measured by the students' cumulative grade point average (CGPA). These findings provide insights into the potential impact of BFS on students' academic success and highlight the importance of addressing the syndrome's underlying factors.

The study's findings are consistent with some previous research conducted in Nigeria. For example, the study by Essien et al. (Year) found a lower prevalence of BFS among senior secondary school pupils compared to the current study's findings among university undergraduates. However, the study by Essien et al. identified female gender and unmarried parents as predictors of BFS, which were not significant in the present study. This discrepancy may be attributed to differences in the sample population and methodology.

Conclusion

This study revealed a high prevalence of BFS among Nigerian university undergraduate students and identified significant associations with academic factors such as the choice of course of study. However, it did not find a strong association between BFS and stimulant use or socioeconomic and demographic factors. This underscores the multifaceted nature of BFS and the need for comprehensive research and support mechanisms for affected students.

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