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High-Prevalence Energy Drink Use among Nigerian University Students: A Cross-Sectional Analysis of Motivations, Dependency Indicators, and Self-Reported Adverse Effects

Abdul-Raheem Folorunsho Ahmad, Luqman Adepoju Hassan, Idowu Oluwagbemiga Coker, Kolade Pelumi Folorunso, Rasheed Tunde Lawal, Foluso Olamide Ojo, Tolulope Adefola Edward, Oluwafemi Samuel Olaniyi

University of Ilesa, Ilesa, Osun State, Nigeria

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ABSTRACT

Background: Energy drink (ED) consumption is rapidly increasing among university students, with potential implications for dependency and adverse health outcomes due to high caffeine and sugar content. This study assessed the prevalence, motivations, dependency indicators, and self-reported adverse effects of ED consumption among Nigerian university students.

Methods: A descriptive cross-sectional survey was conducted among 542 university students across Nigeria using a structured, self-administered questionnaire. Data were analyzed using descriptive statistics and chi-squared tests to explore links between demographic factors, awareness, and consumption.

Results: More than half of respondents (52.8%) currently use energy drinks, mostly to boost energy or improve performance (61.2%). Although 88.9% were aware of health risks, many showed signs of dependency such as cravings (38.5%) or a perceived need to drink (37.1%). Males and younger adults consumed more frequently. Interestingly, non-consumers reported higher rates of some symptoms like headaches and palpitations, possibly due to self-selection bias.

Conclusion: Energy drink use is highly prevalent among Nigerian university students and largely driven by academic and performance-related motivations. Despite high awareness of risks, dependency signs persist. Targeted health education and regulatory measures are needed to reduce potential health risks.

Keywords: Energy drinks; caffeine dependency; awareness; university students; Nigeria; cross-sectional study

INTRODUCTION

Energy drinks (EDs) are non-alcoholic beverages designed with different formulations containing methylxanthines like caffeine and taurine, carbohydrates, vitamins, herbal extracts and sweeteners (1). They are commonly taken on the basis of their perceived effects on reducing fatigue, inhibiting sleep, increasing energy, and improving mental and physical performance (2). The active ingredient primarily is caffeine, which may be obtained by extracting guarana or yerba mate (3). Caffeine is commonly available in significantly higher doses in energy drinks than in soft drinks; e.g., cola beverages typically has about 24 mg of caffeine per serving, whereas energy drinks often range from 50 to 200 mg per serving (4). There is some evidence that caffeine, alone or combined with glucose, can enhance attention, reaction times, and alertness scales and alleviate fatigue during cognitively challenging tasks (5). Also, other typical additives, including taurine, are higher in EDs than other soft drinks, and several of the formulations are high in sugar (21-34 g per 8 ounces) (6). High consumption of sugar has been associated with the development of glucose intolerance and dyslipidemia, systemic inflammation, and other metabolic imbalances that can predispose to cardiometabolic diseases (7).

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The use of EDs has been on the rise globally among young adults, especially university students, who form one of the highest groups of consumers (8). Research conducted by Adepoju and Ojo (2014) discovered that 74.6 percent of students at the University of Ibadan had tried energy drinks at least once, and 42.4 percent had consumed no less than one can of energy drinks per week (6). In the same way, Ezemenahi et al. (2024) found that more than 81.5 percent of medical students enrolled at Nnamdi Azikiwe University Teaching Hospital had used EDs, and the majority of them had started using them between the ages of 10 and 20 years (9). Some of the reported reasons why people consume include the use of the substance to boost their energy levels, improve mental clarity, academic stress, curiosity and peer pressure. Similar results were found in Usmanu Danfodiyo University, Sokoto, where 55.4% of students said they had ever used EDs and 25.7% were currently using them, some up to five cans a day (10). The triggers of ED consumption in Nigerian undergraduates include peer influence, curiosity and promotional marketing (9).

Although consumption is very popular, there is still low awareness about the health risks involved in consuming energy drinks. Among Nigerian university students, studies have reported such adverse effects as insomnia, frequent urination, dehydration, anxiety, headaches, palpitations, and gastrointestinal symptoms (6,10). The findings are consistent with global reports of these adverse effects, like palpitations and sleep problems among adolescents in Korea (11). The high caffeine levels coupled with the sugar load and common use during times of academic or social stress pose questions of dependency, overuse and the long-term health consequences (1).

Since the consumption of energy drinks is growing very fast in Nigeria, and the usage of energy drinks is becoming the norm among students, there is an urgent need to know the consumption patterns, reasons, and health consequences, as well as the possibilities of EDs creating a dependency. This research was thus conducted to help analyze exhaustively the energy drink consumption habits, usage patterns, reasons for use, satisfaction levels, potential health impacts, and signs of dependency among Nigerian university students aged 10 years and above.

MATERIALS AND METHODOLOGY

2.1 Study Design and Setting

This study adopted a descriptive cross-sectional survey design aimed at evaluating energy drink consumption patterns, awareness levels, motivations, dependency indicators, and self-reported adverse effects among Nigerian university students. The research was conducted across selected tertiary institutions within Nigeria's six geopolitical zones, with the highest representation from the South-West region, where student accessibility and participation were greatest during the survey period.

2.2 Study Population and Sampling Technique

The study population comprised university students who were enrolled at the time of data collection. Younger respondents aged 10–19 years were included because, in Nigeria, 16 years represents the typical minimum age for university entry through the Joint Admissions and Matriculation Board (JAMB). Including this group allowed the study to capture early exposure patterns to energy drinks among adolescents transitioning into university life (12) and a convenience sampling technique was employed to recruit participants who were available and willing to participate. Inclusion criteria required that respondents be registered students within recognized tertiary institutions and provide informed consent. Individuals who were not students or who declined consent were excluded from participation.

2.3 Sample Size Determination

A total of 542 respondents participated in the study, consisting of 188 (34.7%) males and 354 (65.3%) females. The sample size was derived using Cochran's formula for cross-sectional studies, assuming a 50% estimated prevalence of energy drink consumption, a 5% margin of error, and a 95% confidence interval (13). The

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computed sample size was adjusted to account for potential non-response and ensure representativeness across age groups and regions.

2.4 Data Collection Instrument

Data were gathered using a structured, self-administered questionnaire developed by the researchers after reviewing relevant literature on energy drink consumption and health outcomes. Questionnaire was set to standard using the Likert scale while the internal consistency of the survey questions was assessed using the Cronbach's alpha. The questionnaire comprised five sections: (i) socio-demographic characteristics; (ii) awareness and knowledge of energy drinks and their potential side effects; (iii) consumption patterns, motivations, and preferred brands; (iv) indicators of dependency such as cravings, perceived need, and difficulty reducing intake; and (v) self-reported adverse effects associated with consumption. The instrument was pretested among 30 students outside the study sample to assess clarity, reliability, and internal consistency. Feedback obtained from the pilot testing informed final revisions before deployment.

2.5 Data Collection Procedure

Questionnaires were distributed both physically and electronically to enhance reach and participation. Trained research assistants supervised the data collection process to ensure accuracy and completeness of responses. Participation was voluntary, and respondents were informed about the study objectives, confidentiality of responses, and their right to withdraw at any stage without consequence.

2.6 Data Analysis

All completed questionnaires were coded and entered into Microsoft Excel before being exported to the Statistical Package for the Social Sciences (SPSS) version 26.0 for analysis. Descriptive statistics such as frequencies, percentages, and charts were used to summarize categorical variables, while cross-tabulations were used to compare energy drink consumers and non-consumers. Pearson's Chi-squared (χ^2) tests were applied to examine associations between socio-demographic variables (age, gender, region, employment status, and marital status) and key study variables including awareness levels and consumption patterns. Statistical significance was set at $p \leq 0.05$.

2.7 Ethical Considerations

Ethical approval for the study was obtained from the ethical committee, Faculty of Basic Medical Science, University of Ilesa. Additional permissions were secured from the relevant departments and university authorities before data collection. Written informed consent was obtained from all participants, and anonymity and confidentiality were strictly maintained.

RESULTS

3.1 Participant Socio-Demographic Characteristics

A total of five hundred and forty-two (542) respondents consisting of 188 (34.7%) males and 354 (65.3%) females participated in the study. It reveals that more females partook in the study with 65.3% responses as against 34.7% responses from their male counterparts. This, however, does not suggest that there is more female population than male at all levels; the gender distribution of the respondents in the study area is based on their accessibility and availability during the period this survey was carried out. The study cohort was characterized by a high proportion of young adults and adolescents, with 47.0% of participants (n=255) aged 20-29 years and 35.4% (n=192) aged 10-19 years. Geographically, participants were primarily from Nigeria's South-west geopolitical zone (82.7%, n=448) as presented in Table 1.

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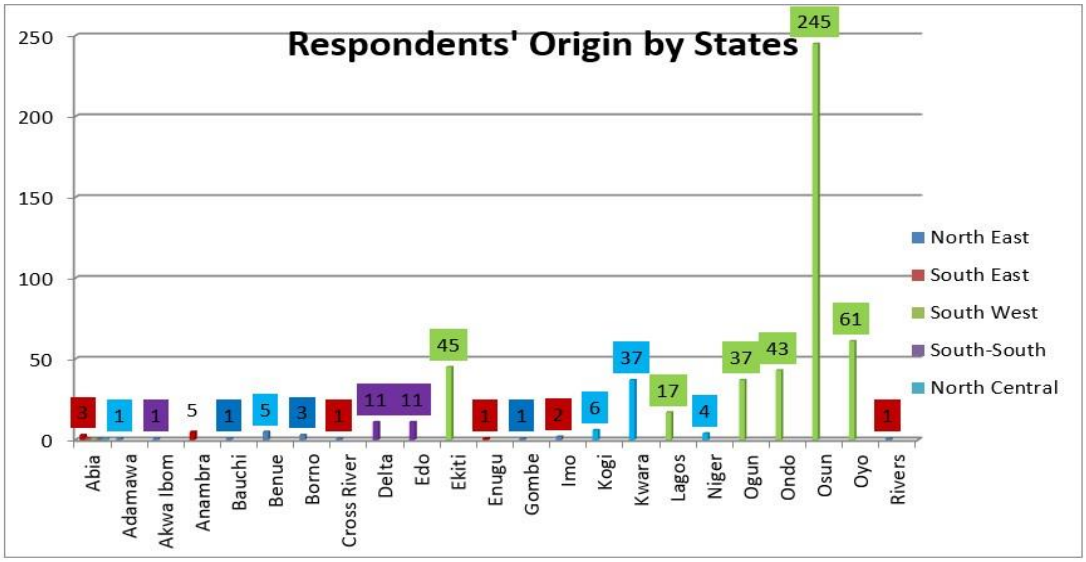
Table 1: Socio-demographic characteristics of the study cohort (N=542).

Characteristic	Category	Frequency (n=542)	Percentage (%)
Age	10-19 Years	192	35.4
	20-29 Years	255	47.0
	30-39 Years	67	12.4
	40-49 Years	16	3.0
	50-59 Years	10	1.8
	60 Years and above	2	0.4
	Total	**542**	**100.0**
Gender	Male	188	34.7
	Female	354	65.3
	Total	**542**	**100.0**
Origin by Geo-Political Zones	South-west	448	82.7
	South-South	25	4.6
	South-East	11	2.0
	North-West	0	0.0
	North-East	6	1.1
	North-Central	52	9.6
	Total	**542**	**100.0**
Employment Status	Employed	103	19.0
	Jo Seeker	21	3.9
	Self-employed	3	0.6
	Student	32	5.9
	Retired	383	70.7
	Total	**542**	**100.0**
Marital Status	Divorced/Widowed	6	1.1
	Married	86	15.9
	Single	450	83.0
	Total	**542**	**100.0**



Figures 1: Bar Chart of Respondents' State of Origin

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3.2 Awareness of Energy Drinks and Potential Side Effects

A high degree of awareness regarding energy drinks was observed across the cohort. The vast majority of participants (93.0%, n=504) reported being familiar with energy drinks. Furthermore, knowledge of potential adverse health effects was similarly widespread, with 88.9% (n=482) of all respondents affirming their awareness of such risks (Table 2).

To synthesize these findings, a composite awareness score was generated. Based on this, the majority of participants (89.1%, n=483) were categorized as having 'high awareness' regarding energy drinks and their potential effects. In contrast, 9.1% (n=49) were categorized as having 'moderate awareness' and 1.8% (n=10) as having 'low awareness' (**Figure 2**).

Table 2: Respondent Awareness of Energy Drinks and Their Potential Side Effects (N=542).

Awareness of Energy Drinks Variables	**Frequency (n=542)**	**Percentage (%)**
Are you familiar with what energy drinks are?	504	93.0
Yes	24	4.4
No	14	2.6
Somewhat	**542**	**100.0**
Total		
Are you aware that energy drinks may have potential side effects?	482	88.9
Yes	39	7.2
No	21	3.9
Somewhat	**542**	**100.0**
Total		

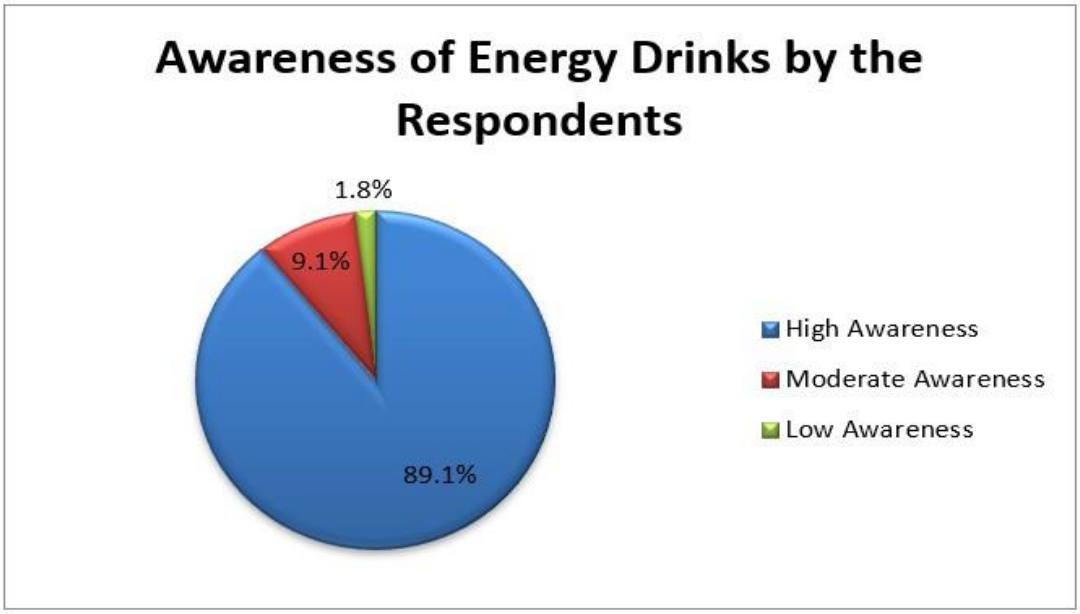

Figure 2: Pie-chart of High/Moderate/Low Awareness percentages

3.3 Consumption Motivations, Patterns, and Dependency Indicators

Analysis of the energy drink consumer cohort (n=286) revealed that consumption is primarily driven by functional and performance-related motives. The leading motivation for use was "to boost energy or

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performance" (61.2%, n=175), a finding consistent with consumption occasions linked to academic or highpressure environments, such as "during stressful situation" (19.2%) and "while studying or working" (18.2%).

Consumption frequency was largely moderate, with a majority of users (68.2%, n=195) consuming fewer than five cans per month. This consumption appears reinforced by high perceived efficacy; a combined 85.7% of users reported that they "partially" (29.4%) or fully "yes" (56.3%) achieve the intended benefits after consumption.

Crucially, and in line with the study's objectives, a substantial subset of consumers reported key indicators of dependency. Despite the moderate consumption frequency, over one-third of users (a combined 37.1%) reported a perceived functional need to consume energy drinks, either "sometimes" (30.8%, n=88) or "always" (6.3%, n=18). This was mirrored by the prevalence of cravings, with a combined 38.5% of consumers experiencing them "Periodically" (30.1%, n=86) or "frequently" (8.4%, n=24). Furthermore, of the consumers who had attempted to reduce their intake (n=107), a notable proportion found it "manageable" (31.1% of all consumers) or "very difficult" (6.3% of all consumers).

These data (detailed in Table 3) characterize a user profile where consumption is motivated by performance demands, reinforced by perceived efficacy, and associated with a significant prevalence of dependency indicators.

Table 3. Energy Drink Consumption Patterns, Motivations, and Dependency Indicators Among Consumers (n=286).

Variable	Response Category	Frequency (n)	Percentage (%)
Brand Consumed	Fearless	116	40.6
	Lucozade Boost	64	22.4
	Predator	42	14.7
	Monster	33	11.5
	Bullet	31	10.8
	Total	**286**	**100.0**
Primary Motivation	To boost energy or performance	175	61.2
	For enjoyment or taste	94 17	32.9
	Habit or social influence	**286**	5.9
	Total		**100.0**
Consumption Occasion	Anytime, no specific occasion	92 55	32.2
	During stressful situation	52	19.2
	While studying or working	46	18.2
	At social gatherings or parties	32	16.1
	During physical exercise or sports	9	11.2
	After physical exertion	**286**	3.1
	Total		**100.0**

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Monthly Frequency	Less than 5 cans	195	68.2
	5–10 cans	59	20.6
	11–20 cans	21	7.3
	More than 20 cans	11	3.8
	Total	**286**	**100.0**
Perceived Efficacy	Yes	161	56.3
	Partially	84	29.4
	Not sure	24	8.4
	No	17	5.9
	Total	**286**	**100.0**
Perceived Need	No, not at all	182	63.6
	Yes, sometimes	88	30.8
	Yes, always	18	6.3
	Total	**286**	**100.0**
Cravings	No, never	176	61.5
	Yes, Periodically	86	30.1
	Yes, frequently	24	8.4
	Total	**286**	**100.0**
Difficulty Quitting	No, I have not tried	179	62.6
	Yes, it was manageable	89	31.1
	Yes, and it was very difficult	18	6.3
	Total	**286**	**100.0**

3.4 Comparative Prevalence of Self-Reported Adverse Effects

To identify potential associations between energy drink consumption and adverse health phenomena, a detailed comparative analysis of symptom prevalence was conducted between consumers (n=286) and non-consumers (n=256). The full frequency distributions for nine separate adverse effects are detailed in Table 4 and 5.

The analysis revealed the unexpected finding that non-consumers reported a statistically significant higher prevalence of several key adverse symptoms. This was most pronounced for headaches, which were reported at least periodically by 47.3% of non-consumers compared to 31.5% of consumers (x^2 test, $p < 0.001$). Similarly, non-consumers reported a significantly higher incidence of rapid heartbeat or palpitations (28.1% vs. 19.2%, $\boldsymbol{x^2}$ test, $p = 0.015$) and **high blood pressure** (12.1% vs. 5.2%, $\boldsymbol{x^2}$ test, $p = 0.004$).

For all other physiological and psychological symptoms measured—including difficulty sleeping, anxiety, fatigue, and irritability—the prevalence rates were comparable between the two groups, with no statistically significant differences observed ($p > 0.05$ for all). For instance, 30.4% of consumers reported experiencing anxiety or nervousness at least periodically, a rate nearly identical to the 30.9% observed in the non-consumer cohort.

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Table 4: Participants' Self-Reported Adverse Effects in Consumers vs. Non-Consumers

Adverse effect	**Energy drink consumers**						**Energy drink non-consumers**					
	Never	Rarely	Periodically	Often	Always	Total	Never	Rarely	Periodically	Often	Always	Total
Difficulty sleeping / Insomnia	107 (37.41%)	97 (33.92%)	37 (12.94%)	31 (10.84%)	14 (4.90%)	286 (100%)	94 (36.72%)	76 (29.69%)	47 (18.36%)	30 (11.72%)	9 (3.52%)	256 (100%)
Headaches	123 (43.01%)	73 (25.52%)	52 (18.18%)	28 (9.79%)	10 (3.50%)	286 (100%)	51 (19.92%)	84 (32.81%)	69 (26.95%)	46 (17.97%)	6 (2.34%)	256 (100%)
Rapid heartbeat / Palpitations	145 (50.70%)	86 (30.07%)	33 (11.54%)	19 (6.64%)	3 (1.05%)	286 (100%)	116 (45.31%)	68 (26.56%)	42 (16.41%)	28 (10.94%)	2 (0.78%)	256 (100%)
Increased thirst	91 (31.82%)	111 (38.81%)	43 (15.03%)	32 (11.19%)	9 (3.15%)	286 (100%)	75 (29.30%)	97 (37.89%)	50 (19.53%)	27 (10.55%)	7 (2.73%)	256 (100%)
High blood pressure	241 (84.27%)	30 (10.49%)	6 (2.10%)	9 (3.15%)	0 (0.00%)	286 (100%)	188 (73.44%)	37 (14.45%)	14 (5.47%)	15 (5.86%)	2 (0.78%)	256 (100%)
Anxiety or nervousness	129 (45.10%)	70 (24.48%)	53 (18.53%)	30 (10.49%)	4 (1.40%)	286 (100%)	108 (42.19%)	69 (26.95%)	49 (19.14%)	20 (7.81%)	10 (3.91%)	256 (100%)
Muscle tremors or cramps	136 (47.55%)	75 (26.22%)	45 (15.73%)	22 (7.69%)	8 (2.80%)	286 (100%)	111 (43.36%)	73 (28.52%)	44 (17.19%)	25 (9.77%)	3 (1.17%)	256 (100%)
Fatigue or energy crashes	125 (43.71%)	72 (25.17%)	60 (20.98%)	23 (8.04%)	6 (2.10%)	286 (100%)	105 (41.02%)	74 (28.91%)	45 (17.58%)	27 (10.55%)	5 (1.95%)	256 (100%)
Feelings of irritability or restlessness	121 (42.31%)	87 (30.42%)	41 (14.34%)	27 (9.44%)	10 (3.50%)	286 (100%)	101 (39.45%)	74 (28.91%)	48 (18.75%)	28 (10.94%)	5 (1.95%)	256 (100%)

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Table 5: Comparative Prevalence of Self-Reported Adverse Effects in Consumers vs. Non-Consumers.

Adverse Effect	Consumers (n=286) reporting 'Periodically,' 'Often,' or 'Always' n (%)	Non-Consumers (n=256) reporting 'Periodically,' 'Often,' or 'Always' n (%)	p-value
Difficulty sleeping / Insomnia	82 (28.67%)	89 (34.77%)	0.1523
Headaches	90 (31.47%)	121 (47.27%)	0.0002*
Rapid heartbeat / Palpitations	55 (19.23%)	72 (28.12%)	0.0147
Increased thirst	84 (29.37%)	84 (32.81%)	0.3870
High blood pressure	15 (5.24%)	31 (12.11%)	0.0042*
Anxiety or nervousness	87 (30.42%)	79 (30.86%)	0.9117
Muscle tremors or cramps	75 (26.22%)	72 (28.12%)	0.6192
Fatigue or energy crashes	89 (31.12%)	77 (30.08%)	0.7930
Feelings of irritability or restlessness	78 (27.27%)	81 (31.64%)	0.2648

* P value ≤ 0.05, hence significant

3.6 Demographic Correlates of Awareness and Consumption Patterns

To identify demographic predictors of awareness and consumption, Pearson Chi-squared (x^2) tests were performed to assess associations between demographic characteristics and the composite 'Awareness Level' and 'Consumption Pattern' scores.

The analysis of awareness (summarized in **Table 5**) identified **Age** as the sole significant demographic predictor. A statistically significant association was found between the participants' age group and their designated awareness level (x^2= 25.091, df = 10, p = 0.005). No significant associations were observed between awareness level and gender, geopolitical origin, employment status, or marital status (p > 0.05 for all).

The analysis of consumption patterns (summarized in **Table 6**) identified **Gender** as the only significant demographic correlate. A statistically significant relationship was found between gender and the 'Good,' 'Fair,' or 'Poor' consumption pattern categories (x^2= 7.779, df = 2, p = 0.020). No other demographic variables showed a significant association with consumption patterns (p > 0.05 for all).

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Table 5: Relationship between socio-demographic and awareness of energy drinks

	Awareness of Energy Drinks			**Total**	x_2	***d.f***	
	High Awareness	**Moderate Awareness**	**Low Awareness**				***pvalue***
Age:	166(30.6%)	25(4.6%)	1(0.2%)	192 (35.4)	25.091	10	0.005*
10-19 Years	232(42.8%)	14(2.6%)	9(1.7%)	255 (47.0%)			
20-29 Years	63(11.6%)	4(0.7%)	0(0.0%)	67 (12.4%)			
30-39 Years	14(2.6%)	2(0.4%)	0(0.0%)	2 (0.4%)			
40-49 Years	7(1.3%)	2(0.4%)	0(0.0%)	16 (3.0%)			
50-59 Years	1(0.2%)	1(0.2%)	0(0.0%)	10 (1.8%)			
60 Years and above **Total**	**483(89.1%)**	**49(9.0%)**	**10(1.8%)**	**542(100.0%)**			
Gender:	312(57.6%)	36(6.6%)	6(1.1%)	354 (65.3%)	1.673	2	0.433
Female	171(31.5%)	13(2.4%)	4(0.7%)	188 (34.7%)			
Male	**483(89.1%)**	**49(9.0%)**	**10(1.8%)**	**542 (100.0%)**			
Total							
Origin:	395(72.9%)	43(7.9%)	10(1.8%)	448 (82.7%)	3.745	8	0.879
South West	23(4.2%)	2(0.4%)	0(0.0%)	25 (4.6%)			
South-South	10(1.8%)	1(0.2%)	0(0.0%)	11 (2.0%)			
South East	0(0.0%)	0(0.0%)	0(0.0%)	0 (0.0%) 6			
North West	6(1.1%)	0(0.0%)	0(0.0%)	(1.1%)			
North East	49(9.0%)	3(0.6%)	0(0.0%)	52 (9.6%)			
North Central	**483(89.1%)**	**49(9.0%)**	**10(1.8%)**	**542 (100.0%)**			
Total							
Employment Status:	94(17.3%)	9(1.7%)	0(0.0%)	103 (19.0%)	6.143	8	0.631
Employed	18(3.3%)	2(0.4%)	1(0.2%)	21 (3.9%)			
Jo Seeker	27(5.0%)	5(0.9%)	0(0.0%)	32(5.9%)			
Self-employed	341(62.9%)	33(6.1%)	9(1.7%)	383 (70.7%)			
Student	3(0.6%)	0(0.0%)	0 (0.0%)	3 (0.6%)			
Retired	**483(89.1%)**	**49(9.0%)**	**10(1.8%)**	**542 (100.0%)**			
Total							
Marital Status:	4(0.7%)	2(0.4%)	0(0.0%)	6 (11.0%)	4.722	4	0.317
Divorced/Widowed	77(14.2%)	8(1.5%)	1(0.2%)	86 (15.9%)			
Married	402(74.2%)	39(7.2%)	9(1.7%)	450 (83.0%)			
Single	**483(89.1%)**	**49(9.0%)**	**10(1.8%)**	**542 (100.0%)**			
Total							

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* P value ≤ 0.05, hence significant

Table 7: Relationship between socio-demographic and consumption patterns of energy drinks

	Respondents' Consumption Patterns			**Total**	***x2***	***d.f***	***pvalue***
	Good Consumption Patterns	**Fair Consumption Patterns**	**Poor Consumption Patterns**				
Age:	46(16.1%)	19(6.6%)	45(15.7%)	110 (38.5)	5.461	8	0.707
10-19 Years	50(17.5%)	26(9.1%)	61(21.3%)	137 (47.9%)			
20-29 Years	10(3.5%)	3(1.0%)	16(5.6%)	29 (10.1%)			
30-39 Years	2(0.7%)	2(0.7%)	2(0.7%)	6 (2.1%)			
40-49 Years	1(0.3%)	0(0.0%)	3(1.0%)	4 (1.4%)			
50-59 Years	**109(38.1%)**	**50(17.5%)**	**127(44.4%)**	**286(100.0%)**			
Total							
Gender:	60(21.0%)	36(13.6%)	76(26.6%)	175 (61.2%)	7.779	2	0.020
Female	49(17.1%)	11(3.8%)	51(17.8%)	111 (38.8%)			
Male	**109(38.1%)**	**50(17.5%)**	**127(44.4%)**	**286(100.0%)**			
Total							
Origin:	96(33.6%)	46(16.1%)	101(35.3%)	243 (85.0%)	10.598	8	0.226
South West	2(0.7%)	3(1.0%)	8(2.8%)	13 (4.5%)			
South-South	2(0.7%)	1(0.3%)	2(0.7%)	5 (1.7%)			
South East	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)			
North West	1(0.3%)	0(0.0%)	3(1.0%)	4 (1.4%)			
North East	8(2.8%)	0(0.0%)	13(4.5%)	21 (7.3%)			
North Central	**109(38.1%)**	**50(17.5%)**	**127(44.4%)**	**286(100.0%)**			
Total							
Employment Status:	15(5.2%)	5(1.7%)	26(9.1%)	46 (16.1%)	11.411	8	0.179
Employed	1(0.3%)	2(0.7%)	7(2.4%)	10 (3.5%)			
Jo Seeker	5(1.7%)	1(0.3%)	5(1.7%)	11(3.8%)			
Self-employed	88(30.8%)	42(14.7%)	87(30.4%)	217 (75.9%)			
Student	0(0.0%)	0(0.0%)	2(0.7%)	2(0.7%)			
Retired	**109(38.1%)**	**50(17.5%)**	**127(44.4%)**	**286(100.0%)**			
Total							

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Marital Status:	0(0.0%)	1(0.3%)	1(0.3%)	2 (0.7%)	4.187	4	0.381
Divorced/Widowed	11(3.8%)	4(1.4%)	19(6.6%)	34 (11.9%)			
Married	98(34.3%)	45(15.7%)	107(37.4%)	250 (87.3%)			
Single	**109(38.1%)**	**50(17.5%)**	**127(44.4%)**	**286(100.0%)**			
Total							

* P value ≤ 0.05, hence significant

DISCUSSION

This study highlights a high prevalence (52.8%) of energy drink use among Nigerian university students, driven mainly by academic and performance-related motives. This observed 52.8% consumption prevalence is substantially similar to, or higher than, average documented rates in university populations across diverse geographical contexts, including Jordan (42.0%-50%) (14,15) and Poland (49%) (16).Within the African context, these findings are particularly salient, as systematic reviews report prevalence rates up to 58% among South African university students (17). This elevated prevalence likely reflects a synergy between the high academic pressure characteristic of Nigerian tertiary institutions (18).

Despite widespread awareness of health risks (88.9%), many users showed dependency indicators such as cravings (38.5%) and perceived functional need (37.1%), suggesting behavioral reinforcement rather than lack of knowledge as the main driver.These patterns align disturbingly well with emerging literature on Caffeine Use Disorder (19). While this study did not employ formal diagnostic criteria, the observed patterns—particularly difficulty reducing consumption despite risk awareness—suggest a meaningful subset may meet criteria for problematic use as conceptualized in DSM-5.

Gender and age were significant predictors of consumption and awareness, respectively, consistent with other reports that younger males are more likely to use energy drinks. Interestingly, non-consumers reported higher rates of headaches, palpitations, and high blood pressure. This counterintuitive finding likely reflects selfselection bias, where individuals with preexisting health concerns avoid energy drinks, rather than a protective effect of consumption. This interpretation is supported by research identifying pre-existing health concerns as a primary reason for non-consumption (20-22). It is also plausible that the consumer and non-consumer groups differ systematically in unmeasured variables, leading to confounding. Baseline stress levels, sleep patterns, or dietary habits (20,22) could be potent confounders, especially given that psychological stress is robustly associated with both headache frequency and cardiovascular symptoms (23).

Overall, the study underscores a gap between awareness and behavior. High knowledge of risks does not appear to stop use,This aligns with established health behavior frameworks, such as the Health Belief Model, which posits that behavior change requires not only risk knowledge but also perceived personal susceptibility, severity, and the absence of significant barriers (24) implying that educational interventions alone may be insufficient. Instead, addressing underlying stress, sleep deprivation, and academic pressure may be more effective in reducing reliance on energy drinks.

Limitations

This study's findings should be interpreted considering several limitations. The cross-sectional design precludes causal inference and cannot rule out reverse causation, particularly relevant to the adverse effects findings. Reliance on self-report introduces potential recall and social desirability biases affecting consumption and symptom reporting. The convenience sample, primarily from South-West Nigeria, limits generalizability. Furthermore, the study did not employ validated dependency scales or control for key confounders like baseline mental health, total caffeine intake, or concurrent substance use, which could influence the observed associations.

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CONCLUSION

Energy drink use is widespread among Nigerian university students and is largely driven by academic and performance pressures rather than ignorance of risks. Although consumption frequency is generally moderate, signs of dependency are present in a notable subset of users. The findings do not establish causal relationships between energy drink use and health outcomes but highlight associations that warrant further exploration.

Implications

Despite limitations, this study offers actionable implications:

1. **Policy:** The high prevalence (52.8%) and awareness-behavior gap (88.9% aware vs. 52.8% consuming) highlight the insufficiency of awareness-only campaigns. Regulatory focus on age restrictions, accurate caffeine labeling for local brands, and marketing controls targeting youth are warranted.

2. **University Interventions:** Given the academic drivers, universities should implement stress management programs, promote healthy fatigue alternatives, and consider regulating on-campus sales/marketing. Screening for problematic ED use may identify students under significant academic distress.

3. **Clinical Practice:** Clinicians serving students should inquire about ED use as a potential indicator of underlying stress, sleep issues, or nascent Caffeine Use Disorder, while interpreting reported symptoms cautiously due to potential self-selection biases.

4. **Future Research:** To strengthen causal inferences, longitudinal studies are essential. Additionally, qualitative investigations should explore the socio-cultural factors driving and impeding behavioral change. Key priorities include analyzing ingredients in local brands and evaluating interventions tailored to the Nigerian setting. Biochemical assays to validate caffeine consumption levels, coupled with histopathological assessments of multi-organ caffeine toxicity in preclinical models featuring diverse local brands, would be highly impactful. These efforts would foster critical synergies between field-based global health research and laboratory-based studies.

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