


Suicidal ideation and attempts among Nigerian undergraduates: Exploring the relationships with depression, hopelessness, perceived burdensomeness, and thwarted belongingness

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Abstract

Objective: The study investigated the prevalence of suicidal behavior and its association with depression, hopelessness, perceived burdensomeness, and thwarted belongingness in a sample of undergraduates in Nigeria.

Introduction: Suicide is a leading cause of death among young adults globally. However, information about suicidal ideation, attempts, and relationships with psychiatric factors, perceived burdensomeness, and thwarted belongingness is sparse in Nigeria. The study investigated the prevalence of suicidal ideation and attempts and associated factors in a sample of undergraduates in Nigeria.

Methods: We collected data from a cross-sectional survey of 625 undergraduate students primarily recruited from universities, colleges of education, and polytechnics in Adamawa Central Senatorial Zone, Adamawa State, northeast Nigeria. The Suicidal Behaviors Questionnaire-Revised, the 15-item Interpersonal Needs Questionnaire, the 9-item Patient Health Questionnaire, and the 20-item version of the Beck Hopelessness Scale were administered to the participants. We used descriptive statistics and binary and multivariate logistic regressions for data analysis.

Results: A total of 616 students with a mean age of 21.41 ± 4.72 years completed the study. The prevalence of suicidal behavior was 34.9% (215/616). Having a female sex (adjusted odds ratio [AOR]=8.37, 95% confidence interval (CI): 2.06, 34.03), depression (AOR=45.15, 95% CI: 0.95, 5.11), hopelessness (AOR=20.10, 95% CI: 5.56, 72.41), and perceived burdensomeness (AOR=89.15, 95% CI: 29.63, 268.30) were associated with suicidal ideation. In addition, being a female (AOR=1.69, 95% CI=1.02, 2.83), being a 200-level student (AOR=3.41, 95% CI=1.46, 7.96), and being a 300-level student (AOR=0.28, 95% CI=0.11, 0.74) were associated with suicidal attempt.

Conclusion: The study's findings show that suicidal behaviors (ideations and attempts) are prevalent among undergraduate students in northeast Nigeria. The findings underline the need for the development of mental health services and early identification and intervention for at-risk young people in Nigeria.

Keywords

Suicidal behavior, suicidal ideation, suicidal attempt, depression, hopelessness, perceived burdensomeness, thwarted belongingness, undergraduate students

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Introduction

Suicide among young adults is a serious public health concern globally. The World Health Organization (WHO) reported that 703,000 people worldwide die by suicide annually.¹ For instance, in 2019, suicide accounted for

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1.3% of all fatalities and was the fourth leading cause of death among individuals aged 15–29.¹ In addition, 77% of global suicides occur in low- and middle-income countries (LMICs), including Nigeria.¹

In Nigeria, available evidence shows that suicide is prevalent among young people. Nigeria has an estimated suicide prevalence of 17.3 per 100,000 in 2016.² The estimated suicide prevalence for Nigeria is higher than the global and African prevalence estimates of 10.5 per 100,000 and 12.0 per 100,000, respectively.² The WHO further reported that in Nigeria, the age-standardized suicide rate for both sexes in 2016 was 17.3 per 100,000, with the rate being 17.5 per 100,000 in males and 17.1 per 100,000 in females.³ In addition, Oladeji et al.⁴ reported that the 12-month prevalence of suicide ideation and attempts among adolescents was between 6.1% and 22.9%, 3.0%, and 12.5%. In contrast, the lifetime rates of suicidal ideation, plan, and attempt were 3.2%, 1.0%, and 0.7%, respectively, for the adult population in Nigeria.

Access to accurate epidemiological data on the prevalence of suicidal behavior and its indicators (ideation, planning, and attempt) among young adults in Nigeria is hampered by several challenges. These include a lack of reliable health information due to the nonexistence of a vital statistics system,^{5,6} poor death registration and criminalization of suicidal behaviors, social stigma, and cultural and religious sentiments.⁷ Also, family members prefer not to disclose the mode of death, reporting suicides as accidental deaths or as homicides at the hospitals or police stations.⁸ In Nigeria, methods of engaging in suicidal behavior among youths include the use of chemicals, self-cutting, burning with kerosene, hanging, and firearms.^{9–11}

Suicidal behavior comprises suicide ideation, plan, attempt, and actual suicide.^{12,13} Suicidal ideation refers to having thoughts of committing suicide. In contrast, a suicide plan refers to the formulation of a specific method through which one intends to die, and a suicide attempt refers to engagement in potentially self-injurious behavior in which there is at least some intent to die, while suicide is the act of intentionally ending one's own life.¹⁰ Suicide ideation has been recognized as the strongest predictor of suicidal behaviors and attempts.^{12–14}

Besides, the literature identifies several risk factors for suicidal ideation and behaviors among young adults. Nock et al.¹³ identified the categories of risk factors for suicidal behaviors to include demographic, psychiatric, psychological, biological factors, and stressful life events. Other risk factors include access to lethal firearms and high doses of illicit substances or drugs.¹³ However, there are emerging risk factors for suicidal behaviors among young adult populations in diverse cultural backgrounds.¹³ Research evidence suggests that the predominant risk factors for suicidal behaviors among Nigerian youths include demographic or personal factors, psychiatric or mental disorders (depression and anxiety), stressful life events (academic stress), family conflict, financial or economic factors (unemployment),

history of childhood adversities, and substance abuse.^{15,16} The WHO reported that Nigeria has the highest number of depression cases in Africa.¹⁷

Furthermore, literature suggests that university or college students are more susceptible to suicidal ideation and behaviors.¹⁸ Higher risk of suicidal ideation and behaviors among this population is due to many developmental and psychosocial changes they experience.¹⁹ The challenges include identity crisis, choosing their careers, perceived nonparental or family support, financial constraints due to exorbitant tuition fees,¹⁹ academic failure, unfulfilled expectations, and poverty.²⁰ Other factors such as depression,¹⁹ hopelessness,²¹ and severed intimate relationships are profound risk factors for suicidal ideation and attempts among university or college students.

Besides the above factors, the interpersonal theory of suicide suggests that perceived burdensomeness (PB), thwarted belongingness (TB), and acquired capability jointly interact to increase the likelihood of fatal self-injury.^{22,23} Van Orden et al.²³ posited that the most lethal form of suicidal craving is caused by the concurrent presence of two interpersonal constructs: TB and PB. The two constructs further reinforced the capability to engage in suicidal behavior (i.e., acquired capability for suicide). Joiner et al.²³ expatiated that suicidal ideation occurs when a person experiences a feeling of being burdened (i.e., I am a burden) from feeling incompetent and feelings of TB because of not being a valuable member of the group (I do not belong). They further affirmed that suicide occurs when these feelings are combined with the acquired capability for suicide, decreased physical pain tolerance, and fearlessness of death. Literature^{23,24} further indicates that low school connectedness and a lack of social support are indicators of TB. However, low self-esteem and feelings of worthlessness are precursors of PB. On this premise, the constructs (i.e., PB and TB) of the interpersonal theory of suicide may provide a valuable theoretical framework for explaining suicidal ideation and behavior among Nigerian youths.^{25,26} Previous studies^{25,27,28} have verified the role of PB and TB in suicidal behaviors in young adults of clinical and nonclinical populations.

The relationship between suicidal ideation, behaviors, mental disorders, and hopelessness among Nigerian youths has been reported in previous studies.²⁹ However, there is a paucity of research examining the prevalence of suicidal ideation and behaviors and their relationship with PB and TB in Nigerian youths. A thorough understanding of the predictors of suicide ideation and attempts in the Nigerian youth population is critical for early suicide prevention. Therefore, the objective of the current study was to investigate the prevalence of suicidal ideation and attempts and examine their relationships with depression, hopelessness, PB, and TB among undergraduates in Adamawa State, northeast Nigeria. We hypothesized that each of these factors would be associated with suicide ideation and attempts among Nigerian undergraduates.

Methods

Study design, setting, and population

This observational study utilized a cross-sectional survey to investigate the outcomes among undergraduate tertiary institutions in Adamawa Central Senatorial Zone, Adamawa State, northeast Nigeria, from July to October 2021. Adamawa Central Senatorial Zone is made up of seven local government Areas. They include Fufore, Girei, Gombi, Hong, Song, Yola North, and Yola South. The zone had seven tertiary institutions at the time of the study. These include Nigerian Law School, Yola; Adamawa State Polytechnic, Yola; College of Legal Studies, Yola; Modibbo Adamawa University, Yola; Adamawa State College of Nursing, Yola; Federal College of Education, Hong; American University of Nigeria, Yola; and College of Education, Hong. The student population for the 2019/2020 academic session was 40,666. The population comprised 22,447 and 18,219 males and females, respectively.³⁰

Sample size and determination procedure

The required sample size was determined using the single population proportion formula.³¹ The assumptions include standard normal distribution ($Z=1.96$), confidence interval 95%, and $\alpha=0.05$, $p=22.9\%$ derived from a systematic review of the literature on suicide and suicidal behavior across the lifespan in Nigeria,⁴ a margin of error (d)=5%. Furthermore, we used a design effect of 2.0 and a nonresponse rate of 15%; the final sample size was 625. The multistage sampling technique was used to select the participants. First, five of the seven Adamawa Central Senatorial Zone tertiary institutions were randomly selected using a simple random sampling technique of balloting without replacement. Next, the proportional allocation was conducted based on the number of participants in each institution. The list of tertiary institutions in the Adamawa Central Senatorial Zone was obtained from the Adamawa State Ministry of Tertiary and Professional Education. The samples were selected from the departments in the selected institutions using convenient sampling. The class representatives assisted with the sample selection.

Participant recruitment and enrollment

The students were recruited via person-to-person interviews and interactions with the course or class representatives. To be eligible for the study, the participants must be institution students and provide written informed consent. Students who were sick or did not provide written informed consent were excluded from the study. After providing written informed consent, the participants completed the questionnaires administered in a conducive classroom environment. The data were collected with the help of research assistants and class representatives with previous experience in survey

data collection procedures. One of the investigators with a Bachelor of Science degree in Health Education supervised the data collection process.

Data quality assurance

We conducted a pretest on 30 participants to ensure the reliability and validity of the questionnaires. Before actual data collection, we conducted a pilot study for cultural appropriateness and cultural relevance, as recommended by Beals et al.³² The pilot study comprised 20 males and 10 females. The students were asked to comment more generally about what issues they experienced while responding to the items in the Suicidal Behaviors Questionnaire-Revised (SBQ-R), the 15-item Interpersonal Needs Questionnaire (INQ-15), and the 9-item version of the Patient Health Questionnaire (PHQ-9), and Beck Hopelessness Scale (BHS). The students reported no issues with the questionnaires. We educated the data collectors on the principles of data collection. The study was conducted in line with the STROBE guidelines.

Procedure. All the participants provided written informed consent before the study. Participants aged 18 years and above (i.e., 18+) provided written informed consent. Also, the legally authorized representatives of minor subjects (i.e., those below the age of 18 years) provided written informed consent before participating in the study.

Ethics approval. Information concerning the purpose of the study, confidentiality, willingness to participate, and the decision to withdraw was provided to all the participants. The permission to conduct the study was obtained from each institution, and the study was approved by the Research Ethics Committee (REC) of the Faculty of Education, University of Nigeria, Nsukka (Reference Number: UNN/FE/REC 22/026). The data collection instruments were administered according to the guidelines stipulated in the Declaration of Helsinki.

Measures

The questionnaire consisted of validated measures of demographic factors (covariates), suicidal ideation, and attempts, as well as measures of PB, TB, depression, and hopelessness.

Demographic characteristics of the participants. The covariate variables included age, gender, academic level, school type, place of residence, and religion. We assessed the demographic characteristics of the participants in a standardized form designed by the investigators. Age was measured as a continuous variable. Nevertheless, age was further categorized into four groups: 15–19 years (1), 20–24 years (2), 25–29 years (3) and 30 years, and above (4); gender (male or female); academic level/year of study for a first-degree program, 100 level or first year (1), 200 level or second year (2),

300 level or third year (3), and 400-level or fourth year (i.e., final year) (4). According to the National Universities Commission, apart from courses offered in the faculties of Law, Engineering and Technology, Medicine, Pharmacy, and Veterinary Medicine, which usually span between 5 and 6 years, other courses offered in many faculties, such as Education and Sciences are 4-year programs. Thus, in this study, the year of study or academic level was categorized into four levels as required by the 4-year first-degree program in Nigeria.³³ The tertiary institutions were composed of public and private institutions. The place of residence was classified into urban and rural areas. Religion was evaluated through responses to the question, “What is your religion?” The possible responses were “Christianity,” “Islam,” and “African Traditional religion.”

Suicidal behavior (suicide ideation and attempt). SBQ-R is a four-item measure designed to assess an individual’s current risk for suicidal behavior based on past suicidal behavior.³⁴ Each item has a different response scale. The first item asks about any past suicidal ideation or attempts, the second item asks about ideation in the past year, the third item asks whether the individual ever told another person about suicidal intent, and the fourth item asks how likely it is that the individual will attempt suicide “someday.” The total score ranges from 3 to 18. Empirical evidence exists to support the use of the SBQ-R in helping to detect suicide risk, using either the total score or the score on the first item. A cutoff score of ≥ 7 is recommended for use in nonclinical samples.³⁴ In addition, Aloba et al.³⁵ evaluated the psychometric characteristics of the SBQ-R in Nigerian University students and recommended a cutoff score of 8 with optimal scores of 0.882 and 0.875 for sensitivity and specificity, respectively, and the highest accuracy value of 0.879 for identifying the students at high risk of suicide. We used a cutoff score ≥ 8 to identify students with suicide ideation and attempts in this study. Also, the SBQ-R yielded Cronbach’s alpha coefficient of 0.92 in this study (See Additional File 1).

PB and TB. The 15-item version of the Interpersonal Needs Questionnaire (INQ) is a self-report scale developed by Van Orden et al.²³ The INQ-15 is a self-report measure of PB and TB. The first six items of the INQ-15 measure PB (e.g., “These days I think I am a burden on society”), and the last nine items measure TB (e.g., “These days I feel disconnected from other people”). The PB scores range from 6 to 42, while TB scores range from 9 to 63. The opposite items are reverse coded, and items are added to calculate the TB and PB subscale scores, with higher scores showing greater TB and PB. Participants were asked to indicate how true each item had recently become for them. A seven-point Likert scale was used, ranging from “not true for me at all” to “very true for me.” Six items on the TB scale were reverse scored, and total scores were coded, with higher scores reflecting greater PB or thwarted belonging.

Regarding the cutoff scores on the INQ-15, a previous study³⁶ recommended cutoff scores of 22 and 31 for PB and TB, respectively. The cutoff scores ensure optimal sensitivity and specificity of the INQ to detect some level of desire for suicide. The INQ-15 has been shown to predict suicidal ideation.³⁷ Previous studies^{38,39} reported that the subscales of INQ-15 have shown good internal consistency, with Cronbach’s alpha values ranging from 0.85 to 0.90 for PB and 0.81 to 0.87 for TB. In this study, the internal consistency reliability value for INQ-15 was 0.71. Also, Cronbach’s alpha values of 0.89 and 0.50 were obtained for the PB and TB subscales, respectively (See Additional Files 2–4).

Depression. The PHQ-9 is an effective screening as well as a monitoring tool assessing the severity of depressive symptoms.^{40,41} The PHQ-9 asks how often respondents have been bothered by problems in the last 2 weeks. Each item of PHQ-9 is scored on a four-point Likert-type scale of 0–3 (0=not at all; 1=several days; 2=more than a week; 3=nearly every day). The PHQ-9 total score ranges from 0 to 27. The depression severity scores range from normal to severe. The PHQ-9 scores of 5–9 are classified as mild depression, 10–14 as moderate depression, 15–19 as moderately severe depression, and scores ≥ 20 as severe depression. Also, 5, 10, 15, and 20 scores represent cutoff points for mild, moderate, moderately severe, and severe depression, respectively. A cutoff score of 10, which had a sensitivity of 88% and a specificity of 88%, is suggested for a possible diagnosis of depressive disorder. A Nigerian study has validated and established the psychometric properties of the PHQ-9 among university students.⁴² The cutoff score of 10 was recommended for major depressive disorder (MDD) with a sensitivity of 84.6% and a specificity of 99.4%. In addition, a positive predictive value of 0.750, negative predictive value of 0.996, and overall correct classification (OCC) rate of 0.992 were reported for the PHQ-9 among Nigerian university students. The cutoff score 10 was used to detect possible MDD in this study. The Cronbach’s alpha value of 0.99 was obtained for the PHQ-9 in the present study. The respondents were asked to place a tick (\checkmark) against the option(s) that best describes their depressive symptoms in the past 2 weeks (See Additional File 5).

Hopelessness. The 20-item version of the BHS developed by Beck et al.⁴³ was used to measure hopelessness. The BHS consists of 20 true–false items assessing an individual’s negative expectations about the future. Possible scores range from 0 to 20, with higher scores indicating greater levels of hopelessness. The BHS scale is also helpful in predicting suicide.⁴⁴ The BHS has shown excellent internal consistency reliability and construct validity with college students.⁴⁵ The psychometric properties of the BHS have been established in prior Nigerian studies.^{46,47} A study reported Cronbach’s alpha value of 0.72 for the BHS scale.⁴⁶ Another study conducted among Nigerian university students reported Cronbach’s alpha reliability coefficient value of 0.87 for a 16-item adapted version of the BHS scale. A BHS score of ≥ 9 has been recommended for those

classified as a high suicide risk group in outpatients.⁴⁸ In the present study, the BHS had a satisfactory internal consistency ($\alpha=0.55$) (See Additional File 6).

Statistical analysis

We used prorated mean scale scores since the rate of missing values was very low. The prorated mean scale scores were calculated by averaging the presented items.^{49,50} We defined a complete case as having at least 60% scale scores.⁴⁹ The ratio of complete cases was calculated as the ratio of the number of complete cases to the number of total cases. The ratio of complete cases was 98.6%. Consequently, the ratio of incomplete cases was 1.4%, which is less than 5%. Furthermore, we used the Kolmogorov–Smirnov normality test to examine whether sample data were drawn from a normally distributed population.^{50,51} The normality test indicated a significant Gaussian distribution. For the study variables-suicide ideation (skewness=-0.12; kurtosis=1.25) and suicide attempt (skewness=-0.57; kurtosis=0.94) showed evidence of normal distribution. The values are within the normal range of +2 to -2. Descriptive statistics of participants' characteristics are presented as means and standard deviations (SD) for continuous variables and as counts and percentages for categorical variables. Moreover, the Chi-squared test was used to compare the variables based on the SBQ-R, PHQ-9, BHS-20, and INQ-15 cutoff points. Unadjusted and adjusted logistic regression analyses were used to estimate associated factors of suicidal behavior (ideation and attempt). Pearson's r was used to assess the relationships between the scores on the study variables. The multivariable logistic regression model was adjusted for sociodemographic variables, depression, hopelessness, PB, and TB. Crude odds ratios (CORs) and adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated to determine factors that are independently associated with suicidal behavior in the sample. We checked model fitness with a Hosmer–Lemeshow test.⁵² Additionally, we estimated Nagelkerke's R^2 values to evaluate the proportion of variation in suicidal ideation or attempt that was explained by the predictive variables. Also, multicollinearity among variables was examined using the variance inflation factor (VIF). A variable with $VIF > 5$ indicates a potential collinearity of that variable with other variables in the model. Binary logistic regression models were computed for each predictor variable (model 1). Subsequently, we only included variables that were significant at $p < 0.05$ in the multivariable models (model 2) to avoid overfitting.⁵³ Statistical analyses were performed using the SPSS version 25.0 software (IBM Co., Armonk, NY, USA). Statistical significance was set at $p < 0.05$.

Results

Participants' characteristics

Of the 625 participants enrolled in the study, 616 responded, giving a response rate of 95.8% (mean age 21.41 ± 4.72 years).

Table 1. Sociodemographic characteristics of the participants (N=616).

Characteristics	Mean (SD)/n (%)
Age (years)	21.41 (4.72)
15–19 years	267 (43.3)
20–24 years	109 (17.7)
25–29 years	219 (35.6)
30 years and above	21 (3.4)
Gender	
Male	411 (66.7)
Female	205 (33.3)
Academic level	
100 level	269 (43.7)
200 level	192 (31.2)
300 level	126 (20.5)
400 level	29 (4.7)
Place of residence	
Rural	78 (12.7)
Urban	538 (87.3)
Religion	
Christianity	310 (50.3)
Islam	291 (47.2)
Traditional religion	15 (2.4)

The sample comprised 616 undergraduate students, of whom 411 (66.7%) and 205 (33.3%) were males and females, respectively. The most frequent age group of the sample was 15–19 years (43.3%). Most participants were 100-level students (43.7%) and resided in urban areas (87.3%). Also, half of the participants were Christians (50.3%). Additional demographic information is presented in Table 1.

Prevalence of suicide behavior (suicide ideation and attempt), depression, hopelessness, PB, and TB

For all the samples, the prevalence of suicidal behavior (SB) was 34.9% (215/616). Also, the prevalence of 27.3% (186/616), 54.2% (334/616), 35.1% (216/616), and 69.2% (426/616), respectively, were reported for depression, hopelessness, PB, and TB in our sample (Table 2). In addition, the results of the bivariate analyses are presented in Table 2. The Pearson Chi-square test statistic for suicidal behavior and predictor variables was significant ($p < 0.001$). There were statistically significant associations between the prevalence of SB among participants and age ($\chi^2 (3)=185.469$, $p < 0.0001$), gender ($\chi^2 (1)=16.217$, $p < 0.0001$), academic level ($\chi^2 (3)=215.037$, $p < 0.0001$), and place of residence ($\chi^2 (1)=14.974$, $p < 0.0001$). However, there was no statistically significant association between the prevalence of SB and religion ($\chi^2 (2)=2.342$, $p=0.310$). Other results on the prevalence of suicidal behavior, depression, hopelessness, PB, TB, and bivariate associations are contained in Table 2.

Table 2. Prevalence of SB, depression, hopelessness, PB, and TB by participants' characteristics, Adamawa State, Nigeria.

Participant's characteristics	n (%)	Prevalence of SB	Prevalence of MDD	Prevalence of HPL	Prevalence of PB	Prevalence of TB
		SBQ-R \geq 8	PHQ-9 \geq 10	BHS-20 \geq 9	INQ-15 \geq 22	INQ-15 \geq 31
		n (%)	n (%)	n (%)	n (%)	n (%)
All sample		215 (34.9)	168 (27.3)	334 (54.2)	216 (35.1)	426 (69.2)
Age (years)						
15–19 years	267 (43.3)	14 (5.2)	17 (6.4)	95 (35.6)	15 (5.6)	219 (82.0)
20–24 years	109 (17.7)	60 (55.0)	12 (11.0)	81 (74.3)	57 (52.3)	93 (85.3)
25–29 years	219 (35.6)	132 (60.3)	130 (59.4)	152 (69.4)	135 (61.6)	93 (42.5)
30 years and above	21 (3.4)	9 (42.9)	9 (42.9)	6 (28.6)	9 (42.9)	21 (100.0)
χ^2		185.469***	189.624***	81.012***	184.397***	116.580***
Sex						
Male	411 (66.7)	121 (29.4)	70 (17.0)	186 (45.3)	119 (29.0)	327 (79.6)
Female	205 (33.3)	94 (45.9)	98 (47.8)	148 (72.2)	97 (47.3)	99 (48.3)
χ^2		16.217***	65.303***	39.991***	20.256***	62.698***
Academic level						
100 level	269 (43.7)	20 (7.4)	20 (7.4)	85 (31.6)	21 (7.8)	222 (82.5)
200 level	192 (31.2)	141 (73.4)	94 (49.0)	164 (85.4)	141 (73.4)	99 (51.6)
300 level	126 (20.5)	45 (35.7)	42 (33.3)	70 (55.6)	45 (35.7)	82 (65.1)
400 level	29 (4.7)	9 (31.0)	12 (41.4)	15 (51.7)	9 (31.0)	23 (79.3)
χ^2		215.037***	104.136***	130.902***	212.173***	52.794***
Place residence						
Urban	78 (12.7)	203 (37.7)	165 (30.7)	282 (52.4)	207 (38.5)	379 (70.4)
Rural	538 (87.3)	12 (15.4)	3 (3.8)	52 (66.7)	9 (11.5)	47 (60.3)
χ^2		14.974***	24.711**	5.573*	21.710***	3.316
Religion						
Christianity	310 (50.3)	104 (33.5)	90 (29.0)	195 (62.9)	102 (32.9)	188 (60.6)
Islam	291 (47.2)	108 (37.1)	75 (25.8)	137 (47.1)	111 (38.1)	226 (77.7)
ATR	15 (2.4)	3 (20.0)	3 (20.0)	2 (13.3)	3 (20.0)	12 (80.0)
χ^2		2.342	1.214	25.497***	3.343	21.227***

SB, suicide behavior; SBQ-R, Suicide Behaviors Questionnaire-Revised; MDD, major depressive disorder; PHQ-9, nine-item version of the Patient Health Questionnaire; INQ-15, 15-item version of the Interpersonal Needs Questionnaire; HPL, hopelessness; PB, perceived burdensomeness; TB, thwarted belongingness; ATR, African traditional religion.

* $p < 0.05$; ** $p < 0.001$; *** $p < 0.0001$

Relationship among study variables

The total mean SBQ-R score was 6.54 ± 5.05 . Pearson correlation analysis showed that the mean suicidal behavior (SBQ-R) score was positively correlated with depression ($r = 0.896$; $p < 0.001$) and hopelessness ($r = 0.308$, $p < 0.001$) and positively associated with INQ-15 total score ($r = 0.487$, $p < 0.001$) and PB ($r = 0.829$, $p < 0.001$). However, suicidal behavior (ideation and attempt) was inversely associated with thwarted belongingness ($r = -0.268$, $p < 0.001$). The total mean INQ-15 score was 46.6 ± 15.76 . Similarly, the mean scores of 16.17 (SD=9.41) and 34.93 (SD=7.53) were obtained for PB and TB, respectively. The mean score for TB suggests that the students experienced more thwarted belongingness. Other correlation coefficient values are presented in Table 3.

Factors associated with suicidal ideation among undergraduate students

Table 4 presents the findings of the unadjusted model of the binary regression analyses. The statistically significant predictive factors for suicidal ideation among the students were being aged 20–24 years (OR=18.01, 95% CI=9.69, 33.46, $p < 0.001$), 25–29 years (OR=23.63, 95% CI=13.48, 41.45, $p < 0.001$), ≥ 30 years (OR=11.03, 95% CI=4.08, 29.81, $p < 0.001$), being a female sex (OR=1.89, 95% CI=1.34, 2.68, $p < 0.001$), being a 200 level student (OR=0.24, 95% CI=0.10, 0.58, $p = 0.001$), being a 300 level student (OR=6.14, 95% CI=2.63, 14.37, $p < 0.001$), and having a rural residence (OR=0.29, 95% CI=0.15, 0.54, $p < 0.001$). Other statistically significant risk factors for suicidal ideation were depression (OR=57.00, 95% CI=31.61, 102.8, $p < 0.001$), hopelessness (OR=34.16, 95% CI=18.77,

Table 3. Descriptive statistics and intercorrelations among key study variables.

Variables	M	SD	1	2	3	4	5	6	7	8
SBQ-R total score	6.54	5.05	—							
Suicide ideation	3.78	2.74	0.982**	—						
Suicide attempt	2.76	2.42	0.977**	0.920**	—					
Depression	7.49	9.51	0.896**	0.897**	0.855**	—				
Hopelessness	11.05	2.37	0.308**	0.243**	0.369**	0.360**	—			
INQ-15 total score	51.10	11.89	0.487**	0.489**	0.463**	0.547**	0.206**	—		
INQ perceived burdensomeness	16.17	9.41	0.829**	0.822**	0.802**	0.839**	0.294**	0.774**	—	
INQ thwarted belongingness	34.93	7.53	-0.268**	-0.255**	-0.271**	-0.185**	-0.043	.612**	-0.027	—

M, mean; SD, standard deviation; SBQ-R, Suicide Behavior Questionnaire-Revised score; PHQ-9, Patient Health Questionnaire score; BHS, beck hopelessness scale score; INQ-15, 15-item version of the Interpersonal Needs Questionnaire score.

**Correlation is significant at the 0.01 level.

62.18, $p < 0.001$), PB (OR=383.00, 95% CI=179.40, 817.50, $p < 0.001$), and TB (OR=0.15, 95% CI=0.10, 0.22, $p < 0.001$).

Moreover, in the multivariable model, the results showed that the participants aged 20–24 years (AOR=0.01; 95% CI: 0.00, 0.26) and those aged 25–29 years (AOR=0.05; 95% CI: 0.00, 1.25), respectively, were 0.01 times and 0.05 times less likely than the participants aged 15–19 years to experience suicidal ideation. Also, the risk of having suicidal ideation was 8.37 times (AOR=8.37; 95% CI: 2.06, 34.03) higher among female students than male students. In addition, the odds of experiencing suicidal ideation were 45.15 times (AOR=45.15; 95% CI: 0.95, 5.11), 20.10 times (AOR=20.10; 95% CI: 5.56, 72.41), and 89.15 times (AOR=89.15; 95% CI: 29.63, 268.30) higher among students who were depressed, hopeless, and experienced PB than the students without these outcomes. In contrast, TB was not significantly associated with suicidal ideation among the students (AOR=0.89; 95% CI: 0.27, 2.88) (Table 4).

Factors associated with suicidal attempt among undergraduate students

Table 4 further presents the findings of the unadjusted model for binary logistic regression analyses. The statistically significant predictive factors for suicidal attempt among the students were being aged 20–24 years (OR=31.17, 95% CI: 16.04, 60.57, $p < 0.001$), 25–29 years (OR=29.04, 95% CI: 15.89, 53.09, $p < 0.001$), ≥ 30 years (OR=13.55, 95% CI: 4.89, 37.52, $p < 0.001$), being female sex (OR=1.94, 95% CI: 1.38, 2.74, $p < 0.001$), being a 200 level student (OR=30.53, 95% CI: 18.07, 51.58, $p < 0.001$), being a 300 level student (OR=5.19, 95% CI: 3.01, 8.95, $p < 0.001$), being a 400 level student (OR=4.12, 95% CI: 1.74, 10.19, $p = 0.001$), and having a rural residence (OR=0.37, 95% CI: 0.20, 0.66, $p = 0.001$). Other statistically significant risk factors for suicidal attempt were being depressed (OR=40.15, 95% CI: 23.23, 69.39, $p < 0.001$), being hopeless (OR=36.90, 95% CI: 20.26, 67.22, $p < 0.001$), having PB

(OR=437.00, 95% CI: 195.4, 977.2, $p < 0.001$), and TB (OR=0.13, 95% CI: 0.09, 0.19, $p < 0.001$).

The results of the multivariable logistic regression model showed that the risk of being a victim of a suicidal attempt is significantly associated with being aged 20–24 years (AOR=24.73, 95% CI: 10.72, 60.57, $p < 0.001$), 25–29 years (AOR=39.08, 95% CI: 15.26, 100.10, $p < 0.001$), ≥ 30 years (AOR=26.13, 95% CI: 6.16, 110.73, $p < 0.001$), being female sex (AOR=1.69, 95% CI: 1.02, 2.83, $p = 0.043$), being a 200 level student (AOR=3.41, 95% CI: 1.46, 7.96, $p = 0.043$), and being a 300 level student (AOR=0.28, 95% CI: 0.11, 0.74, $p = 0.010$). Furthermore, the odds of experiencing a suicidal attempt were 21.34 times (AOR=21.34; 95% CI: 6.93, 65.74, $p < 0.001$), and 325.50 times (AOR=325.50; 95% CI: 104.5, 1014.13, $p < 0.001$) higher among students who were depressed and perceived themselves hopeless than those without the outcomes. Contrarily, students with TB were 0.18 times (AOR=0.18; 95% CI: 0.07, 0.44, $p < 0.001$) less likely to experience suicidal ideation than those without TB.

Discussion

Suicide is a leading cause of death among adolescents and young adults. However, only a limited number of studies have focused on young people in Nigerian higher education settings. This study provides ample evidence on the prevalence of suicidal behavior (suicidal ideation and attempt) and the relationship with depression, hopelessness, PB, and TB. It is essential to identify factors associated with a higher risk of suicidal behavior among young people in Nigeria. Besides the profound risk factors (i.e., depression and hopelessness) for suicidal ideation and attempt among youths, we evaluated whether PB and TB constructs of the interpersonal theory of suicide as a framework were associated with suicidal ideation and attempt among students in public tertiary institutions in Adamawa State, Northeast Nigeria. The study findings could enable the recommendation of context-specific suicide behavior prevention strategies in Nigeria.

Table 4. Relationship between suicide behavior, demographic characteristics, depression, hopelessness, perceived burdensomeness, and thwarted belongingness in students Adamawa State, Nigeria.

Variables	Suicidal ideation		Suicidal attempt		p
	COR (95% CI)	p	COR (95% CI)	p	
Age					
15–19 years (ref)	1				
20–24 years	18.01 (9.69, 33.46)	<0.001	31.17 (16.04, 60.57)	<0.001	24.73 (10.72, 57.00)
25–29 years	23.63 (13.48, 41.45)	<0.001	29.04 (15.89, 53.09)	<0.001	39.08 (15.26, 100.1)
≥30 years	11.03 (4.08, 29.81)	<0.001	13.55 (4.89, 37.52)	<0.001	26.13 (6.16, 110.73)
Sex					
Male (ref)	1				
Female	1.89 (1.34, 2.68)	<0.001	1.94 (1.38, 2.74)	<0.001	1.69 (1.02, 2.83)
Academic level					
100 level (ref)	1				
200 level	0.24 (0.10, 0.58)	0.001	30.53 (18.07, 51.58)	<0.001	3.41 (1.46, 7.96)
300 level	6.14 (2.63, 14.37)	<0.001	5.19 (3.01, 8.95)	<0.001	0.28 (0.11, 0.74)
400 level	1.24 (0.52, 2.94)	0.634	4.21 (1.74, 10.19)	0.001	0.44 (0.12, 1.68)
Place of resid.					
Urban (ref)	1				
Rural	0.29 (0.15, 0.54)	<0.001	0.37 (0.20, 0.66)	0.001	1.28 (0.49, 3.30)
Religion					
Christianity (ref)	1				
Islam	1.17 (0.84, 1.63)	0.355	1.08 (0.77, 1.50)	0.668	—
ATR	0.47 (0.13, 1.72)	0.256	0.44 (0.12, 1.58)	0.206	—
Depression					
No (PHQ-9 < 10)	1				
Yes (PHQ-9 ≥ 10)	57.00 (31.61, 102.8)	<0.001	40.15 (23.23, 69.39)	<0.001	1.49 (0.49, 4.56)
Hopelessness					
No (BHS-20 < 9)	1				
Yes (BHS-20 ≥ 9)	34.16 (18.77, 62.18)	<0.001	36.90 (20.26, 67.22)	<0.001	21.34 (6.93, 65.74)
PB					
No (INQ-15 < 22)	1				
Yes (INQ-15 ≥ 22)	383.0 (179.4, 817.5)	<0.001	437.0 (195.4, 977.2)	<0.001	325.5 (104.5, 1014.13)
TB					
No (INQ-15 < 31)	1				
Yes (INQ-15 ≥ 31)	0.15 (0.10, 0.22)	<0.001	0.13 (0.09, 0.19)	<0.001	0.18 (0.07, 0.44)
Nagelkerke's R ²					0.922

Note: Yes implies SBO-R score ≥ 8; No implies SBO-R score < 8; ATR, African traditional religion; No is the reference category for depression, hopelessness; perceived belongingness (PB), and thwarted belongingness (TB); AOR, adjusted odds ratio; 95% CI, 95% confidence intervals for each COR and AOR; ref, reference category; Hosmer and Lemeshow test, p -value = 0.161; Nagelkerke's R²; Nagelkerke's R Squared.

** $p < 0.001$; * $p < 0.05$.

The main study findings are valuable for further discussion. In this study, the prevalence of suicidal behavior was 34.9%. The prevalence of suicidal behavior (suicide ideation and attempt) is higher than that reported in prior Nigerian studies.^{4,5} The disparities in the prevalence rates of suicidal behavior as reported in this study and those reported in previous studies, including Nigerian studies, could be attributed to the meaning of suicidal ideation and attempt, prevailing cultural and religious factors, and economic situations. Furthermore, contextual factors have been indicated to considerably influence the evaluation of the risks and protective factors for suicidality.⁵⁴ The reported prevalence of 34.9% in this study was higher than the 12-month prevalence of 6.1%–22.9% and 3%–12.5% for suicide ideation and attempts, respectively, among adolescents, and lifetime prevalence rates of 3.2% and 0.7%, respectively, for suicidal ideation and attempt in the adult population. The increase in the prevalence of suicidal behavior could also be attributed to the prevailing economic situations in the country and young people's prolonged exposure to sectarian violence by religious extremists, including the Boko Haram sect in northeast Nigeria.⁵⁵ Additionally, literature shows that compared to adults, many young people engage in suicidal behavior without prior suicidal ideation or both suicidal ideation and plans due to adolescent impulsivity. Hence, impulsivity can explain the higher prevalence of suicidal behavior reported in this study.⁵⁶

The prevalence of 27.3%, 54.2%, 35.1%, and 69.2%, respectively, were reported for depression, hopelessness, PB, and TB in our sample. The prevalence of depression among our sample was within the range reported in previous studies. For instance, the prevalence of depression among university students ranges between 8.3% in 2006,⁵⁷ and 71.8% in 2022.⁵⁸ The disparity between the reported prevalence of depression in 2006, 2022, and the current study could be due to current multiple public health and economic challenges facing Nigeria, such as the COVID-19 pandemic, health and social workers' burnout, communal violence, high inflation rates, unemployment, and insecurity.⁵⁹ These situations may be implicated in the continual deterioration of young people's mental health in Nigeria.

Furthermore, there is a paucity of data on the prevalence of hopelessness, PB, and TB among Nigerian youth. Thus, there is no evidence to compare this study's findings in the Nigerian context. The current findings on the prevalence of hopelessness, PB, and TB among Nigerian youth may provide a basis for the design and effective implementation of school-based mental health-promoting programs that improve protective factors for young people's mental well-being such as good social support, self-esteem, and healthy and positive relationships.

The bivariate and multivariable logistic regressions showed that the significant predictors of suicidal ideation and attempt among the undergraduate students included age, being a female, being a 200-level or 300-level student,

having a rural residence, depression, hopelessness, and PB. Consistent with other studies,^{4,13,15} our findings showed that younger persons were more likely to have suicidal ideation and attempts than older persons. This finding is understandable since older people are more resilient to stressful situations, mature emotionally, and likely to handle life and academic challenges better than younger people. Many younger people, especially those in their first year in university or college, are still experiencing biological, social, and emotional development; thus, they may find it more difficult to handle stressful situations, frustration, and academic challenges effectively. This may lead to depression and subsequently, suicidal ideation.^{20,60}

The study's findings indicated that compared to males, females were more likely to have suicidal ideation and attempts. This finding is consistent with previous studies.^{5,13,60} Literature evidence shows that women are more likely to experience suicidal behavior than men.⁶¹ For instance, a previous study reported that in LMICs, females are more prone to suicidal behavior than males, notably because of rigid gender norms and discrimination.⁶² Petroni et al.⁶² further averred that although rigid gender norms and discrimination such as unequal chore burdens, caretaking responsibilities, sexual abuse, exploitation, and exclusion from education, employment, and decision-making have negative effects on both males and females, the impacts are much more pronounced on females, restricting their opportunities and aspirations. Petroni et al.'s⁶² observations accurately portray the challenges women, especially young women, face in Nigeria. Young women in Nigeria are vulnerable to sexual abuse and exploitation, gender-based violence, and exclusion from employment opportunities. Hence, young women, more than young men, may experience the impact of deteriorating economic situations and insecurity in Nigeria. Therefore, the likelihood of committing or attempting suicide is higher among young women than men.

In both the binary and multivariable regression models, depression, hopelessness, and PB were significantly associated with suicidal behavior (suicidal ideation and attempt) among undergraduate students. Research evidence has demonstrated that depression, hopelessness, and PB are significant risk factors for suicidal behaviors.^{14,15,19,21,24,27,29,48,57,60}

In contrast, our findings show that TB was not significantly associated with suicidal ideation among students. The inverse association between TB and suicidal behavior in our study negates the proposition of the interpersonal theory of suicide regarding the role of TB in suicide occurrence. Nevertheless, the finding is consistent with a previous study.⁶³ Therefore, the findings suggest that TB, a fundamental construct of the interpersonal theory of suicide, does not predict suicidal ideation and attempts in our sample. While the interpersonal theory of suicide does not posit that PB or TB influence suicidal behavior differently, it may be of some significance, from both theoretical and practical perspectives, that PB may be a stronger predictor of suicide behavior

than TB. Also, it is reasonable to infer that TB is not common among undergraduate students of tertiary institutions,⁶¹ including those in Nigeria, compared to PB. Thus, longitudinal studies that further explore the association between TB and suicidal behavior among young people in LMICs, including Nigeria, are needed. Such studies may contribute to the growing body of research testing the relationships between constructs of the interpersonal theory of suicide and suicidal behaviors among youth in developing nations. Furthermore, our findings suggest that public health experts should focus more on developing suicide intervention programs that mitigate PB among students in tertiary institutions in Nigeria.

Strength and limitations

This study has provided noteworthy findings on the prevalence of suicide behaviors (ideation and attempt) and association with depression, hopelessness, PB, and TB in Nigerian undergraduate students. The present study, to the best of the researchers' knowledge, is one of the notable attempts made to evaluate suicidal behavior in a large sample of undergraduate students in northeast Nigeria. The relatively large sample size increases the generalizability of the findings to students of tertiary institutions in Nigeria. However, there are some limitations. The reported prevalence of suicidal behavior might not be a true reflection of the magnitude of suicidal behavior among undergraduate students in Nigeria. This situation may be attributed to students' reluctance to provide information on their suicidal behaviors since suicide is considered a taboo or curse in many communities based on religious and cultural beliefs. In addition, causal inferences cannot be made from data derived from cross-sectional studies. However, the direction and strength of associations provide researchers with profound insights into the current state of suicidal behavior in Nigerian youth. Also, caution should be taken in generalizing findings to other populations. We also used self-reported questionnaires, which could introduce recall and response bias. For instance, the participants could underestimate or overestimate some information since suicidal behavior was reported retrospectively. Also, it would have been helpful to have examined suicidal behavior with a clinical interview schedule. However, scarce resources and the relatively large sample size made this approach infeasible. To address these limitations, the researchers underwent extensive training to standardize the participants' instructions during the interview process. Also, we used well-validated instruments for data collection. Future studies should consider replicating our findings using a larger sample size and a longitudinal design.

Conclusions

The study's findings show that suicidal behaviors (ideations and attempts) are prevalent among higher education students

in Adamawa Central senatorial zone, northeast Nigeria. The findings also show that age, having a female sex, depression, hopelessness, and PB are significant predictors of suicidal ideation and attempts among undergraduate students in northeast Nigeria. These findings underline the need to develop mental health services for undergraduate students in Nigeria. Early identification and intervention for at-risk students, for example, those experiencing different forms of physical, sexual, and emotional abuse, substance use, and failed relationships, can reduce the prevalence of suicidal behaviors among this population. Our findings also underline the need to develop and implement suicide prevention programs as an integral part of academic programs in tertiary institutions in Nigeria.

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Authors' contributions

OSA and NIL conceived the idea, wrote the proposal, and participated in data collection, analysis, write-up, and manuscript revision. CCI and CNI revised subsequent drafts of the article. OSA, NIL, and LEO were involved in data collection, analysis, and final review of the manuscript. All authors read and approved the manuscript to be considered for publication.

Availability of data and materials

The dataset(s) supporting the conclusions of this article is (are) included within the article (and its additional file(s)).

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Ethics approval

Ethical approval for this study was obtained from the Research Ethics Committee (REC) of the Faculty of Education, University of Nigeria, Nsukka (Reference Number: UNN/FE/REC 22/026).

Informed consent

Written informed consent was obtained from all subjects before the study. Participants aged 18 years and above (i.e., 18+) provided written informed consent. Also, the legally authorized representatives of minor subjects (i.e., those below the age of 18 years) provided written informed consent before participating in the study.

Trial registration

Not applicable.

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Supplemental material

Supplemental material for this article is available online.

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