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# Conceptualising the correlates of adolescent suicidal behaviour in Benin: evidence from a national survey

Jacob Owusu Sarfo<sup>1\*</sup>, Timothy Pritchard Debrah<sup>2</sup>, Newton Isaac Gbordzoe<sup>3,4</sup>, Dean Kormla Attigah<sup>3,5</sup>, Paul Obeng<sup>1</sup> and Cyril Sewornu Torsu<sup>6</sup>

## Abstract

**Background** Despite efforts to increase awareness about suicide, related behaviours among adolescents in Benin persist as a significant health challenge globally. Nonetheless, there is a dearth of empirical evidence that conceptualises suicidal behaviour and its correlates to provide a better picture for preventive interventions. We analysed a national survey dataset of school-going Benin adolescents, with an analytical sample of 2,536.

**Results** The prevalence of suicidal ideation, plan, and attempt were 14.8%, 16.3%, and 15.3%, respectively. The likelihood of ideating suicide increased among adolescents who engaged in marijuana usage, encountered bullying, felt lonely, and experienced anxiety. Additionally, the likelihood of planning suicide was high among individuals who skipped school, used marijuana, encountered bullying, felt lonely, experienced anxiety, and engaged in multiple sexual relationships. Similarly, the likelihood of attempting suicide was increased among adolescents in grades 3-6 who skipped school, used marijuana, encountered bullying, and felt lonely. Nonetheless, being a male was protective against suicidal ideation and suicidal plans, while younger age was protective against suicidal attempts. Also, having parents who respected adolescents' autonomy and privacy (never inspected their things without their knowledge) had lower odds of suicidal ideation.

**Conclusion** Suicide prevention programmes must consider multidimensional protective and risk factors concerning adolescents' personal, parental, family, and community settings in Benin.

**Keywords** Adolescents, Suicidal behaviours, Prevalence, Protective factors, Risk factors, Benin

## Introduction

Suicide remains dominant in the research and public health space. The global suicide rates have seen an approximately 36% rise over the last 11 years [4]. The World Health Organization (WHO) estimates revealed that suicide accounts for 700,000 fatalities yearly [26]. Additionally, suicide rates ranked among the top nine causes of mortality for those between ages 10 and 64 in 2021 [3]. Within the same year, it ranked second for the 10-14 and 20-34 age groups globally. Besides, beyond these figures, there were significant cases of suicide ideation (SI) (12.3 million), suicide plan (SP) (3.5 million), and suicide attempts (SA) (1.7 million) [3]. In Africa,

\*Correspondence:

Jacob Owusu Sarfo  
jacob.sarfo@ucc.edu.gh

<sup>1</sup> Department of Health, Physical Education and Recreation, University of Cape Coast, Cape Coast, Ghana

<sup>2</sup> School of Nursing and Midwifery, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

<sup>3</sup> Centre for Behaviour and Wellness Advocacy, Koforidua, Ghana

<sup>4</sup> School of Nursing and Midwifery, Family Health University, Accra, Ghana

<sup>5</sup> Nursing and Midwifery Training College, Odumase-Krobo, Ghana

<sup>6</sup> Department of Family and Community Health, University of Health and Allied Sciences, Hohoe, Ghana



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the annual prevalence of suicide among adolescents was 34,00, where about 3.2 per 100,000 adolescents commit suicide [17].

The vulnerabilities associated with adolescence increase their risk of suicidal behaviour. However, reporting suicidal behaviour, especially in low- and middle-income countries (LMICs), remains low, resulting in underestimates [8]. Many researchers have utilised the Global School-based Student Health Survey (GSHS) in reporting suicidal behaviours among these high-risk groups with varying figures. For instance, evidence from 59 LMICs reported a prevalence of 17% [25]. Also, a previous study in Benin reported the prevalence of suicide behaviour as 20% [10].

Furthermore, sub-Saharan Africa is home to most adolescents [27]. Given the strong evidence of suicidal behaviour in this age group, the need to study risk factors of suicidal behaviour, especially in LMICs, cannot be overstated. Previous studies have consistently recorded high prevalence. Li et al. [11] in their study recorded 14.5%, 14.6%, and 12.7%, respectively, for SI, SP, and SA. A similar study by Seidu et al. [21] in Mozambique revealed the occurrence of SI, SP and SA at 17.7%, 19.6% and 18.5%, respectively. Also, hunger was associated with SI, physical attack or sustaining injury ideation, SP and SA, and bullying was associated with SA. On the other hand, having close friends reduced the likelihood of SI, SP and SA [21].

While countries such as Benin strive to attain Sustainable Development Goals (SDG) by 2030, tackling the troubling issue of adolescent suicide is important in achieving SDGs 3 and 4. To a greater extent, conceptualising the factors that are linked to adolescent suicidal behaviours is crucial for mental health promotion and suicide prevention. Additionally, recent studies on suicidal behaviour among adolescents in Benin have not fully conceptualised these protective and risk factors from the broader socio-demographic and psychosocial characteristics of participants [5, 10]. Therefore, this study sought to examine extensively multidimensional factors that serve as associated protective or risks for adolescent suicidal behaviour among adolescents in Benin.

### **Conceptual framework for adolescent suicide in Benin**

The study's conceptual framework is guided by the Theory of Dynamic Risk and Protective Factors [9], in addition to existing literature that examines the correlates of suicidal behaviour among adolescents [18, 19], Seidu et al., 2022). Based on similar GSHS studies, our framework conceptualises protective factors as variables that can decrease the likelihood of adolescents exhibiting any suicidal behaviour while associated risk factors as variables that increase the occurrence of suicidal behaviour

[18–21]. Our conceptualisation of adolescent suicidal behaviour in Benin categorised the outcome variable into SI, SP and SA. Based on several previous studies, we conceptualised demographic factors like sex, age, close friends, parents who respect their children's privacy and autonomy and having understanding and caring parents as protective factors. In contrast, associated suicidal risk behaviour included grades at school, hunger, truancy, substance and drug use, alcohol, and other psychosocial factors like physical attacks, fights, injuries, bullying, loneliness, worrying, and risky sexual behaviours.

## **Method**

### **Research design**

By analysing the 2016 GSHS dataset pertaining to Benin, we determined the prevalence and correlates of adolescents' suicidal behaviours. The GSHS employs a school-centred approach utilising self-administered questionnaires to gather information on health behaviours and protective factors (WHO, 2020). This survey adopts a cross-sectional design to collect data from member countries of the WHO aimed at preventing risky behaviour among teenagers aged 13 to 18 years.

### **Sampling procedure**

The GSHS employed a two-stage cluster sampling design to generate data that accurately represented students across Grades 3–6, including the terminal grade. Students in these grades in Benin are typically teenagers between the ages of 13 and 17. In selecting the study participants, the study first sampled schools using probability proportional to student enrolment size. However, classes were selected at random, and all students within those classes were invited to partake in the study in the second phase. The study achieved 100%, 78%, and 78% response rates at schools, students, and overall study levels. From the Benin GSHS survey, we utilised 2496 responses out of a total of 2536 students. Some responses were omitted from our analysis due to missing values exceeding 10%.

### **Variables**

The outcome variables included suicidal behaviours like SI, SP and SA. We defined the outcome variables as whether the adolescent had experienced any of the following within the past year: serious contemplation of suicide, making plans for suicide or attempting suicide. Participants were asked to choose between "1=yes" or "0=no". Those who chose "1" were classified as having experienced SI, SP or SA, while those who chose "0" had not experienced any of these within the past 12 months.

The explanatory variables in the study encompassed socio-demographic factors (gender, age, and school grade), personal attributes (skipping school, experiencing

hunger, and leading a sedentary lifestyle), substance use (marijuana, alcohol, and cigarette consumption), and psychosocial aspects (experiencing physical attacks or fights, sustaining serious injuries, feelings of worry, presence of close friends, parental tobacco use, having understanding parents, and parents or guardians respecting privacy by refraining from inspecting an adolescent’s belongings without their knowledge). The socio-demographic variables were coded for analysis as follows: sex (male=1, female=0), age (13-15=1, 16-18=0) and grade (3<sup>rd</sup>-6<sup>th</sup>=1, Terminal-2<sup>nd</sup>=0). Personal variables such as hunger, truancy and missed physical education (PE) classes were coded and labelled as 1=yes,0=no. The variables related to drug and substance use, including cigarette smoking, alcohol consumption, and marijuana use, were coded as “1=yes” and “2=no” for each. Further, we coded psychosocial variables such as physical attack, physical fight, bullying, loneliness, worry, close friends, multiple sexual partners, ever had sexual intercourse, Parental respect for children’s privacy, serious injury, parental/ guardian use of tobacco and having understanding parents code each as “1=yes, 0=no”.

**Data analysis**

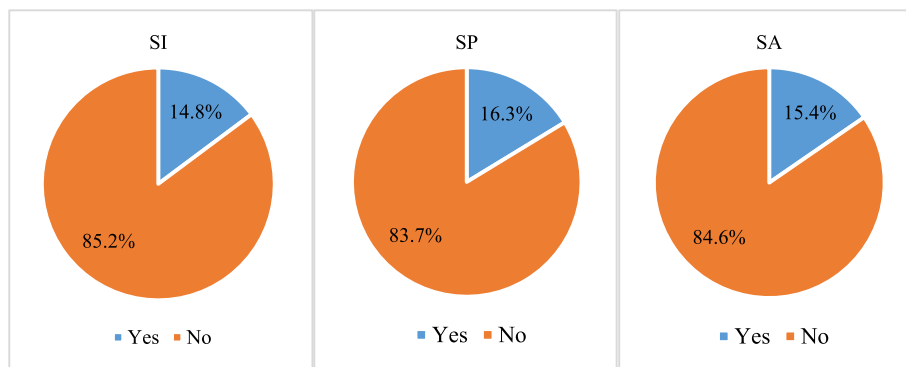
At the school level, as well as within specific grade levels, we utilized sample weighting techniques to account for variations in representation among adolescents in Benin and to counteract any biases stemming from non-response. Various parameters were measured using a dichotomous scale. The analysis focused on individual participants as the primary unit of examination. We utilized bivariate analysis employing Pearson’s Chi-square test to explore the associations between SI, SP, and SA and the explanatory variables. Variables demonstrating a statistically significant association ( $p<0.05$ ) were subsequently included in a binomial logistic regression model. The outcomes were then presented alongside adjusted

odds ratios (AOR) and their corresponding 95% confidence intervals (CI) ( $p<0.05$ ).

**Results**

**Prevalence analysis**

The prevalence of SI, SP and SA was 14.8%, 16.3% and 15.3%, respectively (see Fig. 1). More females (8.1%) significantly experienced SI than males, whereas an equal percentage (8.2%) of both males and females had SP. However, more (9.2%) males attempted suicide than females. Also, significantly more adolescents aged 16-18 years planned suicide (14.5%) and attempted suicide (13.9%). Again, more adolescents in 3<sup>rd</sup>-6<sup>th</sup> grade significantly attempted suicide. Further, adolescents who mostly got hungry significantly had SI (3.2%) and SP (3.5%). Also, truant adolescents significantly had SI (4.2%), SP (5.0%) and SA (4.7%). Adolescents who missed PE classes significantly had SI (2.8%) and SP (3.0%). Further, participants who smoked cigarettes significantly had SI (1.3%), SP (1.2%) and SA (1.1%). Also, participants who drank alcohol and those who used marijuana significantly had SI (7.5%, 0.8%) and SP (8.0%, 0.7%), respectively. Physically attacked victims significantly had SI (4.2%) and SP (5.0%). Teenagers involved in physical altercations showed a noteworthy association with SI at a rate of 4.2%, SP at 4.4%, and SA at 4.2%. Bullied victims and those who mostly feel lonely significantly had SI (3.8%, 3.7%), SP (8.7%, 3.7%) and SA (7.8%, 3.8%), respectively. Furthermore, teenagers who predominantly experience anxiety and those who have engaged in sexual activity with multiple partners exhibited a statistically significant association with SI at rates of 5.0% and 4.6%, respectively, as well as SP at rates of 4.8% and 5.6%, respectively, and SA at rates of 4.2% and 5.4%, respectively. Teenagers who have engaged in sexual activity and those whose parents respect their privacy by refraining from inspecting their belongings without their knowledge demonstrated a significant correlation with SI. (8.4%, 11.2%), SP (9.6%,



**Fig. 1** Prevalence of suicidal behaviours among In-School Adolescents in Benin

12.7%) and SA (8.7%, 12.1%) respectively. Seriously injured adolescents also significantly had SI (7.2%, 8.1%), SP (8.1%) and SA (8.0%). Adolescents whose parents/guardians use tobacco significantly had SA (2.0%). Also, participants whose parents usually understood them significantly had SP (4.7%) (see Table 1 and Fig. 1)

### Bivariate analysis

Table two presents the chi-square analyses showing the association between explanatory variables and SI, SP and SA. The sex of participants was significantly associated with SI ( $p < 0.001$ ), SP ( $p < 0.05$ ) and SA ( $p < 0.05$ ). Also, age was significant for SP ( $p < 0.05$ ) and SA ( $p < 0.01$ ). Moreover, grade was significantly associated with only SA ( $p < 0.05$ ). Personal factors such as hunger were significantly associated with SI ( $p < 0.05$ ) and SP ( $p < 0.05$ ). Truancy was significantly associated with SI ( $p < 0.01$ ), SP ( $p < 0.001$ ) and SA ( $p < 0.001$ ). Also, missing PE classes were significantly associated with SI ( $p < 0.05$ ) and SP ( $p < 0.05$ ). Smoking cigarettes was significantly associated with SI ( $p < 0.001$ ), SP ( $p < 0.01$ ) and SA ( $p < 0.01$ ). Alcohol and marijuana use were significantly associated with SI ( $p < 0.01$ ,  $p < 0.001$ ) and SP ( $p < 0.05$ ,  $p < 0.001$ ), respectively. Psychosocial factors such as physical attack and physical fight were significantly associated with SI ( $p < 0.001$ ,  $p < 0.01$ ), SP ( $p < 0.001$ ,  $p < 0.05$ ) and SA ( $p < 0.001$ ,  $p < 0.05$ ), respectively. Bully and loneliness were significantly associated with SI ( $p < 0.001$ ,  $p < 0.001$ ), SP ( $p < 0.001$ ,  $p < 0.001$ ) and SA ( $p < 0.001$ ,  $p < 0.01$ ) respectively. Having ever had sex and having multiple sexual partners were significantly associated with SI ( $p < 0.01$ ,  $p < 0.05$ ), SP ( $p < 0.001$ ,  $p < 0.001$ ) and SA ( $p < 0.001$ ,  $p < 0.001$ ) respectively. Also, having parents who never or rarely went through adolescents' things without his or her knowledge and those who were seriously injured were significantly associated with SI ( $p < 0.001$ ,  $p < 0.05$ ), SP ( $p < 0.01$ ,  $p < 0.01$ ) and SA ( $p < 0.001$ ,  $p < 0.05$ ) respectively. Furthermore, the presence of parents or guardians who use tobacco showed a significant association with SA. Similarly, having supportive and understanding parents was significantly linked with SP ( $p < 0.05$ ), as indicated in Table 1.

### Multiple logistic regression analysis

Table 2 presents the logistic regression outcomes concerning predictors of SI, SP, and SA. The findings indicate that males exhibited a lower likelihood of experiencing SI (AOR = 0.54, 95% CI = 0.421-0.701) and SP (AOR = 0.641, 95% CI = 0.503-0.818) compared to females. Additionally, individuals aged 13-15 years were notably less inclined to have SA than those aged 16-18 years (AOR = 0.71, 95% CI = 0.535-0.951). Moreover, adolescents in Grades 3rd to 6th demonstrated higher odds of

experiencing SA (AOR = 1.49, 95% CI = 1.101-2.010) in contrast to those in terminal to 2nd grades.

Also, participants who were truant showed higher likelihoods of experiencing SP (AOR = 1.33, 95% CI = 1.032-1.729) and SA (AOR = 1.31, 95% CI = 1.008-1.700) compared to those who attended school regularly. Additionally, individuals who smoked marijuana were more prone to experiencing SI (AOR = 3.256, CI = 1.614-6.571), SP (AOR = 2.390, CI = 1.186-4.815), and SA (AOR = 4.24, CI = 2.133-8.444) than non-marijuana users. Notably, victims of physical attacks were more likely to have SP (AOR = 1.512, CI = 1.160-1.971) and SA (AOR = 1.41, CI = 1.076-1.851) compared to those who had never experienced physical attacks. Similarly, individuals who were bullied had higher odds of experiencing SI (AOR = 1.781, CI = 1.400-2.266), SP (AOR = 1.55, CI = 1.234-1.954), and SA (AOR = 1.30, CI = 1.028-1.644) than those who were not bullied.

Moreover, individuals who predominantly experienced feelings of loneliness were at higher risk of experiencing SI (AOR = 1.768, CI = 1.328-2.355), SP (AOR = 1.58, CI = 1.187-2.091), and SA (AOR = 1.85, CI = 1.389-2.452) compared to those who did not predominantly feel lonely. Similarly, participants who were predominantly worried were more likely to experience SI (AOR = 1.745, CI = 1.346-2.264) and SP (AOR = 1.36, CI = 1.049-1.754) than those who were not predominantly worried. Adolescents who reported having multiple sexual partners had a higher likelihood of experiencing SP (AOR = 1.37, CI = 1.007-1.869) than those who did not. Furthermore, adolescents whose parents respected their privacy and autonomy were less likely to experience SI (AOR = 0.73, CI = 0.549-0.957) compared to those without such parental attitudes. (See Table 2).

### Discussion

Using data from the 2016 GSHS, we examined the prevalence and factors associated with SI, SP, and SA among adolescents in Benin. We found the prevalence of SI, SP, and SA to be 14.8%, 16.3%, and 15.3%, respectively. Despite the significant proportion of school-going adolescents in Benin who ideate, plan and attempt suicide, these prevalences are relatively lower compared to the prevalence of SI, SP, and SA found in some other neighbouring African countries such as Ghana [12] and Mozambique [21], which also participated in the GSHS. Despite the relatively high prevalence of suicide risk among adolescents in Benin, sound comparison of the prevalence with other countries may be limited due to the contextual differences in study populations, study periods, and country-specific cultures, which may account for the various prevalence of suicidal behaviour.

**Table 1** Association of risk factors with suicidal ideation, plan and attempts among respondents

Variables	SI (N=2496)		SP (N=2496)		SA (N=2496)	
	Yes	No	Yes	No	Yes	No
	Chi-square (χ <sup>2</sup> )		Chi-square (χ <sup>2</sup> )		Chi-square (χ <sup>2</sup> )	
<b>Demographic</b>						
Sex						
Male	169 (6.8%)	1187 (47.6%)	204 (8.2%)	1152 (46.2%)	229 (9.2%)	1127 (45.2%)
Female	201 (8.1%)	939 (37.6%)	204 (8.2%)	936 (37.5%)	156 (6.3%)	984 (39.4%)
Age						
13-15	44 (1.8%)	308 (12.3%)	46 (1.8)	306 (12.3)	38 (1.5)	314 (12.6)
16-18	326 (13.1%)	1818 (72.8%)	362 (14.5)	1782 (71.4)	347 (13.9)	1797 (72.0)
Grade						
3rd-6th grade	235 (9.4%)	1311 (52.5%)	249 (10.0)	1297 (52.0)	253 (10.1)	1293 (51.8)
Terminal - 2nd grade	135 (5.4%)	815 (32.7%)	159 (6.4)	791 (31.7)	132 (5.3)	818 (32.8)
<b>Personal</b>						
Hunger						
Yes	80 (3.2%)	348 (13.9%)	87 (3.5%)	341 (13.7%)	75 (3.0%)	353 (14.1%)
No	290 (11.6%)	1778 (71.2%)	321 (12.9%)	1747 (70.0)	310 (12.4%)	1758 (70.4%)
Truancy						
Yes	106 (4.2%)	469 (18.8%)	126 (5.0)	449 (18.0)	118 (4.7)	457 (18.3)
No	264 (10.6%)	1657 (66.4%)	282 (11.3)	1639 (65.7)	267 (10.7)	1654 (66.3)
Missed PE classes						
Yes	71 (2.8%)	313 (12.5%)	76 (3.0%)	308 (12.3%)	62 (2.5%)	322 (12.9%)
No	299 (12.0%)	1813 (72.6%)	332 (13.3%)	1780 (71.3)	323 (12.9%)	1789 (71.7%)
<b>Drugs and substance use</b>						
Smoke cigarettes						
Yes	33 (1.3%)	81 (3.2%)	31 (1.2%)	83 (3.3%)	28 (1.1%)	86 (3.4%)
No	337 (13.5%)	2045 (81.9%)	377 (15.1%)	2005 (80.3)	357 (14.3%)	2025 (81.1%)
Drank alcohol						
Yes	186 (7.5%)	894 (35.8%)	199 (8.0%)	881 (35.3%)	174 (7.0%)	906 (36.3%)
No	184 (7.4%)	1232 (49.4%)	209 (8.4%)	1207 (48.4%)	211 (8.5%)	1205 (48.3%)
Marijuana use						
Yes	19 (0.8%)	18 (0.7%)	17 (0.7%)	20 (0.8%)	18 (0.7%)	19 (0.8%)
No	351 (14.1%)	2108 (84.5%)	391 (15.7%)	2068 (82.9)	367 (14.7%)	2092 (83.8%)
<b>Psychosocial</b>						
Physical attack						
Yes	105 (4.2%)	418 (16.7%)	124 (5.0%)	399 (16.0%)	112 (4.5%)	411 (16.5%)
No	265 (10.6%)	1708 (68.4%)	284 (11.4%)	1689 (67.7)	273 (10.9%)	1700 (68.1%)
Physical fight						
Yes	105 (4.2%)	460 (18.4%)	111 (4.4%)	454 (18.2%)	105 (4.2%)	460 (18.4%)
No	265 (10.6%)	1666 (66.7%)	297 (11.9%)	1634 (65.5)	280 (11.2%)	1651 (66.1%)
Bullied						
Yes	213 (8.5%)	839 (33.6%)	218 (8.7%)	834 (33.4%)	194 (7.8%)	858 (34.4%)
No	157 (6.3%)	1287 (51.6%)	190 (7.6%)	1254 (50.2)	191 (7.7%)	1253 (50.2%)
Loneliness						
Yes	94 (3.8%)	268 (10.7%)	92 (3.7%)	270 (10.8%)	94 (3.8%)	268 (10.7%)
No	276 (11.1%)	1858 (74.4%)	316 (12.7%)	1818 (72.8)	291 (11.7%)	1843 (73.8%)
Worry						
Yes	126 (5.0%)	405 (16.2%)	119 (4.8%)	412 (16.5%)	104 (4.2%)	427 (17.1%)
No	244 (9.8%)	1721 (69.0%)	289 (11.6%)	1676 (67.1%)	281 (11.3%)	1684 (67.5%)

**Table 1** (continued)

Variables	SI (N=2496)			SP (N=2496)			SA (N=2496)		
	Yes	No	Chi-square (χ <sup>2</sup> )	Yes	No	Chi-square (χ <sup>2</sup> )	Yes	No	Chi-square (χ <sup>2</sup> )
Close friends	Yes 51(2.0%)	245(9.8%)	1.540	57(2.3%)	239(9.6%)	2.081	51(2.0%)	245(9.8%)	.839
Multiple sexual partners	No 319(12.8%)	1881(75.4%)		351(14.1%)	1849(74.1%)		334(13.4%)	1866(74.8%)	
	Yes 115(4.6%)	536(21.5%)	5.631*	140(5.6%)	511(20.5%)	17.143***	134(5.4%)	517(20.7%)	17.968***
Ever had sexual intercourse	No 255(10.2%)	1590(63.7%)		268(10.7%)	1577(63.2%)		251(10.1%)	1594(63.9%)	
	Yes 195(8.4%)	930(40.1%)	9.917**	223(9.6%)	902(38.9%)	19.711***	202(8.7%)	923(39.8%)	15.244***
Parental respect for children's privacy	No 151(6.5%)	1041(44.9%)		155(6.7%)	1037(44.8%)		145(6.3%)	1047(45.2%)	
	Yes 279(11.2%)	1769(70.9%)	13.028***	316(12.7%)	1732(69.4%)	7.009**	303(12.1)	1745(69.9)	3.469*
Serious injury	No 91(3.6%)	357(14.3%)		92(3.7%)	356(14.3%)		82(3.3)	366(14.7)	
	Yes 180(7.2%)	896(35.9%)	5.436*	202(8.1%)	874(35.0%)	8.148**	200(8.0%)	876(35.1%)	14.502***
Parental/ guardian use of tobacco	No 190(7.6%)	1230(49.3%)		206(8.3%)	1214(48.6)		185(7.4%)	1235(49.5%)	
	Yes 42(1.7%)	208(8.3%)	.859	47(1.9%)	203(8.1%)	1.223	49(2.0%)	201(8.1%)	3.713***
Having understanding parents	No 328(13.1%)	1918(76.8%)		361(14.5%)	1885(75.5)		336(13.5%)	1910(76.5%)	
	Yes 116(4.6%)	704(28.2%)	.444	117(4.7%)	703(28.2%)	3.856*	123(4.9%)	697(27.9%)	.169
	No 254(10.2%)	1422(57.0%)		291(11.7%)	1385(55.5)		262(10.5%)	1414(56.7%)	

\* indicates significance at  $p < 0.05$ , \*\* indicates significance at  $p < 0.01$ , and \*\*\* indicates significance at  $p < 0.001$

**Table 2** Logistic regression for predictors of SI, SP and SA

Variables		SI AOR (95%CI)	SP AOR (95%CI)	SA AOR (95%CI)
<b>Demographic</b>				
Sex (male)	Male	.54(.421-.701)***	.64(.503-.818)***	1.09(.850-1.392)
	Female	1	1	1
Age	13-15	.79(.590-1.063)	.76(.573-1.008)	.71(.535-.951)*
	16-18	1	1	1
Grade	3rd-6th	1.09(.807-1.467)	1.26(.944-1.681)	1.49(1.101-2.010)*
	Terminal-2 <sup>nd</sup>	1	1	1
<b>Personal</b>				
Hunger	Yes	1.25(.932-1.669)	1.25(.947-1.659)	1.09(.817-1.461)
	No	1	1	1
Truancy	Yes	1.17(.890-1.544)	1.34(1.032-1.729)*	1.31(1.008-1.700)*
	No	1	1	1
Missed PE classes	Yes	1.23(.908-1.674)	1.19(.886-1.591)	.95(.698-1.298)
	No	1	1	1
<b>Drugs and substance use</b>				
Smoke cigarettes	Yes	1.55(.947-2.543)	1.24(.767-2.018)	.98(.586-1.635)
	No	1	1	1
Drank alcohol	Yes	1.19(.937-1.513)	1.12(.893-1.412)	.92(.727-1.163)
	No	1	1	1
Marijuana use	Yes	3.26(1.614-6.571)**	2.39(1.186-4.815)*	4.24(2.133-8.444)***
	No	1	1	1
<b>Psychosocial</b>				
Physical attack	Yes	1.26(.953-1.675)	1.51(1.160-1.971)**	1.41(1.076-1.851)*
	No	1	1	1
Physical fight	Yes	1.10(.829-1.459)	1.01(.770-1.328)	1.02(.769-1.341)
	No	1	1	1
Bullied	Yes	1.78(1.400-2.266)***	1.55(1.234-1.954)***	1.30(1.028-1.644)*
	No	1	1	1
Loneliness	Yes	1.77(1.328-2.355)***	1.58(1.187-2.091)**	1.85(1.389-2.452)***
	No	1	1	1
Worry	Yes	1.75(1.346-2.264)***	1.36(1.049-1.754)*	1.16(.888-1.517)
	No	1	1	1
Close friends	Yes	1.15(.816-1.609)	1.16(.840-1.609)	1.13(.811-1.581)
	No	1	1	1
Multiple sexual partners	Yes	1.10(.792-1.527)	1.37(1.007-1.869)*	1.22(.895-1.671)
	No	1	1	1
Ever had sexual intercourse	Yes	1.20(.898-1.590)	1.15(.873-1.519)	1.13(.853-1.501)
	No	1	1	1
Parental respect for children's privacy	Yes	.73(.549-.957)*	.78(.595-1.025)	.81(.609-1.065)
	No	1	1	1
Having understanding parents	Yes	1.09(.746-1.593)	1.09(.765-1.564)	1.31(.925-1.858)
	No	1	1	1
Parental/ guardian use of tobacco	Yes	.99(.772-1.275)	.87(.679-1.106)	1.02(.802-1.302)
	No	1	1	1
Serious injury	Yes	1.22(.959-1.547)	1.09(.864-1.365)	1.12(.886-1.411)
	No	1	1	1

The significance levels are denoted as follows: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . The goodness-of-fit tests were conducted using the Hosmer and Lemeshow test for SI ( $\chi^2(8) = 8.572, p = 0.380$ ), SP ( $\chi^2(8) = 7.617, p = 0.472$ ), and SA ( $\chi^2(8) = 6.630, p = 0.577$ )



Among the risk factors, extant literature has found that being truant and consistently absent from school influences suicidal behaviour among school-going adolescents [1, 6, 13]. Similarly, our study found that adolescents in Benin who were truant from school had higher chances of planning and attempting suicide compared to those who were not truant. While explaining the mechanism between truancy and suicidal behaviour, it is important to consider the factors that influence truancy among these adolescents critically. There is evidence of both externalising and internalising behaviours among adolescents absent from school [15]. This finding suggests the need for adolescents who are experiencing mental distress and truancy to be given early attention and support in Beninese schools. In addition to providing proper mental health resources within and outside schools in Benin, there is a need for school authorities to create a friendly and inclusive school climate that can significantly reduce these risks.

Adolescents in Benin who used marijuana had increasing probabilities of SI, SP, and SA compared to those who did not use marijuana. Adolescents' use of marijuana and engagement in suicidal behaviour are related in a complicated and diverse way. Although a previous study linked marijuana use to mental health consequences, such as SI, SP, and SA among school-going adolescents from 10 African countries [24], it is important to realise that definitive proof of causality is difficult to come by. Nonetheless, we explained this association to mean that several adolescents who use marijuana may have already been experiencing mental health problems, which may cause them to consider suicide. It is possible that these preexisting mental health problems could increase their vulnerability to suicidal behaviour. School authorities in Benin need to collaborate with mental health professionals to design age-appropriate assessment, support, and treatment for school children who use marijuana and those at risk of using marijuana.

Our study further found that adolescents in Benin who experienced bullying, experienced loneliness, and got worried had an increased likelihood of SI, SP and SA. The risk of suicide linked with bullying victimisation, loneliness, and worrying has been well-established in previous studies [2, 20, 22, 14]. The concurrence of bullying, loneliness, and worry may explain how they interactively influence suicide risk among adolescents. Being bullied may trigger emotional distress, isolation and alienation, and low self-esteem, which trigger the desire for escapism among school-going adolescents. Thus, they may tend to consider that attempting suicide may be their only effective means to end their suffering. It is critical to identify the warning signs of bullying among adolescents early and offer the victims assistance and intervention by

providing a safe and supportive school environment and implementing anti-bullying programs to reduce the incidence of suicide among these children.

Corroborating our study findings, which found the odds of SP to be higher among adolescents who have multiple sexual partners, previous studies also established the link between having multiple sexual partners and suicidal behaviour [16, 23]. The prevalence of intimate partner violence among teenagers, which may predispose them to suicidal behaviour, can be used to explain this data. Additionally, some adolescents are more likely to have sexually transmitted diseases from having several sex experiences. People's awareness of these sexually transmitted diseases may breed stigmatisation and discrimination, which further leads to adolescents' feelings of guilt, loneliness, or rejection. Adolescents in Benin need to be informed, through their parents, teenagers and religious bodies, about the dangers and drawbacks of engaging in many sexual relationships in order for them to stop doing so.

Significant protective factors observed in the study included sex (males), younger age (13-15 years), and having parents who respect adolescents' privacy and autonomy were protective factors against suicidal behaviour. Biological factors like sex, age, and parental role in the complex pathways of reducing suicidal behaviour have been well researched. Among school-going adolescents in Benin, there were lower odds of suicidal ideations and plans among males compared to females, as was similarly found by extant literature in Ghana [12], and Saint Lucia [18]. Within most African settings, several masculine norms inform behaviour [7]. For instance, traditional and cultural perspectives, norms and expectations discourage males and younger people from openly expressing emotions, including feelings of vulnerability or sadness.

Another protective factor noted in the study's model was adolescent age. Younger adolescents (13-15 years) in Benin had lower suicide attempt odds than those aged 16 years and above. As a result, younger adolescents who are males tend to be less likely to communicate or express their suicidal behaviour and seek help for the same, leading to a potential underreporting of suicidal ideation and plans among them. Additionally, in as much as younger adolescents may ideate and plan suicide, access to the means to attempt it may be difficult for them. These reasons may underscore the observed findings among adolescents in Benin.

As part of the protective factors, supportive parental behaviours have been proven in several studies as having a potential impact on adolescent mental health, particularly suicidal thoughts [18, 19]. The finding suggests that parents who respect their children's privacy and autonomy may contribute to reducing the likelihood of



their children experiencing suicide. Supportive parenting regarding a child's privacy and autonomy involves acknowledging their boundaries, giving them a voice to express themselves, and allowing them to make decisions within appropriate limits. Given these findings, there is a need to encourage culturally sensitive programmes for supportive parenting and sex and age-specific suicide prevention strategies in schools in Benin to reduce the suicide risk among adolescents.

## Conclusion

We found the prevalence of suicide behaviours in Benin among adolescents to be a major concern. We observed that risks associated with suicidal behaviour included grades at school, hunger, truancy, substance and drug use, alcohol, and other psychosocial factors like physical attacks, fights, injuries, bullying, loneliness, worrying, and risky sexual behaviours. However, protective factors of suicide behaviour include sex (males), age (13–15 years), and having parents who respect adolescents' privacy and autonomy.

Based on these associated risks and protective factors, Benin could face challenges in achieving the goal of ensuring healthy lives for its school-age adolescents by the year 2030. This could hinder efforts to meet SDGs 3.5 and 4.1. It is essential for students to have access to multidisciplinary support services and suicide prevention interventions that address their psychosocial needs.

## Strengths and limitation

This study is one of a kind that conceptualised suicidal behaviour among adolescents in Benin by modelling risk and protective factors. Also, this study utilised a sample size of 2496 and ensured sampling rigour, i.e. two-staged cluster sampling design, ensuring a fair representation of the participants from the various grades and sexes, as well as measuring psychological variables with validated instruments. Notwithstanding these strengths, the secondary data used single item scales to in measuring variables like loneliness, worry, SI, SP and SA. As a result, the study could not account for all critical clinical manifestations required for diagnostic reasons. Furthermore, this study is cross-sectional and thus may not be adequate to establish causal relations between correlates and adolescents' suicidal behaviour in Benin. Nevertheless, the policy and research implications underscore interventions for mental health promotion.

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## Authors' contributions

Conceptualisation: JOS, methodology, data curation, data analysis: JOS, NIG, PO; writing—original draft preparation, writing: JOS, TPD, NIG, DKA, CST, and PO; writing—review and editing: all authors; writing—supervision: JOS. All authors read and agreed to the final version of the manuscript for publication.

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## Availability of data and materials

The study's data is available at the WHO website: "<https://extranet.who.int/ncdsmicrodata/index.php/catalog/627/study-description>."

## Declarations

### Ethics approval and consent to participate

Before commencing data collection, the study obtained approval from the Institutional Review Boards of both the Benin MoH and MoE. The researchers adhered strictly to the ethical guidelines outlined by these institutions. Additionally, the necessary procedures to gain entry permission and approval from the MOH and school authorities were followed. Informed consent was obtained from participants aged 18 and above, while children under 18 provided assent along with parental consent after receiving comprehensive information about the study.

### Consent for publication

Not required.

### Competing interests

We have no competing interests.

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