Journal of Affective Disorders 295 (2021) 989–996

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research Paper

Epidemiology of suicidal behaviours amongst school-going adolescents in post-conflict Sierra Leone

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ARTICLE INFO

Keywords:
Adolescents
Post-conflict
Sierra Leone
Suicidal ideation
Suicide
Suicide attempt

ABSTRACT

Background: Children and young people living in post-conflict contexts are at an increased risk of suicidal behaviours (ideations and attempts). Not much is known about the extent of suicidal behaviours amongst adolescents in most notable post-conflict countries in sub-Saharan Africa, including Sierra Leone.

Methods: We performed a secondary analysis of data from the 2017 Sierra Leone World Health Organisation Global School-based Student Health Survey conducted amongst students in secondary schools nationwide. We estimated the 12-month prevalence and performed bivariable and multivariable analyses to assess the correlates of suicidal behaviours.

Results: Of the 2,798 analytic sample, 14.6% (males = 15.1%, females = 14.0%) reported suicidal ideation, and the 12-month prevalence estimate of suicide attempt was 19.6% (male = 20.9%, females =17.8%). The factors associated with suicidal behaviours were multi-layered. While no statistically significant gender association with suicide ideation or attempt was observed at the personal level, being aged 18 or older, loneliness, and health risk behaviours (cannabis use, and leisure time sedentary behaviour) were associated with increased odds of suicidal behaviours. Within the family context, parental monitoring was associated with increased odds of suicidal ideation, but parental supervision was associated with reduced odds of suicide ideation.

Limitations: The cross-sectional nature of the data did not support causal inferences.

Conclusions: Taken together, professional mental healthcare would be helpful in treating adolescent emotional problems (e.g., depression and loneliness) related to suicidal behaviours; but prevention and intervention programmes targeted at addressing adolescent health risk behaviours, and familial and interpersonal problems may yield more favourable outcomes.

1. Background

Indicator 3.4.2 of goal 3 of the United Nations Sustainable Development Goals (SDGs) seeks to reduce by one third premature mortality from suicide by the year 2030 (Bertelsmann Stiftung and Sustainable Development Solutions Network, 2018). Towards the attainment of this indicator, 3.4.2 (reduction of suicide mortality), the "Lancet Commission on Global Mental Health and Sustainable Development" has charged all countries, particularly, low- and middle-income countries (LAMICs) to – among other actions – scale up research which translates into real-world effects (Patel et al., 2018). However, countries in sub-Saharan Africa face significant challenges in achieving most of the SDGs, including goal 3: "to ensure healthy lives and promote wellbeing for all at all ages" (Bertelsmann Stiftung and Sustainable Development Solutions Network, 2018).

Although suicide occurs amongst all age groups within the general population, it represents a leading cause of death in young people worldwide (Glenn et al., 2020; WHO, 2014). In 2015, 78% of deaths due to suicide across the world were recorded in LAMICs (Bachmann, 2018). The most recent systematic review for the Global Burden of Disease Study indicates that suicide remains in the top 12 causes of deaths amongst persons aged 10 – 24 years in sub-Saharan Africa (Naghavi and

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https://doi.org/10.1016/j.jad.2021.08.147
Received 4 March 2021; Received in revised form 17 July 2021; Accepted 27 August 2021
Available online 3 September 2021

Global Burden of Disease Self-Harm Collaborators, 2019). Globally, adolescents – relative to the general adult population – are at heightened risk of self-harm and suicide (Hawton et al., 2012; WHO, 2014). However, adolescents and other young people living in humanitarian and fragile settings, including situations of natural disasters, prolonged political and socioeconomic instability, armed conflict, and post-conflict contexts are at a disproportionately increased risk of suicidal behaviours and other negative mental health outcomes (Betancourt et al., 2015; Borba et al., 2016; EWEC, 2016; Kadir et al., 2019; Sher and Vilens, 2009; WHO, 2017).

Suicidal behaviours (taken in this study to mean suicidal ideation and attempt) represent strong risk factors for death by suicide across all age groups (Hawton et al., 2012; Klonsky et al., 2016; Turecki et al., 2019; WHO, 2014). The implication is that, any carefully designed research aimed at understanding and preventing suicidal behaviours represents not only a response to the recent call by the Lancet Commission on Global Mental Health and Sustainable Development for increased mental health research (Patel et al., 2018), but also could be contributing towards the attainment of indicator 3.4.2 of the SDGs. Thus far, higher pooled estimates of 12-month prevalence of suicidal ideation (21% [95% confidence interval, CI = 20.1–21.0%]) and attempt (16.3% [95% CI = 8.4– 29%]) have been reported amongst adolescents in Africa (Biswas et al., 2020; Li et al., 2020; Liu et al., 2018; Uddin et al., 2019), relative to the recent global estimates of the problem [suicidal ideation = 14.2% (95%CI = 11.6–17.3%) and suicide attempt = 4.5% (95% CI = 3.4–5.9%)] (Lim et al., 2019).

In LAMICs, the reported evidence on factors associated with suicidal behaviours amongst adolescents and other young people can be understood from an ecological perspective, including paying attention to exposures, risk and protective factors within the family, school, extra-familial interpersonal relationships, and the general sociocultural contexts within which the young people live (Aggarwal et al., 2017; Biswas et al., 2020; Campisi et al., 2020; Li et al., 2020; Liu et al., 2018; McKinnon et al., 2016; Quarshie et al., 2020b). The evidence suggests personal-level factors (e.g., [female] gender, hopelessness, alcohol and drug misuse, low self-esteem, depression, anxiety), family-level factors (e.g., conflict between parents, family history of suicidal death or attempted suicide, parental divorce, physical abuse, family poverty, food deprivation, conflict with parents, parental support and understanding), school-level factors (lack of peer support at school, bullying victimisation, poor school climate, knowledge of peer suicide or attempted suicide, breakups, truancy, poor schoolwork or academic failure), and interpersonal factors and factors within the broader community context (sexual abuse, physical attack victimisation, armed conflict/community violence, child marriage, poverty) (Quarshie et al., 2020b).

It is imperative to indicate that, put together, nearly all the primary studies reporting evidence on the prevalence estimates and correlates of suicidal behaviours amongst adolescents in sub-Saharan Africa have been conducted in relatively stable countries. We still do not know much about the extent of self-harm and suicidal behaviours and associated factors amongst adolescents in notable war-affected and post-conflict countries in the subregion, including Sierra Leone, Cameroon, Central African Republic, Congo Republic-Brazzaville, Democratic Republic of the Congo, Guinea-Bissau, Mali, and South Sudan (Betancourt et al., 2020; Quarshie et al., 2020b). Thus far, only five studies have reported evidence from post-conflict sub-Saharan African countries: Congo Republic-Brazzaville (Okoko et al., 2011), Ivory Coast (Yéo-Tenena et al., 2010), Rwanda (Ng et al., 2015), Northern Uganda (Kinyanda et al., 2011), and Liberia (Quarshie et al., 2020). In Northern Uganda, for example, the lifetime estimate of suicidality was 6.1% (95% CI = 4.6 – 7.9%); female gender, depression, psychotic syndrome, history of exposure to war trauma, and being an orphan were associated with elevated odds of suicidality (Kinyanda et al., 2011).

The most recent evidence from Liberia has shown relatively higher estimates of suicidal behaviours amongst school-going adolescents (ideation = 26.8% [95%CI = 25.1 – 28.5%], planning = 36.5% [95%CI = 34.6 – 38.4%], and attempt = 33.7% [95%CI = 31.9 – 35.6%]) (Quarshie et al., 2020). School-going adolescents who experienced bullying victimisation and food deprivation were likely to report suicidal ideation, planning, and attempt. Although none of the study's predefined exposure factors was associated with suicidal ideation only, increased odds of suicidal planning were found among participants who reported having many close friends and experiencing parental monitoring at home. Leisure-time sedentary behaviour was associated with elevated odds of suicidal planning and attempt. While cannabis use, alcohol drunkenness, physical attack victimisation, and parental supervision were uniquely associated with higher odds of attempted suicide, parental understanding and having a smaller number of close friends were uniquely related to lower odds of attempted suicide (Quarshie et al., 2020).

1.1. Aims and objectives

The current study draws on data from the 2017 Sierra Leone World Health Organisation Global School-based Student Health Survey (WHO-GSHS) conducted nationwide amongst secondary school students to:

i Estimate the 12-month prevalence of suicidal behaviours (ideation and attempt) amongst school-going adolescents in Sierra Leone.
ii Describe some commonly reported psychosocial factors associated with suicidal behaviours (ideation and attempt) amongst school-going adolescents in Sierra Leone.

2. Methods

2.1. Context

The design and development of this study draw on data from the 2017 Sierra Leone WHO-GSHS conducted by the WHO and the Centers for Disease Prevention (CDC) of the United States. Sierra Leone is an Anglophone West African country categorised as a low-income country (The World Bank, 2020), with a low human development index - HDI rank of 182 (UNDP, 2020). The country experienced an 11-year civil war – between 1991 and 2002 – that weakened further an already less robust (public) health system, inequitable and under-functioning educational system, insufficient social services, and community structures (Betancourt et al., 2020; Maclure and Denov, 2009; Poirier, 2012). The recent devastation caused by the Ebola virus disease outbreak (2014 – 2015) and the mudslides that created further problems in 2017 within the country are also noteworthy (Meltzer et al., 2014; Musoke et al., 2020). Sierra Leone's general population is 7,092,113, and the composition is relatively young, as 24.3% of the population are adolescents aged 10 – 19 years (Weekes and Bah, 2017). The mean years of schooling is 3.7 years and the expected years of schooling is 10.2 years (UNDP, 2020). National crude estimates by the WHO in 2016 suggest that, overall, 4.1 per 100,000 adolescents aged 10 – 19 years in the country die by suicide (female = 3.0/100,000; male = 5.2/100,000) (WHO, 2020a).

2.2. Study design and sample

The WHO-GSHS is a cross-sectional survey conducted in interested WHO member states to evaluate behavioural health factors amongst youth in school. Data were collected by means of a self-administered questionnaire. More information on the methodology and the topics addressed by the survey are available on the WHO website (WHO, 2020b). Briefly, each country's WHO-GSHS questionnaire consists of validated survey items examining the behavioural risks and protective factors across multiple areas of functioning amongst school-going adolescents. After obtaining ethical approval and permissions from the relevant authorities, data for the WHO-GSHS are collected from a nationally representative sample of secondary school students.

Like all the WHO-GSHS surveys, the Sierra Leone WHO-GSHS measured alcohol use, dietary behaviours, drug use, hygiene, mental health, physical activity, protective factors, sexual behaviours, violence, and unintentional injury (WHO, 2020b). Students who voluntarily consented to complete the survey recorded their own answers on a computer scannable form distributed by trained staff during one standard class period. No individually identifiable information was collected. Approximately two years after the data are gathered, clean data files are made freely available to the public (https://www.who.int/ncds/surveillance/gshs/sierraleone/en/). In analysing and reporting this cross-sectional data, we have been guided by the community-agreed recommendations of Strengthening the Reporting of Observational Studies in Epidemiology – STROBE (Vandenbroucke et al., 2007).

2.3. Sampling

For all countries participating in the WHO-GSHS, a two-stage approach is used to generate a nationally representative sample of in-school adolescents who are in the target age ranges. The first stage consists of a cluster sampling design in which schools are randomly sampled from a list of all schools in the country using a probability proportionate to size (PPS) method. For the second sampling stage, classrooms that include high proportions of students from the targeted age groups are sampled for inclusion from within each of the participating schools. All students in each selected school have an equal chance of being selected for the study. Participants for the current study were Junior Secondary School 2 to Senior Secondary School 3 students sampled from selected schools in Sierra Leone. Due to the complex sampling design, numerical weights were applied to each student record to enable generalisation of study results to the student population of Sierra Leone. Of the sampled schools, 94% participated in the study and the student response rate was 87%, whilst the overall response rate was 82%.

2.4. Measures

2.4.1. Outcome variables

Suicidal ideation and suicidal attempt were the outcome variables. Both outcome variables were assessed using single-item measures. Specifically, the item, “during the past 12 months, did you ever seriously consider attempting suicide?” was used to determine suicidal ideation. The responses were dichotomised as “yes” (1) or “no” (0). Suicidal attempt was measured with the question “during the past 12 months, how many times did you actually attempt suicide?” The responses for this question were “0”, “1”, “2 or 3”, “4 or 5”, and “6 or more times”. Consistent with most secondary analyses of the WHO-GSHS data from sub-Saharan Africa, we applied a binary recoding to the suicidal attempt variable, no attempt (0) and one or more attempts (1) for analysis (Campisi et al., 2020; Quarshie et al., 2020; Shayo and Lawala, 2019).

2.4.2. Exposure variables

To facilitate comparison, the selection of exposure variables was informed by previous studies of correlates, risks, and protective factors for suicide behaviours in adolescents based on the WHO-GSHS data from sub-Saharan African countries (Asante et al., 2017; Campisi et al., 2020; Quarshie et al., 2020). Demographic variables included were age, school grade, and gender. Other variables including school, family, as well as personal and lifestyle factors were used to determine their predictive effects on the two outcome variables (suicide ideation and suicide attempts). The specific variables and their survey questions used, and coding used for the statistical analysis are presented as Supplementary Material (e-Table 1).

2.5. Statistical analyses

Analyses were performed with Stata 14.0 statistical software (StataCorp LP, College Station, Texas, USA). Sample weights were used in all analyses, so results are generalisable to the population. Univariate analysis involving frequencies and proportions was used to estimate the 12-month prevalence and 95% confidence intervals of suicidal ideation, and attempt. Unlike many previously published secondary analyses of the WHO-GSHS data from other African contexts which applied restrictive inclusion criteria to obtain limited analytical sample sizes (Carvalho et al., 2019; Koyanagi et al., 2019; (Vancampfort et al., 2019)), we were interested in gaining a more comprehensive sample and therefore less biased view of the problem of suicidal behaviours amongst school-going adolescents in Sierra Leone. Towards this end we included the total sample of the survey in our analyses. Thus, we applied the exclude cases pairwise option to handle missing data. In the exclude cases pairwise option, a participant is excluded only if they are missing the data required for the specific analysis, but they are included in any of the analyses for which they have the needed information (Pallant, 2011). In the primary analyses, chi-square tests were performed to examine the bivariate relationships between the exposure and outcomes variables. Exposure variables that demonstrated significant differences between those who reported suicide behaviours and those who did not at or below the 0.05 level ($p< 0.05$) threshold were then entered into logistic regression models in the second step. The second step involved creating chunk-wise logistic regression models separately for risk factors and for protective factors for suicide behaviours. Three logistic regression models were developed for each outcome variable (suicidal ideation, and attempt). The risk factor models included age, sex, school grade and risk factors significant in the bivariable analysis. The protective factor models included age, sex, and significant protective factors in the bivariable analysis. All variables from these two logistic regression models (both risk and protective factors) were then entered simultaneously into final logistic regression models to determine factors associated with suicide behaviours amongst the survey participants. Demographic variables (age, sex and school grade) were included in all logistic regression models. Variables included in the analyses and coding are shown in Supplementary Material (e-Table 1).

3. Results

3.1. Participant characteristics

A total of 2798 students participated in the study, including 1,258 (45.0%) male, 1484 (53.0%) female students and 56 (2%) participants with missing responses for gender. More than half (63.9%) of the participants were junior secondary school students and 56.9% reported to having been bullied on one or more occasions in the past one month. Additionally, about 9 in 10 students had close friends, 30.9% felt supported by their peers and 26.4% spent 3 or more hours a day engaged in leisure or sedentary behaviours.

3.2. Prevalence estimates of suicidal ideation and attempt

Overall, 14.6% (95% CI = 13.3– 16.0%) reported suicidal ideation during the previous 12 months, representing 15.1% (95% CI = 13.2 – 17.3%) males and 14.0% (95% CI = 12.3 – 15.9%) females. Across the total sample, the 12-month prevalence estimate of suicide attempt was 19.6%, (18.2 – 21.1%), comprising 20.9% (18.7% – 23.2%) males and 17.8% (15.9 – 19.9%) females. Of the adolescents who reported suicidal attempt, 54.3% reported a single episode and 45.7% repeated the attempts at suicide during the previous 12 months.

3.3. Bivariable associations

Bivariable findings are presented in Table 1. Generally, most of the variables showed significant bivariate associations with suicidal behaviours (ideation and attempt). However, amongst the demographic variables, adolescents in junior schools were more likely to report

Table 1
Bivariable analysis of the factors associated with suicidal behaviours.

Variable	Suicidal Ideation (n = 394)				Suicidal attempt (n = 541)			
	No	Yes	χ^2	p-value	No	Yes	χ^2	p-value
	n (%)	n (%)			n (%)	n (%)		
Demographics								
Gender			0.69	.407			4.08	.043
Male	1016 (84.9)	181 (15.1)			981 (79.1)	259 (20.9)		
Female	1243 (86.0)	202 (14.0)			1204 (82.2)	261 (17.8)		
Age (in years)			0.32	.574			7.09	.008
≤ 17 years	2024 (85.3)	350 (14.7)			1971 (81.1)	459 (18.9)		
≥ 18 years	262 (86.5)	41 (13.5)			234 (74.8)	79 (25.2)		
School grade			6.14	.013			0.20	.658
JSS	1458 (84.2)	273 (15,8)			1404 (80.0)	349 (20.0)		
SSS	825 (87.8)	115 (12.2)			795 (80.8)	189 (19.2)		
Personal factors								
Alcohol drunkenness			78.99	<.001			220.2	<.001
Yes	150 (67.7)	76 (32.3)			115 (46.9)	130 (53.1)		
No	2057 (76.6)	284 (23.4)			2031 (85.4)	348 (14.6)		
Leisure-time sedentary behaviour			44.94	<.001			38.02	<.001
≥ 3 h/day	540 (77.9)	153 (22.1)			523 (72.8)	195 (27.2)		
< 3 h/day	1732 (88.3)	229 (11.7)			1668 (83.4)	331 (16.6)		
Cannabis use			21.77	<.001			199.5	<.001
Yes	105 (72.9)	39 (27.1)			62 (39.0)	97 (61.0)		
No	2110 (86.8)	321 (13.2)			2070 (84.0)	393 (16.0)		
Loneliness			3.47	.062			31.86	<.001
Yes	449 (82.8)	93 (17.2)			401 (72.3)	154 (27.7)		
No	1832 (86.0)	298 (14.0)			1806 (82.8)	374 (17.2)		
Anxiety			40.43	<.001			37.02	<.001
Yes	378 (76.2)	118 (23.8)			357 (70.8)	147 (29.2)		
No	1914 (87.4)	276 (12.6)			1856 (82.7)	388 (17.3)		
School factors								
Truancy			0.830	.362			47.28	<.001
Yes	797 (84.7)	144 (15.3)			721 (73.7)	258 (26.3)		
No	1486 (86.0)	242 (14.0)			1482 (84.5)	272 (15.5)		
Peer support			4.38	.036			0.81	.367
Yes	729 (87.7)	102 (12.3)			692 (81.9)	153 (18.1)		
No	1550 (84.7)	281 (15.3)			1512 (80.4)	368 (19.6)		
Close friends			5.22	.021			25.64	<.001
Yes	2067 (86.0)	337 (14.0)			2020 (81.9)	448 (18.1)		
No	189 (80.4)	46 (19.6)			161 (68.2)	75 (31.8)		
Bullying victimisation			83.41	<.001			114.6	<.001
Yes	1086 (79.9)	273 (20.1)			1018 (72.8)	380 (27.2)		
No	979 (93.1)	73 (6.9)			965 (90.1)	106 (9.9)		
Family factors								
Parental supervision			32.29	<.001			6.03	.012
Yes	1124 (89.6)	131 (10.4)			1061 (82.5)	225 (17.5)		
No	1139 (81.8)	254 (18.2)			1120 (78.8)	302 (21.2)		
Parental understanding			0.18	.670			7.70	.006
Yes	1017 (85.2)	176 (14.8)			1004 (83.0)	206 (17.0)		
No	1260 (85.8)	208 (14.2)			1193 (78.8)	322 (21.2)		
Parental monitoring			5.27	.022			4.93	.026
Yes	994 (83.9)	191 (16.1)			1000 (82.4)	214 (17.6)		
No	1281(87.0)	191 (13.0)			1191 (79.0)	317 (21.0)		
Parent intrusion of privacy			0.11	.736			2.89	.089
Yes	694 (85.5)	121 (14.5)			644 (78.6)	175 (21.4)		
No	1582 (85.7)	265 (14.3)			1549 (81.4)	353 (18.6)		

Note: χ^2 = chi square

suicide ideation while males were more likely to report suicide attempt during the previous 12 months. Age did not show any association with suicide behaviours in the bivariable analysis. Similarly, amongst the personal and lifestyle variables, alcohol drunkenness, cannabis use, ≥ 3 h/day of leisure activities and anxiety were all strongly associated with both suicide ideation and attempt in the previous 12 months. Alcohol drunkenness showed the strongest relationship with both suicidal ideation ($\chi^2_{(1)} = 78.99$, $p < 0.001$), and attempt ($\chi^2_{(1)} = 220.2$, $p < 0.001$). Amongst the school-related factors, adolescent victims of bullying were more likely to report both domains of suicidal behaviour, whereas those who were truant were more likely to report suicidal attempt ($\chi^2_{(1)} = 47.28$, $p < 0.001$). Also, adolescents who reported having close friends were less likely to report suicide ideation ($\chi^2_{(1)} = 5.22$, $p= 0.021$) and suicide attempt ($\chi^2_{(1)} = 25.64$, $p < 0.001$) than those who did not.

Amongst the family-related factors, although none of the suicide behaviours differed according to level of parental intrusion of privacy, parental monitoring and parental supervision were significantly associated with suicide ideation and attempts. Parental understanding was significantly associated with suicide attempt but not suicidal ideation during the previous 12 months.

3.4. Multivariable associations

Results of the logistic regression models are presented in Table 2, stratified by supposed risk and protective factors of suicidal ideation and attempt. Notably, no gender association with suicide ideation or attempt was observed. However, adolescents aged 18 years or more had approximately 2 times higher odds for suicide attempts than those of

Table 2
Multivariate associations.

Variables in models	Suicidal ideation				Suicidal attempt			
	β	aOR	95% CI	*p*-value	*β*	aOR	95% CI	*p*-value
Logistic regression for risk factors								
Demographic variables								
Gender								
Female (reference)		1.00				1.00		
Male	0.033	1.03	0.79, 1.35	0.803	-0.070	0.93	0.73, 1.19	0.578
Age (in years)								
≤ 17 (reference)		1.00				1.00		
≥ 18	0.090	1.09	0.70, 1.70	0.689	**0.447**	**1.56**	**1.07, 2.29**	**0.021**
School grade								
Junior school (reference)		1.00				1.00		
Senior school	**-0.458**	**0.63**	**0.46, 0.87**	**0.005**	**-0.536**	**0.58**	**0.43, 0.79**	**<0.001**
Personal and lifestyle factors								
Alcohol drunkenness	**0.841**	**2.32**	**1.52, 3.55**	**<0.001**	**0.948**	**2.58**	**1.76, 3.79**	**<0.001**
Leisure-time sedentary behaviour	**0.851**	**2.34**	**1.78, 3.08**	**<0.001**	0.174	1.19	0.91, 1.56	0.206
Cannabis use	0.236	1.27	0.73, 2.20	0.483	**1.625**	**5.08**	**3.17, 8.14**	**<0.001**
Loneliness	0.090	1.09	0.80, 1.51	0.579	**0.408**	**1.50**	**1.13, 2.01**	**0.006**
Anxiety	**0.670**	**1.95**	**1.44, 2.66**	**<0.001**	**0.452**	**1.57**	**1.17, 2.11**	**0.003**
School environmental factors								
Truancy	**-0.349**	**0.71**	**0.52, 0.95**	**0.022**	0.253	1.29	0.99, 1.67	0.058
Bullying victimisation	**0.951**	**2.59**	**1.91, 3.51**	**<0.001**	**0.824**	**2.28**	**1.73, 3.00**	**<0.001**
Family-related factors								
Parental intrusion of privacy	0.022	1.02	0.77, 1.36	0.881	0.137	1.15	0.88, 1.50	0.315
Logistic regression for protective factors								
Demographic variables								
Gender								
Female (reference)		1.00				1.00		
Male	0.057	1.06	0.84, 1.34	0.634	0.120	1.13	0.92, 1.38	0.251
Age (in years)								
≤ 17 (reference)		1.00				1.00		
≥ 18	-0.077	0.93	0.62, 1.39	0.710	0.454	**1.57**	**1.15, 2.16**	**0.005**
School grade								
Junior school (reference)		1.00				1.00		
Senior school	**-0.337**	**0.71**	**0.55, 0.93**	**0.013**	**-0.233**	**0.79**	**0.63, 0.99**	**0.045**
School environment factors								
Peer support	**-0.320**	**0.73**	**0.55, 0.95**	**0.022**	-0.076	0.93	0.73, 1.17	0.518
Close friends	-0.341	0.71	0.49, 1.04	0.078	**-0.662**	**0.52**	**0.37, 0.71**	**<0.001**
Family factors								
Parent supervision	**-0.831**	**0.44**	**0.34, 0.57**	**<0.001**	-0.140	0.87	0.70, 1.08	0.213
Parental understanding	0.120	1.13	0.87, 1.45	0.356	**-0.247**	**0.78**	**0.62, 0.98**	**0.032**
Parental monitoring	**0.491**	**1.63**	**1.26, 2.12**	**<0.001**	-0.070	0.93	0.74, 1.17	0.549
Final logistic regression model for all risk and protective factors								
Demographic variables								
Gender								
Female (reference)		1.00				1		
Male	0.008	1.01	0.76, 1.34	0.958	-0.113	0.89	0.69, 1.16	0.389
Age (in years)								
≤ 17 (reference)		1.00				1.00		
≥ 18	0.048	1.05	0.66, 1.66	0.839	0.504	**1.66**	**1.12, 2.45**	**0.012**
School grade								
Junior school (reference)		1.00				1.00		
Senior school	**-0.437**	**0.65**	**0.46, 0.90**	**0.011**	-0.636	**0.53**	**0.39, 0.72**	**<0.001**
Risk factors								
Alcohol drunkenness	**0.954**	**2.59**	**1.64, 4.10**	**<0.001**	**0.898**	**2.45**	**1.65, 3.66**	**<0.001**
Leisure-time sedentary behaviour	**0.700**	**2.01**	**1.50, 2.70**	**<0.001**	0.162	1.18	0.89, 1.56	0.260
Cannabis use	0.025	1.02	0.57, 1.86	0.936	**1.660**	**5.26**	**3.21, 8.59**	**<0.001**
Loneliness	0.095	1.10	0.78, 1.54	0.581	**0.359**	**1.43**	**1.06, 1.93**	**0.019**
Anxiety	**0.743**	**2.10**	**1.51, 2.92**	**<0.001**	**0.481**	**1.62**	**1.19, 2.20**	**0.002**
Truancy	-0.294	0.75	0.55, 1.02	0.064	0.258	1.29	0.99, 1.70	0.061
Bullying victimisation	**0.978**	**2.66**	**1.93, 3.66**	**<0.001**	**0.846**	**2.33**	**1.75, 3.10**	**<0.001**
Parental intrusion of privacy	0.076	1.08	0.78, 1.49	0.648	0.207	1.23	0.92, 1.65	0.169
Protective factors								
Peer support	-0.283	0.75	0.54, 1.05	0.091	-0.086	0.92	0.69, 1.23	0.562
Close friends	-0.323	0.72	0.45, 1.16	0.176	**-0.542**	**0.58**	**0.38, 0.89**	**0.012**
Parent supervision	**-0.991**	**0.37**	**0.27, 0.51**	**<0.001**	-0.075	0.93	0.70, 1.22	0.596
Parental understanding	0.141	1.15	0.84, 1.57	0.375	-0.263	0.77	0.58, 1.02	0.070
Parental monitoring	**0.618**	**1.85**	**1.35, 2.55**	**<0.001**	-0.056	0.95	0.71, 1.27	0.707

Note: β = beta value; aOR = odds ratio; CI = Confidence Interval; Statistically significant results are in bold face

lesser age in the previous 12 months.

3.4.1. Risk factors for suicidal behaviour

In the final adjusted logistic models, bullying victimisation, alcohol drunkenness and anxiety were all significantly associated with increased odds of suicidal ideation and attempt. Cannabis use (OR: 5.26, 95% CI = 3.21–8.59; $p < 0.001$) and loneliness (OR: 1.43, 95% CI = 1.06–1.93; $p = 0.019$) were associated with increased odds of suicidal attempts only, whereas leisure time sedentary behaviour was only associated with increased odds for suicide ideation (OR: 2.01, 95% CI = 1.50–2.70; $p <$

0.001). Interestingly, parental monitoring (OR: 1.85, 95% CI = 1.35–2.55; $p < 0.001$) was uniquely associated with the increased odds of suicidal ideation.

3.4.2. Protective factors of suicidal behaviour

In the fully adjusted models, no variable showed unique protective effects for both suicide behaviours (ideation and attempt). Having a greater number of close friends was only associated with lower odds for suicide attempts (OR: 0.58, 95% CI = 0.38–0.89; $p= 0.012$), whereas parental supervision was only protective for suicide ideation only (OR: 0.37, 95% CI = 0.27–0.51; $p < 0.001$).

4. Discussion

Generally, this study sought to contribute evidence to the literature on suicidal behaviours amongst school-going adolescents in post-conflict sub-Saharan African countries. Specifically, we performed a secondary analysis of the 2017 Sierra Leone WHO-GSHS data. To the best of our knowledge, and drawing on the most recent systematic reviews reporting evidence from (sub-Saharan) Africa (Aggarwal et al., 2017; Quarshie et al., 2020b), this is the first non-clinic-based cross-sectional study that provides evidence on suicidal behaviours amongst school-going adolescents in post-conflict Sierra Leone. Our major findings were two: (1) overall, approximately, 1 out of 6 adolescents reported suicidal ideation during the previous 12 months, while about 2 in 10 adolescents endorsed one or more suicide attempts during the same period; and (2) the factors associated with suicidal behaviours were multi-layered and multi-contextual, including personal-, and family-level factors. Discussing the findings of the current study within the general lens of available evidence on suicidal behaviours amongst school-going adolescents from sub-Saharan Africa will be insightful, but also relating the discussion to evidence from post-conflict Western sub-Saharan Africa (where Sierra Leone is located) will be more meaningful and relevant.

Relative to the recent 12-month prevalence estimates from post-conflict Libera (ideation = 26.8%, and attempt = 33.7%), the observed estimates in the current study are lower (i.e. ideation = 14.6% and attempt = 19.6%). This finding – of comparatively lower prevalence estimates from Sierra Leone – is unexpected, given that some of the participants in the current study might have been born at the latter part or shortly after the civil war in Sierra Leone. Young people exposed to (protracted) armed conflict and violence-related trauma are at increased risk of internalising problems and suicidal tendencies (Betancourt et al., 2020; Kadir et al., 2019, 2018; Liu, 2017). Whereas the difference in the estimates may be attributable to varying sample characteristics, this observation could be pointing to the need for further research aimed at exploring specific contextual factors (including cultural, family and school variables) responsible for the sharp variations in these estimates. Potentially, evidence from such studies in the future would be informative for designing targeted prevention efforts. Within the broader context of sub-Saharan Africa, the prevalence estimates reported in the current study underscore suicidal ideations and attempts as significant mental health outcomes requiring intervention and prevention efforts amongst school-going adolescents in post-conflict Sierra Leone.

The current study found that the factors associated with suicidal behaviours were multi-layered and multi-contextual. At the personal level, no statistically significant gender association with suicide ideation or attempt was observed, but being older (18 years or older), loneliness, and health risk behaviours (cannabis use, and leisure time sedentary behaviour) were associated with increased odds of suicidal behaviours. This finding is not surprising, considering that the most recent study from neighbouring post-conflict Liberia reports similar evidence (Quarshie et al., 2020). The lack of significant gender association with suicidal behaviours could imply that the post-conflict living circumstances may be equally difficult for both school-going adolescent boys and girls in Sierra Leone. This explanation could also be rendered for the comparable prevalence estimates of suicidal behaviours between boys and girls in the current study (males = 15.1%, and females = 14.0%). The finding that being aged 18 or older was associated with suicidal behaviour is to be expected, as participants within this age bracket are likely to have been born towards the end of civil war; their childhood might have been directedly affected by the war and the harsh realities of the immediate aftermath of the armed conflict in Sierra Leone.

Published evidence based on the WHO-GSHS from sub-Saharan Africa has consistently shown loneliness as a critical factor associated with suicidal behaviours amongst school-going adolescents (Biswas et al., 2020; Quarshie et al., 2020b). In Sierra Leone this is to be expected, given that emotional and internalising problems can persist across generations in post-conflict contexts (Betancourt et al., 2020, 2018).

Again, the finding that health risk behaviours – cannabis use and leisure time sedentary behaviour – are associated with increased odds of suicidal behaviours is consistent with recent evidence from neighbouring post-conflict Liberia (Quarshie et al., 2020). Cannabis (and other drug) misuse is common in post-conflict West African countries (Olurishe, 2019), while leisure time sedentary behaviour represents an emerging public health concern amongst adolescents in LAMICs (Vancampfort, Damme, et al., 2019). Leisure time sedentary behaviour is associated with increased levels of depression (Vancampfort et al., 2018), which in turn elevates the risk of self-harm and suicidal behaviours (Quarshie et al., 2020b; Vancampfort, Stubbs, et al., 2019). Cannabis use (like, alcohol and other substance use) impairs judgement, complicates depression, and increases self-directed harm impulses, including suicidal thoughts and behaviours (Borges and Loera, 2010; Carvalho et al., 2019; Quarshie et al., 2021).

Furthermore, the current study has shown that, within the family context, parental monitoring was associated with increased odds of suicidal ideation, but parental supervision was associated with reduced odds of suicide ideation. In terms of peer relationships, having many close friends was associated with lower odds of suicide attempts. These findings are interesting, as they contradict the recent evidence from Liberia – where all three variables (parental monitoring, parental supervision, and having many close friends) were associated with increased odds of suicidal behaviours (Quarshie et al., 2020). The finding that 'parental supervision' and 'having many close friends' are associated with reduced odds of suicidal behaviours is consistent with adolescent development models which posit that supportive parental supervision and having wider social networks are protective against the onset and maintenance of negative behavioural and (mental) health outcomes (Patton et al., 2016; Viner et al., 2012).

The key findings of this study have notable implications for prevention efforts and future research in Sierra Leone. The multi-layered nature of the factors associated with suicidal behaviors amongst school-going adolescents in the current study suggests the need for multi-contextual and multi-sectoral intervention and prevention efforts. For example, social welfare policies aimed at reducing family poverty and enhancing supportive parenting are required to improve the family environment of adolescents. Also, anti-drug and substance use policies, anti-bullying and anti-violence policies, and interpersonal problem-solving and inter-peer communication programmes are needed to enhance supportive school climate. There is evidence to suggest that, in the long-run, supportive school climate promotes adolescent social and emotional health (Wong et al., 2021). High schools should consider including mental health literacy lessons in their curricula and the implementation of educational activities that promote help-seeking behaviours; these can potentially improve help-seeking behaviours amongst students – who are at risk of – emotional problems such as anxiety and loneliness.

Considering that this is a one-off cross-sectional survey (that also reported some findings that are inconsistent with evidence from other post-conflict Western African contexts), there is a need for further studies using more robust designs (e.g., cohort or longitudinal studies, and carefully designed qualitative [interview] studies). Besides

clarifying some of the key findings across time, future studies using robust designs will expand our understanding of the major individual characteristics, family-level factors, school-related variables, and interpersonal-level factors that act as risks and protective factors of suicidal behaviours amongst school-going adolescents in post-conflict Sierra Leone.

As recommended recently for public mental health research involving young people in Africa (Quarshie, 2020), future studies should include items assessing the sexual and gender minority status of participants (lesbian, gay, bisexual, transgender, queer or questioning [LGBTQ+] orientation). Emerging studies have reported worrying vulnerability to self-harm and suicidal behaviours amongst school-going adolescents in some countries within sub-Saharan Africa (Bantjes et al., 2019; Quarshie et al., 2020a).

4.1. Limitations

In most post-conflict countries in sub-Saharan Africa, a considerable number of children and adolescents remain 'out-of-school', while school drop-out and attrition rates are higher (Poirier, 2012). Thus, a critical limitation of the current study is that the findings may not necessarily apply to out-of-school adolescents in Sierra Leone, including truants. The WHO-GSHS recruited only students present on the day of the survey. The cross-sectional nature of the data does not support causal inferences. Considering that suicide and suicidal behaviours are proscribed and stigmatised in Sierra Leone (Keenan, 2017), our data might have been influenced by non-disclosure and social desirability bias.

5. Conclusions

The prevalence estimates reported in the current study underscore suicidal ideations and attempts as significant mental health outcomes requiring intervention and prevention efforts amongst school-going adolescents in post-conflict Sierra Leone. Taken together, the implications of the key findings of the current study for prevention and intervention is that professional mental healthcare would be helpful in treating adolescent emotional problems (e.g., depression and loneliness) related to suicidal behaviours; but prevention and intervention programmes targeted at addressing adolescent health risk behaviours, and familial and interpersonal problems may yield more favourable outcomes.

Funding/Role of funding sources

The authors received no financial support or specific grant from any funding agency in the public, commercial or not-for-profit sectors, for the research, authorship, and/or publication of this article.

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Kwaku Oppong Asante: Conceptualization, Writing – review & editing, Methodology. **Emmanuel Nii-Boye Quarshie:** Conceptualization, Writing – original draft, Writing – review & editing. **Henry K. Onyeaka:** Conceptualization, Writing – review & editing, Data curation, Formal analysis, Writing – original draft.

Declaration of Competing Interest

The authors declare that they have no competing interests.

Acknowledgments

We thank the Sierra Leone Ministry of Education, the Ministry of Health & Sanitation – Sierra Leone (MOHS-SL), and the World Health Organisation and its partners for making publicly and freely available the data from the 2017 Eswatini WHO Global School-based Student Health Survey. More significantly, we thank all the school-going adolescents who contributed data about their life world for this survey.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2021.08.147.

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