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Running title: Suicidal behaviour

Suicidal ideation, plans and attempts: Prevalence and associated factors in school-going adolescents in Sierra Leone in 2017

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Abstract:

Background: The study aimed to assess the prevalence and correlates of suicidal ideation, plans and attempts among middle school students in Sierra Leone.

Method: Data from 2,798 adolescents (15 years of median age) that responded to the cross-sectional "2017 Sierra Leone Global School-Based Student Health Survey (GSHS)" were analysed.

Results: The prevalence of past 12-month suicidal ideation was 14.2%, suicide plans 16.0%, and suicide attempts 19.1%. In adjusted logistic regression analysis, worry-induced sleep disturbance (Adjusted Odds Ratio-AOR: 1.84, 95% Confidence Interval-CI: 1.32-2.57), bullied (AOR: 2.90, 95% CI: 1.77-4.74), trouble from alcohol use (AOR: 1.90, 95% CI: 1.03-3.50), and leisure-time sedentary behaviour (AOR: 2.42, 95% CI: 1.18-4.98) were associated with suicidal ideation. Bullied (AOR: 2.40, 95% CI: 1.46-3.95) and current cannabis use (AOR: 2.48, 95% CI: 1.51-4.09) were associated with suicide plans in the past 12 months. No close friends (AOR: 2.63, 95% CI: 1.46-4.72) loneliness (AOR: 1.69, 95% CI: 1.08-2.66), bullied (AOR: 2.33, 95% CI: 1.66-3.28), trouble from alcohol use (AOR: 4.01, 95% CI: 2.25-7.13) and current cannabis use (AOR: 2.93, 95% CI: 1.37-6.25) were positively and school attendance (AOR: 0.62, 95% CI: 0.42-0.92) negatively associated with suicide attempts in the past 12 months.

Conclusion: Almost one in five students had made suicide attempts in the past 12 months and several associated variables were discovered that can assist in designing interventions.

Key words: Suicidal ideation, suicide plans, suicide attempts, middle school students, Sierra Leone

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Background

Globally, among young people, suicide is the major cause of death [1]. Suicidal behaviour, such as suicide attempts, is an important predictor of death [2]. Current trends of suicidal ideation, plans and attempts and its correlates in adolescent populations may be relevant in suicide prevention strategies [3]. In a multicountry adolescent school survey, including 8-13 countries of the sub-Saharan African region, the pooled prevalence of past 12-month suicidal ideation was 20.4% (ranging from 10.3% in Malawi to 31.8% in Zambia), suicide plans 23.7% (ranging from 8.3% in Tanzania to 41.0% in Zambia) and attempted suicide was "19.3% (ranging from 10.2% in Tanzania to 27.9% in Benin)" [4].

Children that grow up in a post-conflict setting, such as in Sierra Leone, may be exposed to various adversities, including violence at home and family disruption, and may develop various psychopathological symptoms [5-7]. The "effects of trauma from living through conflict, epidemics, and natural disasters are long-lasting and may be transmitted intergenerationally in Sierra Leone" [8]. In a qualitative study in Sierra Leone, Yoder et al. [9] conclude that "in the aftermath of a decade of conflict and a devastating Ebola crisis, children and adolescents in Sierra Leone are at critical risk of developing mental health problems." Sierra Leone had 13.96 suicides per 100,000 inhabitants in 2015, above the world average of 9.56 suicides per 100,000 people [10]. Patients (N=546) assessed in the mental health programme in Makeni, Sierra Leone, found that 1.8% had "self-aggressive behaviour, including suicide attempts and self-injurious behaviour" [11]. There is a lack of information on suicidal ideation, plans and attempts among middle school children in Sierra Leone.

As previously reviewed [12,13], risk factors of suicidal behaviour among adolescents include "female sex, older age, lower socioeconomic status, having no close friends, loneliness, anxiety, bullied, exposure to interpersonal violence, alcohol use, drug use, cannabis use and injury, and protective factors include parental and peer support." Furthermore, sexual behaviour [14] and sedentary behaviour [15,16] increased and physical activity [15-17] decreased the likelihood of suicidal behaviour. The study aimed to assess the prevalence and correlates of suicidal ideation, plans and attempts among middle school students in Sierra Leone.

Methods

Data from the cross-sectional national "2017 Sierra Leone Global School-based Student Health Survey GSHS" were analyzed [18]. In a two-stage cluster sample design "schools

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were selected with a probability proportional to enrollment size, and classes were randomly the selected and all students in selected classes were eligible to participate" [18]. The overall study response rate was 82%. [18]. Ethical approval was obtained from an ethics committee in Sierra Leone, and participants gave written consent [18].

Measures

Qutcome variables: Suicidal ideation was measured with the question "During the past 12 months, did you ever seriously consider attempting suicide?" (Yes, No") Suicide plan: "During the past 12 months, did you make a plan about how you would attempt suicide?" (Yes, No") and suicide attempt: "During the past 12 months, how many times did you actually attempt suicide?" (number of times) Responses were grouped into 1=0 times, 1=2 or more times [18].

Covariates included demographic variables (age, sex), four psychosocial distress variables (loneliness and worry-induced sleep disturbance in the past 12 months, bullied in the past month, and number of close friends), four health risk behaviours (trouble from alcohol use, current cannabis use, multiple sexual partners, leisure-time sedentary behaviour) four protective factors (peer support, parental support, school attendance and physical activity) (details in Table 1) [18]. The four parental support items (supervision, bonding, connectedness, and respect) were grouped into low, medium, and high [12].

Data analysis

Statistical analyses were done with "STATA software version 15.0 (Stata Corporation, College Station, Texas, USA)," taking the multistage sampling and weighting of the data into account. Univariate and multivariable logistic regression was utilized to estimate predictors of past 12-month suicidal ideation, suicide plans, and suicide attempts. Variables significant in univariate analysis were subsequently included in the multivariable models. $P<0.05$ was considered significant. Missing values were excluded from the analysis.

Results

The sample consisted of 2,798 middle school students (median age: 15 years, interquartile range 14-17), 48.4% were female and 51.6% male, 14.2% had suicidal ideation, 16.0% suicide plans and 19.1% suicide attempts in the past 12 months. Further sample details are shown in Table 2.

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Table 2

Associations with suicidal ideation

In adjusted logistic regression analysis, worry-induced sleep disturbance (Adjusted Odds Ratio-AOR: 1.84, 95% Confidence Interval-CI: 1.32-2.57), bullied (AOR: 2.90, 95% CI: 1.77-4.74), trouble from alcohol use (AOR: 1.90, 95% CI: 1.03-3.50), and leisure-time sedentary behaviour (AOR: 2.42, 95% CI: 1.18-4.98) were associated with past 12-month suicidal ideation. In addition, in univariate analysis cannabis use was positively and high parental support negatively associated with suicidal ideation (see Table 3).

Table 3

Associations with suicidal plans

In the adjusted logistic regression analysis, bullied (AOR: 2.40, 95% CI: 1.46-3.95) and current cannabis use (AOR: 2.48, 95% CI: 1.51-4.09) were associated with suicide plans in the past 12 months. In addition, in univariate analysis, no close friends, worry-induced sleep disturbance, trouble from alcohol use, and leisure-time sedentary behaviour were associated with suicide plans (see Table 4).

Table 4

Associations with attempting suicide

In the adjusted logistic regression analysis, no close friends (AOR: 2.63, 95% CI: 1.46-4.72) loneliness (AOR: 1.69, 95% CI: 1.08-2.66), bullied (AOR: 2.33, 95% CI: 1.66-3.28), trouble from alcohol use (AOR: 4.01, 95% CI: 2.25-7.13) and current cannabis use (AOR: 2.93, 95% CI: 1.37-6.25) were positively and school attendance (AOR: 0.62, 95% CI: 0.42-0.92) negatively associated with suicide attempts in the past 12 months. In addition, in univariate analysis, multiple sexual partners and leisure-time sedentary behaviour were associated with suicide attempts (see Table 5).

Table 5

Discussion

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In this national study among school adolescents in Sierra Leone, the prevalence of past year suicidal ideation (14.2%) was lower than in 13 African countries (20.4%) but higher than in Malawi (10.3%) [4]. The proportion of past year suicide plans in this study (16.0%) was lower than in 13 African countries (23.7%) but higher than in Tanzania (8.3%), and the proportion of year suicide attempts in this study (19.1%) was similar than in 8 African countries (19.3%) and higher than in Tanzania (10.2%) [4]. It appears that the rate of suicidal behaviour among adolescents in Sierra Leone is not significantly higher than in other African countries, including those without a post-conflict context.

Previous studies found a higher prevalence of suicidal behaviour (ideation, plans and attempts) in females than in male adolescents [19,20], while this survey did not find significant gender differences. This finding might indicate that similarly to girls, boys "internalize emotional-behavioural problems (leading more likely to suicidal ideation and suicide attempts)" [21]. In a multicountry adolescent school survey [19], suicidal ideation, plans and attempts increased with age, while we did not find significant age differences in this study.

In agreement with previous studies [19,20,22,23], this study found an association between psychosocial distress (loneliness, worry-induced sleep disturbance, no close friends, and/or being bullied) and suicidal ideation, plans and/or attempts. Several researchers [24,25] have shown that having psychosocial distress predicts suicidal behaviour. Suicide prevention efforts should include the treatment of mental distress and anti-bullying programmes.

In agreement with previous investigations [12,13,15,16,19,26], this survey found an association between health risk behaviours (trouble from alcohol use, current cannabis use, and/or sedentary behaviour) and suicidal ideation, plans and/or attempts. Some research [14] showed an association between sexual behaviour and suicide attempt, while this study found only in univariate analysis a significant positive association with suicide attempts.

Consistent with a previous study [27], this study showed that school attendance was protective against suicide attempts. This shows the potentional importance of promoting school attendance in preventing suicide attempts. Unlike previous research [13,15-17,19,20,28-30], this study did not find that parental and peer support, and physical activity was protective against suicidal behaviour, only high parental support was protective against suicidal ideation in univariate analysis. Despite human resource limitations in providing mental health services in Sierra Leone [11], "mental health services are now freely available in all districts, with mental health nurses stationed in almost all district hospitals providing

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basic counselling for those with common mental health disorders and where needed, providing referrals for more complex cases."[31]

Study limitations

Due to the cross-sectional survey design, no causative conclusions can be drawn between independent and dependant variables. The gross secondary school enrolment in Sierra Leone was 42% in 2017 [32]; therefore majority of adolescents do not attend middle school. It is possible that the prevalence of suicidal behaviour was higher in out-of school than in-school adolescents. The data was assessed by self-administered anonymous questionnaires in a class room setting, which may have biased some responses. Some variables, such as anger management and help seeking, were not measured in this survey and should be assessed in future research.

Conclusion

The 2017 Sierra Leone GSHS found that almost one in five students had been engage in suicidal ideation, plans and/or suicide attempts in the past year. Psychosocial distress (loneliness, worry-induced sleep disturbance, no close friends, and/or being bullied) and health risk behaviours (trouble from alcohol use, current cannabis use, and/or sedentary behaviour) increased the risk of suicidal ideations, plans and/or attempts. Protective against suicide attempts was school attendance and in univariate analysis high parental support was protective against suicidal ideation. Targeting the identified risk factors and promoting identified protective factors of suicidal behaviour in interventions may reduce suicidal behaviour among school adolescents.

Conflict of interest

"The authors declare that they have no conflict of interest."

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Author contributions

"All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all

these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work."

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Table 1: Questionaire items

Variables	Question	Response options (coding scheme)
Suicidal ideation	"During the past 12 months, did you ever seriously consider attempting suicide?"	"Yes, No"
Suicide plan	"During the past 12 months, did you make a plan about how you would attempt suicide?"	"Yes, No"
Suicide attempt	"During the past 12 months, how many times did you actually attempt suicide?"	"1=0 times to 5=6 or more times (coded 1=1, 2=2 and 3–5=3)"
Age	"How old are you?"	"11 years old or younger to 18 years old or older"
Sex	"What is your sex?"	"Male, Female"
	Psychosocial distress	
No close friends	"How many close friends do you have?"	"1 = 0 to 4 = 3 or more (coded 1+=0, 0=1)"
Loneliness	"During the past 12 months, how often have you felt lonely?"	"1=never to 5=always (coded 1–3=0 and 4–5=1)"
Sleep disturbance caused by worry	"During the past 12 months, how often have you been so worried about something that you could not sleep at night?"	"1=never to 5=always (coded 1–3=0 and 4–5=1)"
Bullied	"During the past 30 days, on how many days were you bullied?"	"1=0 days to 7=All 30 days (coded 1-2=0 and 3–7=1)"
	Health risk behaviour	
Trouble from alcohol use	"During your life, how many times have you got into trouble with your family or friends, missed school, or got into fights, as a result of drinking alcohol?"	"1=0 time to 4=10 or more times (coded 1=0 and 2-4=1)"
Current cannabis use	"During the past 30 days, how many times have you used marijuana (also called jamba)?"	"1=0 times to 5=20 or more times (coded 1=0 and 2-5=1)"
Multiple sexual partners	"During your life, with how many people have you had sexual intercourse?"	"I have never had sexual intercourse, 1 person to 6 or more people" (coded 2-6 people=1 and never and 1=0)"
Leisure-time sedentary behavior	"How much time do you spend during a typical or usual day sitting and watching television, playing computer games, talking with friends, or doing other sitting activities, such as watching movies, drafting, Ludo, or chatting on social media (WhatsApp, Facebook, or Twitter)?"	"1=Less than 1 hour per day… 3= 3 to 4 hours per day …6=8 or more hours a day"
	Protective factos	
Peer support	"During the past 30 days, how often were most of the students in your school kind and helpful?"	"1=never to 5=always (coded 1-2=1, 3–5=0)"
Supervision	"During the past 30 days, how often did your parents or guardians check to see if your homework was done?"	"1=never to 5=always (coded 1-2=1 and 3–5=0)"
Connectedness	"During the past 30 days, how often did your parents or guardians understand your problems and worries?"	"1=never to 5=always (coded 1-2=1 and 3-5=0)"
Bonding	"During the past 30 days, how often did your parents or guardians really know what you were doing with your free time?"	"1=never to 5=always (coded 1-2=1 and 3-5=0)"
Respect for privacy	"During the past 30 days, how often did your parents or guardians go through your things without your approval?"	"1=never to 5=always (coded 1–3=0 and 4–5=1)"
School attendance	"During the past 30 days, on how many days did you miss classes or school without permission?"	"1=0 days to 5= 10 or more days (coded 1=1 and 2-5=0)"

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Physical activity	"Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time. Physical activity can be done in sports, playing with friends, or walking to school. Some examples of physical activity are running, fast walking, biking, dancing, and football." "During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?"	"0=0 days to 7=7 days (coded 0-6=0 and 7=1)"

Table 2: Sample and proportion of suicidal ideation, plan and attempted suicide among middle school students in Sierra Leone, 2017

Variable	Response	Sample	Suicidal ideation	Suicide plans	Suicide attempts
		N (%)	%	%	%
Socio-demographics					
All		2798	14.2	16.0	19.1
Age (years)	≤14	973 (35.6)	14.7	15.3	17.7
	15-17	939 (34.6)	14.1	15.5	20.1
	≥18	868 (29.8)	13.5	17.1	19.8
Gender	Female	1484 (48.4)	14.0	16.0	18.1
	Male	1258 (51.6)	14.1	15.7	19.3
Psychosocial distress					
No close friends	No	2482 (90.8)	13.5	15.1	17.9
	Yes	249 (9.2)	20.3	24.4	30.0
Loneliness	No	2202 (80.6)	13.8	15.4	16.7
	Yes	566 (19.4)	15.9	18.8	28.0
Worry-induced sleep disturbance	No	2264 (81.5)	12.4	14.1	17.0
	Yes	520 (18.5)	22.4	24.3	28.2
Bullied	No	1078 (43.4)	6.5	9.4	9.8
	Yes	1423 (56.6)	19.5	21.4	26.8
Health risk behaviours					
Trouble from alcohol use	No	2389 (93.3)	12.4	14.5	14.7
	Yes	206 (6.7)	33.8	31.7	59.3
Current cannabis use	No	2546 (95.7)	13.1	14.5	16.1
	Yes	138 (4.3)	33.4	38.6	63.2
Multiple sexual partners (≥2)	No	2285 (87.0)	13.5	15.2	17.0
	Yes	360 (13.0)	18.6	20.9	28.9
Sedentary behaviour	No	2025 (75.0)	11.1	13.2	16.3
	Yes	727 (25.0)	23.2	23.7	26.6
Protective factors					
Peer support	Low	1905 (70.4)	14.7	16.6	18.5
	High	854 (29.6)	11.7	13.1	18.6
Parental support					
0-1	Low	1116 (39.6)	15.1	16.4	21.8
2	Moderate	781 (30.0)	17.1	18.5	17.7
3-4	High	771 (30.4)	9.2	13.1	15.8
School attendance	No	992 (35.0)	14.4	16.5	25.6

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	Yes	1777 (65.0)	13.8	15.5	15.2
Physically active	No	2294 (82.1)	15.1	16.9	19.9
	Yes	450 (17.9)	9.7	11.4	15.5

Table 3: Associations with suicidal ideation among school adolescents in Sierra Leone, 2017

Variable	Categories	COR (95% CI)	AOR (95% CI)
Age (years)	≤14	1 (Reference)	---
	15-17	0.95 (0.73, 1.24)	
	≥18	0.90 (0.63, 1.29)	
Gender	Female	1 (Reference)	---
	Male	1.01 (0.74, 1.37)	
Psychosocial distress			
No close friends	No	1 (Reference)	---
	Yes	1.63 (0.89, 3.00)	
Loneliness	No	1 (Reference)	---
	Yes	1.18 (0.69, 2.01)	
Worry-induced sleep disturbance	No	1 (Reference)	1 (Reference)
	Yes	2.05 (1.39, 3.02)***	1.84 (1.32, 2.57)***
Bullied	No	1 (Reference)	1 (Reference)
	Yes	3.46 (2.23, 5.37)***	2.90 (1.77, 4.74)***
Health risk behaviours			
Trouble from alcohol use	No	1 (Reference)	1 (Reference)
	Yes	3.61 (2.10, 6.19)***	1.90 (1.03, 3.50)*
Current cannabis use	No	1 (Reference)	1 (Reference)
	Yes	3.33 (1.91, 5.81)***	1.46 (0.75, 2.85)
Multiple sexual partners (≥2)	No	1 (Reference)	---
	Yes	1.46 (0.89, 2.41)	
Sedentary behaviour	No	1 (Reference)	1 (Reference)
	Yes	2.43 (1.26, 4.71)**	2.42 (1.18, 4.98)*
Protective factors			
Peer support	Low	1 (Reference)	---
	High	0.77 (0.47, 1.26)	
Parental support			
0-1	Low	1 (Reference)	1 (Reference)
2	Moderate	1.16 (0.55, 2.44)	1.34 (0.64, 2.81)
3-4	High	0.57 (0.38, 0.86)**	0.65 (0.42, 1.09)
School attendance	No	1 (Reference)	---
	Yes	0.95 (0.54, 1.66)	
Physically active	No	1 (Reference)	---
	Yes	0.61 (0.35, 1.04)	

COR=Crude Odds Ratio; AOR=Adjusted Odds Ratio; CI=Confidence Interval; ***p<0.001, **p<0.01, *p<0.05

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Table 4: Associations with suicide plan among school adolescents in Sierra Leone, 2017

Variable	Categories	COR (95% CI)	AOR (95% CI)
Age (years)	≤14 15-17 ≥18	1 (Reference) 1.02 (0.78, 1.33) 1.14 (0.78, 1.18)	---
Gender	Female Male	1 (Reference) 0.98 (0.74, 1.30)	---
Psychosocial distress			
No close friends	No Yes	1 (Reference) 1.81 (1.04, 3.14)*	1 (Reference) 1.25 (0.58, 2.71)
Loneliness	No Yes	1 (Reference) 1.27 (0.82, 1.98)	---
Worry-induced sleep disturbance	No Yes	1 (Reference) 1.96 (1.27, 3.02)**	1 (Reference) 1.56 (0.99, 2.46)
Bullied	No Yes	1 (Reference) 2.64 (1.68, 4.13)***	1 (Reference) 2.40 (1.46, 3.95)***
Health risk behaviours			
Trouble from alcohol use	No Yes	1 (Reference) 2.73 (1.48, 5.01)**	1 (Reference) 1.59 (0.85, 2.96)
Current cannabis use	No Yes	1 (Reference) 3.71 (2.11, 6.52)***	1 (Reference) 2.48 (1.51, 4.09)***
Multiple sexual partners (≥2)	No Yes	1 (Reference) 1.48 (0.87, 2.51)	---
Sedentary behaviour	No Yes	1 (Reference) 2.04 (1.02, 4.07)*	1 (Reference) 2.00 (0.87, 4.63)
Protective factors			
Peer support	Low High	1 (Reference) 0.76 (0.46, 1.23)	---
Parental support 0-1 2 3-4	 Low Moderate High	 1 (Reference) 1.16 (0.56, 2.40) 0.77 (0.49, 1.20)	---
School attendance	No Yes	1 (Reference) 0.93 (0.56, 1.55)	---
Physically active	No Yes	1 (Reference) 0.63 (0.38, 1.05)	---

COR=Crude Odds Ratio; AOR=Adjusted Odds Ratio; CI=Confidence Interval; ***p<0.001, **p<0.01, *p<0.05

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Table 5: Associations with suicide attempt among school adolescents in Sierra Leone, 2017

Variable	Categories	COR (95% CI)	AOR (95% CI)
Age (years)	≤14 15-17 ≥18	1 (Reference) 1.17 (0.81, 1.68) 1.14 (0.73, 1.79)	---
Gender	Female Male	1 (Reference) 1.08 (0.76, 1.54)	---
Psychosocial distress			
No close friends	No Yes	1 (Reference) 1.97 (1.16, 3.34)*	1 (Reference) 2.63 (1.46, 4.72)**
Loneliness	No Yes	1 (Reference) 1.94 (1.40, 2.70)***	1 (Reference) 1.69 (1.08, 2.66)*
Worry-induced sleep disturbance	No Yes	1 (Reference) 1.92 (1.40, 2.65)***	1 (Reference) 1.64 (0.97, 2.75)
Bullied	No Yes	1 (Reference) 3.37 (2.53, 4.48)***	1 (Reference) 2.33 (1.66, 3.28)***
Health risk behaviours			
Trouble from alcohol use	No Yes	1 (Reference) 2.73 (1.48, 5.01)**	1 (Reference) 4.01 (2.25, 7.13)***
Current cannabis use	No Yes	1 (Reference) 8.91 (4.53, 17.53)***	1 (Reference) 2.93 (1.37, 6.25)**
Multiple sexual partners (≥2)	No Yes	1 (Reference) 1.99 (1.26, 3.13)**	1 (Reference) 1.25 (0.69, 2.28)
Sedentary behaviour	No Yes	1 (Reference) 1.86 (1.34, 2.59)***	1 (Reference) 1.18 (0.71, 1.94)
Protective factors			
Peer support	Low High	1 (Reference) 1.00 (0.70, 1.43)	1 (Reference)
Parental support 0-1 2 3-4	 Low Moderate High	 1 (Reference) 0.77 (0.55, 1.04) 0.67 (0.45, 1.00)	 ---
School attendance	No Yes	1 (Reference) 0.52 (0.35, 0.78)**	1 (Reference) 0.62 (0.42, 0.92)*
Physically active	No Yes	1 (Reference) 0.73 (0.51, 1.06)	---

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COR=Crude Odds Ratio; AOR=Adjusted Odds Ratio; CI=Confidence Interval; ***p<0.001, **p<0.01, *p<0.05