



Suicidal behaviours (ideation, plan and attempt) among school-going adolescents: A study of prevalence, predisposing, and protective factors in Saint Vincent and the Grenadines

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ABSTRACT

Suicide occurs throughout life and is among the leading causes of death among adolescents globally. Aside from the growing literature on this serious mental health issue, little is known about the prevalence of suicide and the variables that predispose and protect adolescents against it in Saint Vincent and the Grenadines. We analysed the Global School-based Student Health Survey data collection among school-going adolescents in Saint Vincent and the Grenadines to explore the prevalence, risk and protective variables associated with suicidal behaviours. We observed prevalence rates of 26%, 26%, and 19% for suicide ideation, plan, and attempt, respectively. Furthermore, sex (being male) and having parents or guardians who understand the problems and worries of adolescents served as protective factors against all three suicide behaviours. However, we observed truancy, cigarette smoking, bullying victims (on/off school property), being cyberbullied, loneliness, and worry as risk factors for suicide ideation among adolescents. Risk for suicide plan was predicted by truancy, cigarette smoking, physical fight, bullying victims (on/off school property), being cyberbullied, loneliness, and worry. After controlling for other factors, truancy, amphetamine or methamphetamine use, cigarette smoking, physical fight, bullying victims (on/off school property), serious injury, close friends, loneliness, and worrying about life issues predicted suicide attempt risk among adolescents in Saint Vincent and the Grenadines. Early identification and suicide prevention interventions focusing on identified protective and risk factors may help minimise the prevalence of suicide behaviours among school-going adolescents in Saint Vincent and the Grenadines.

1. Introduction

Transitioning from childhood through adolescence to adulthood is characterised by various developmental milestones and experiences that pose significant impacts on the physical, emotional, social and mental wellbeing of adolescents [20,22,54,61]. During this transition period, adolescents experience heightened mental health problems, including suicide [9]. Also, by age 14, half of the adolescents' mental health problems are well established [32]. Suicidal behaviours remain a significant global health issue among adolescents even though countries strive to achieve the Sustainable Development Goal (SDG) 3.4 target, which seeks to promote mental health and wellbeing by 2030 [71].

Suicide, described as any mortality resulting from injuring oneself with the intent to die [13], is characterised mainly by a spectrum of behaviours, including suicidal ideation (the thought of killing oneself), suicidal plan

(formulating methods and steps) and suicidal attempt (engaging in a harmful suicide-inducing act) with most suicidal attempts being the prime predictor of suicide [51,75]. Highlighting the scope of suicidal behaviours (idea, plan and attempt) is an essential forerunner for informing interventions toward preventing suicide among the population. Furthermore, suicide is a global mental health problem facing both developed and developing countries [14,37,52,76].

Suicide is a phenomenon that occurs across all age groups and in all regions across the world. Although epidemiological evidence suggests a 30% increment in the suicide rate between 2000 and 2018 and a relative decline between 2019 and 2020, suicide was ranked fourth as the leading cause of death among people between the ages of 15 and 19 years in 2019, with 703,000 people losing their lives due to suicide annually [13,76]. Suicide, as a leading cause of death in the United States, accounted for 45,979 deaths in 2020 [14], and in the same year, 12.2 million, 3.2 million and

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1.2 million American adults engaged in suicidal ideation, plan and attempt, respectively [64]. Whilst these reported figures in America alone are significantly high for suicidal behaviours, WHO indicated that up to 77% of the global occurrence of suicide is among low- and middle-income countries [76].

Some previous studies have reported insights about the prevalence of suicidal behaviours among adolescents based on data from individual countries, whilst other studies synthesised data from multiple countries. For instance, prevalence rates of 18.8%, 14.7%, and 7.9% for suicidal ideation, plan and attempt among adolescents in the United States between 1991 to 2017 were reported by Lindsey et al. [37]. Another study among adolescents in the United States by Nock et al. [50] reported a 12.1%, 4.0%, and 4.1% prevalence of suicidal ideation, plan and attempt, respectively. Also, a Vietnamese adolescent study by Nguyen Thi Khanh et al. [48] reported prevalence rates of suicidal ideation, plan, and attempt as 14.2%, 5.5%, and 3.0%, respectively. Among Africans, country prevalence such as 18.2%, 22.5% and 22.2% were reported in Ghana for suicidal ideation, plan and attempt, respectively [52]. Other evidence includes studies by Seidu et al. [58] in Mozambique with the prevalence of 17.7%, 19.6% and 18.5% for suicidal ideation, plan, and attempt, respectively. In Ethiopia, Amare et al. [2] also reported prevalence rates of 22.5% and 16.2% for suicide ideation and attempt.

From a broader perspective, the population-based study among 59 low-and-middle-income countries found the overall prevalence of suicidal idea, plan and attempt as 16.9%, 17.0%, and 17.0%, respectively [69]. In the same study, the African region had the highest prevalence of suicidal ideation (20.4%) and suicide plan (23.7%), whilst the highest prevalence of suicide attempt (20.5%) was found in the Western Pacific Region, with Southeast Asia being the region with the lowest prevalence of suicidal ideation (8.0%), plan (9.9%), and attempt (9.2%) [69]. Aside from the regional and countrywide prevalence of suicide behaviours, multiple factors, including but not limited to demographic, personal, environmental, and psychological, influence suicidal behaviours [33,45,68].

Evidence shows that while some of these factors are predisposing or risks, others are protective against suicide behaviours among adolescents [19,52]. From our review of the existing literature on correlates of suicide behaviours, we identified demographic, personal, drug and substance use, and psychosocial factors as the primary correlate in several studies [19,50,52,58,60]. According to Joiner's interpersonal theory of suicide, suicide risk is brought about by the interaction of three factors: an individual's experience of loneliness, their perception of being a burden on others, and addiction to self-harm due to earlier non-suicidal self-injury, suicidal behaviour, or some other risk behaviours [72]. Miranda-Mendizabal et al. [46] explained that despite gender differences in suicidal behaviours, females presented a higher risk of suicidal behaviours than males. Additionally, Oppong Asante et al. [52] found risk factors such as worrying, loneliness, bullying, being physically attacked, involvement in a physical fight, food insecurity, truancy, and an increasing number of close friends associated with suicidal behaviours. Also, evidence from McKinnon et al. [45] suggests limited parental support and alcohol and tobacco use as risk factors for suicidal behaviours. Nonetheless, peer support [58], parental understanding of adolescents' problems, and parental respect for privacy [52] protected adolescents' engagement in suicidal behaviours.

Notwithstanding the several existing studies on adolescents' suicide behaviours, little attention has been paid to Saint Vincent and the Grenadines. Saint Vincent and the Grenadines, an island country in Eastern Caribbean, has 26,700 young people (10-24 years) [70]. According to the UN population projections, as reported by UNICEF [70], young people accounted for 24% of the population in 2020. Despite a reported 27% prevalence of suicide attempt among adolescents (13-17) in Saint Vincent and the Grenadines [70], data on the suicide-specific mortality rate suggests 4.25 suicides per 100,000 people in 2017 [67]. Due to this paucity of current evidence on the prevalence and correlates of suicide behaviours (idea, plan, and attempt) among school-going adolescents in Saint Vincent and the Grenadines, we analysed the Global School-based Student Health Survey (GSHS) to provide a nationally representative picture of the case. Our

study's findings will also inform policy decisions regarding the implementation of workable interventions to reduce suicide among adolescents in Saint Vincent and the Grenadines. Arguably, policies, suicide prevention strategies, and health promotion interventions based on evidence are effective ways to help the nation of Saint Vincent and the Grenadines achieve SDG 3 targets by 2030 [71].

2. Conceptual framework of adolescent suicide

Our study's framework of adolescent suicide was conceptualised based on the Risk and Protective Factors Model (RPFM, [27]) and the Perceptual Control Theory (PCT, [55]). The RPFM served as the explanatory theoretical base to explain our study's correlates of suicide behaviours, while the PCT formed the descriptive theory for adolescents' suicide behaviours.

2.1. Risk and protective factors model [27]

The RPFM, as the explanatory theory posits, that within a particular population, there are factors that may ameliorate the effects of psychological problems (protective) or exacerbate the probability of developing a psychological problem (risk factors). Several factors may be associated with susceptibility to mental health problems among school-going adolescents, including suicide. These include personal, situational, and social context characteristics associated with mental health. Among adolescents, pertinent socio-demographic factors related to suicidal ideation and attempt may include younger age, perceived socioeconomic status, and alcohol and substance use [45,52]. Knowledge of risk and protective factors associated with suicidal ideation among school-going adolescents living in Saint Vincent and the Grenadines is needed to help develop preventive programmes among this population.

Besides, we deduced from this model that suicidal ideation and attempts among adolescents are associated with several personal, familial, societal, and systemic factors that need to be addressed holistically to reduce the incidence prevalence of suicide among adolescents [2,37,45,52]. In this study, we used the nationwide GSHS to explore risk and protective factors associated with ideators, planners and attempters. We further explored multiple risks and protective factors at the individual, family, peer, and school levels to understand factors related to suicidal behaviours. We hypothesised that predictive criteria would be uniquely associated with outcome criteria. Specifically, we expected psychosocial factors (such as personality type, school truancy, understanding parents, loneliness, and worrying), substance use and related violent behaviours to increase the risk of suicidal behaviours. Nevertheless, we hypothesised demographic factors like being male, lower age, lower grades and other psychosocial factors like parental support behaviours (understanding parents) and peer behaviours (having close friends) as possibly protective of suicidal behaviours in our study.

2.2. Perceptual control theory [55]

The PCT [55] embodied the concepts of control, goal conflict, and awareness and served as the descriptive theory that guided this study. Suicide is regarded as occurring due to a long-standing conflict between an individual's personal goals, culminating in an acute loss of control. The individual then strives to regain control through suicide because of little awareness of their actions on other valued goals. This psychological mechanism of limited awareness is posited to be the common pathway by which individuals contemplate suicidal thoughts (ideators), project means toward suicide outcome (planners) and make a suicide attempt (attempters). This framework theorises that loss of control and goal conflict increase an individual's psychological distress. In our study, we noted that PCT explained all suicidal behaviours as an effort to act on the environment to achieve and maintain adolescents' desired experiences (perceptual states).

Essentially, when school-going adolescents are in crisis, intent to die and motivation for ending their lives act as precipitating mechanisms [43]. Both ideators and attempters can experience ambivalence about

suicide if they have motivations for suicide and reasons for staying alive [10]. In addition, individuals who are in crisis can experience imagery related to suicide, such as images of desired outcomes (*all will end*) or unwanted consequences (*I may fail the attempt and may harm myself eventually*) [26]. Thus, evidence shows that only a third of ideators can become attempters [49], suggesting differences between ideators and attempters [34]. Ideators and attempters have been found to differ in terms of environmental, social, and physiological factors, such as sensitivity to pain and access to means of suicide [35]. In addition, there is evidence that ideators and attempters differ regarding the psychological processes underlying their experiences leading to and during suicidal crises. For example, in a study, attempters demonstrated an increased focus on suicide-related stimuli [15] and reduced fear of death [63] relative to ideators.

Adolescents' suicide risk can fluctuate over days or even hours [10]. The period between considering suicide and trying can be as short as ten minutes [17]. School-going adolescents have an intrinsic need to control their perceptions of themselves and their society [42]. This inherent need includes being academically successful and maintaining friendships with peers, which gives them a sense of purpose [40]. This normal human functioning is described as a state in which individuals have as much control as they would like over the most important experiences [12]. Powers [56] stated that when individuals do not have sufficient control over their experiences, they experience error (i.e., a sense of discrepancy between the current experiences and the experience they would like to have). The error can result in psychological distress that may manifest in various ways, depending on individual factors/goals and extrinsic factors [41].

Moreover, PCT proposes a more subtle way to reduce an individual's control over their experiences, which is when they try to control two incompatible experiences simultaneously [55]. For example, vulnerable students may have a dilemma of choosing between the dictates of their peers and personal values accrued from home. This dilemma may result in conflicts between the individual's goals, often outside the individual's awareness. As a result, this conflict can remain unresolved and consequently, the individual cannot achieve control over their goal, which may lead to ongoing psychological distress [23,55]. There are situations whereby focusing on the discrepancy (problem), they gain new insights into ways of resolving it through a process known as reorganisation [41]. Individuals develop new ways of achieving their goals through trial and error [12,41,55]. However, if goal conflict remains outside of an individual's awareness and is not resolved, it can become chronic goal conflict [12] and eventually, ending one's life becomes the best option. In this study, we hypothesised that predictive criteria would be uniquely associated with three outcome criteria (suicide ideation, plan, and attempt). Specifically, we also hypothesise that the prevalence of suicide ideators and planners may be higher than attempters, as indicated by evidence [49].

3. Method

3.1. Study design and sample

We gathered and analysed data on suicide behaviours and their correlates in school-going adolescents (aged 13-17 years) in Saint Vincent and the Grenadines. We used data from the 2018 GSHS [77]. The GSHS is a school-based survey which uses a self-administered questionnaire to obtain data on young people's health behaviour and protective factors related to the leading causes of morbidity and mortality among adolescents worldwide. In collaboration with the CDC and Saint Vincent and the Grenadines' Ministry of Health, Wellness and Environment, the WHO carried out the GSHS. The survey used a cross-sectional study design to collect data from WHO member countries that were interested in examining the behavioural risk factors and protective factors in several domains of functioning among the youth in schools. The study used close-ended structured questionnaires to solicit responses from student adolescents in Saint Vincent and the Grenadines. The WHO website (<https://extranet.who.int/ncdsmicrodata/index.php/catalog/878/study-description#metadata-identification>)

contains details of the systematic steps followed in collecting data from the respondents.

3.2. Sampling procedure

A two-stage cluster sampling method was used to produce data representative of all students in Form 2 to First-year Saint Vincent and the Grenadines Community College in Saint Vincent and the Grenadines. In the first stage, schools were selected with probability proportional to enrolment size. In the second stage, classes were randomly selected, and all students in selected classes were eligible to participate. The school response rate was 100%, the student response rate was 78%, and the overall response rate was 78%. A total of 1,877 students participated in the survey. The overall response rate in this study was higher than the overall response rate among Senior High School students in Ghana (71%) [52] but slightly lower than the overall response rate reported in Mozambique [58]. Despite the differences in overall response rates, our study achieved a 100% school response rate which was not so among Ghanaian senior high (96%) and Mozambique (97%) schools. Thus, our school response rate ensured that students from all schools in Saint Vincent and the Grenadines were fully represented. The 78% overall response rate based on a 100% school response rate makes our sample representative of the overall student population.

4. Measures

4.1. Dependent variables

We extracted three primary outcome measures on suicidal behaviours (suicidal ideation, suicidal plan, and suicidal attempt) from the data. The study measured each of the suicidal behaviours (suicidal ideation, suicidal plan, and suicidal attempt) with a single self-report item or question. For instance, the item, "during the past 12 months, did you ever seriously consider attempting suicide?" was used to measure suicidal ideation, while the suicidal plan was measured with the question, "during the past 12 months, did you make a plan about how you would attempt suicide?". The responses were categorised as "yes" (1) or "no" (2). Suicidal attempt was measured with the question, "during the past 12 months, did you actually attempt suicide?" The responses to these questions were categorised as "yes" (1) or "no" (2). While assessing the prevalence of suicidal behaviours in this study, we made reference to a 12-month period to reflect a period prevalence rather than a point prevalence or incidence of suicidal behaviours of adolescents. Although Bryan et al. [10] asserted that suicide risk can fluctuate over days or even hours, and the period between considering suicide and trying can be as short as ten minutes [17], most previous GSHS studies also measured suicide risk behaviours over a 12-month period [2,52,58,69]. Thus, with the period prevalence measurement approach, we were able to obtain baseline data about the risk of suicidal behaviours among the participants.

4.2. Independent variables

A set of predictor variables, including demographic characteristics of the participants, psychological, socio-environmental factors and parental involvement, was used to determine their predictive effects on the three outcome variables (suicidal ideation, suicidal plan and suicidal attempts). The details of the questions, the variable names and the coding used for the statistical analysis are presented in Table 1.

4.3. Ethical statements

Prior to the actual data collection, the data collection instruments were piloted to test the validity and reliability of the instruments. The study also received required Institutional Review Board approvals from Saint Vincent and the Grenadines' Ministry of Health, Wellness and Environment and the Ministry of Education before the data collection was carried out. Entry

Table 1
Definition of explanatory and measurement coding of variables

Variable	Survey question	Coding
Age	How old are you?	1 = 12-14 2 = 15-17
Sex	What is your sex?	1 = Male 2 = Female
Grade	In what form are you?	1 = Grade 1-3 2 = Grade 4-6
Close friends	Do you have close friends?	1 = yes 2 = no
Physical attack	During the past 12 months, have you experience any physical attack?	1 = yes 2 = no
Suicidal ideation	During the past 12 months, did you ever seriously consider attempting suicide?	1 = yes 2 = no
Suicidal attempt	During the past 12 months, did you attempt suicide?	1 = yes 2 = no
Suicidal plan	During the past 12 months, did you make a plan about how you would attempt suicide?	1 = yes 2 = no
School truancy	During the past 30 days, did you miss classes or school without permission?	1 = yes 2 = no
Amphetamine use	During your life, did you use amphetamine or methamphetamine (also called ice or yellow)?	1 = yes 2 = no
Current use of alcohol	During the past 30 days, did you have at least one drink containing alcohol?	1 = yes 2 = no
Current marijuana smoking	During the past 30 days, did you use marijuana?	1 = yes 2 = no
Physical fight	During the past 12 months, did you engage in any physical fight?	1 = yes 2 = no
Bullied off campus property	During the past 12 months, have you ever been bullied when you were not on school property?	1 = yes 2 = no
Bullied on school property	During the past 12 months, have you ever been bullied on school property?	1 = yes 2 = no
Cyber bullied	During the past 12 months, have you ever been cyber bullied?	1 = yes 2 = no
Parents/guardians who used tobacco	Do any of your parents/guardians use tobacco?	1 = yes 2 = no
Multiple sexual partners	During your life, have you had sexual intercourse with more than one person?	1 = yes 2 = no
Cigarette smoking	Do you currently smoke cigarettes?	1 = yes 2 = no
Understanding parents	During the past 30 days, did your parents or guardians understand your problems and worries?	1 = yes 2 = no
Serious injury	During the past 12 months, were you seriously injured?	1 = yes 2 = no
Loneliness	During the past 12 months, how often have you felt lonely?	1 = yes 2 = no
Worried	During the past 12 months, have you been so worried about something that you could not sleep at night?	1 = yes 2 = no

permission protocols were followed to seek permission from the Ministry of Health, Wellness and Environment, the Ministry of Education, and the heads of the various schools included in the study. In addition, individual and parental informed consent was solicited from adolescents and parents of minors (children below 18 years).

Access to the data can be obtained at the WHO website (<https://extranet.who.int/ncdsmicrodata/index.php/catalog/878/study-description#metadata-identification>)

4.4. Statistical analysis

We applied the sample weighting method at the school, student, and sex within grade levels to make it representative of the adolescents in Saint Vincent and the Grenadines to minimise bias on various trends of non-responses. We recorded some variables on a binary scale in this study. We used the multiple imputation (MI) technique to address the issue of missing data. We applied the MI technique where the missing values exceeded 1%. The missing data ranged from 1% to 10% and were missing at random. We conducted five MI with the automatic imputation method to maintain data

quality concerning missing values. Imputed values compared reasonably to observed values and results using the complete case analysis. Also, we assessed the final model's goodness of fit following the MI procedure and data cleaning. The results revealed no evidence of a lack of fit with our model's attempt to predict suicidal behaviours significantly.

Additionally, we performed a bivariate analysis using Pearson Chi-square to estimate the relationship between suicidal behaviours and the explanatory variables. We further entered the variables that showed significant association ($p < 0.05$) into a binomial logistic regression model. The results obtained from the analysis were presented with corresponding adjusted odds ratios (AOR) at a 95% confidence interval (CI) ($p < 0.05$).

5. Results

5.1. Background characteristics of adolescents in saint vincent and the grenadines

The prevalence of suicidal behaviours among the respondents was 26%, 26%, and 19% for suicidal ideation, suicidal plan and suicidal attempt, respectively (See Figure 1). Suicidal behaviours (ideation, plan, and attempt) among adolescents in Saint Vincent and the Grenadines were significantly associated with several explanatory factors. Specifically, a significant percentage of females had suicidal ideation (19.5%), suicidal plan (17.1%), and attempted suicide (12.3%). More students in grades 1-3 (13.3%) significantly attempted suicide. Also, students who missed classes without permission had suicidal ideation (10.3%), suicidal plan (9.2%) and attempted suicide (7.3%). We also noted that students who used drugs like amphetamine experienced suicidal ideation (2.8%), had a suicidal plan (2.4%) and attempted suicide (2.9%). Moreover, more students who used marijuana experienced suicidal ideation (6.3%), made suicidal plans (5.8%) and attempted suicide (4.7%).

Besides, adolescents who drank alcohol significantly experienced suicidal ideation (14.3%), made suicidal plans (14.3%) and attempted suicide (10.3%). More students who smoked cigarettes significantly experienced suicidal ideation (3.7%), made suicidal plans (3.5%) and attempted suicide (3.1%). Similarly, students who were physically attacked experienced suicidal ideation (9.3%), made suicidal plans (8.6%) and attempted suicide (7.0%). Also, a significant number of students who engaged in physical fights had suicidal ideation (10.5%), suicidal plan (10.3%) and attempted suicide (4.8%). Moreover, more students who were physically bullied (on-campus and off-school property) significantly experienced suicidal ideation (10.6%, 7.9%), suicidal plan (9.4%, 7.6%) and attempted suicide (7.1%, 5.8%), respectively. More students who felt lonely and also were worried about something significantly experienced suicidal ideation (10.5%, 8.5%), suicidal plan (9.8%, 7.0%) and attempted suicide (7.1%, 6.2%), respectively. We further observed that students who were cyberbullied and also had serious injuries significantly experienced suicidal ideation (7.7%, 15.7%), suicidal plan (7.1%, 14.8%) and attempted suicide (5.3%, 12.0%), respectively. (See Table 2).

5.2. Bivariate analysis

Table two below presents the association between independent variables and suicidal behaviours (suicidal idea, plan and attempt). Sex of participants was significantly associated with suicidal ideation ($p < 0.000$), suicidal plan ($p < 0.000$) and suicidal attempt ($p < 0.000$). Adolescents' grades were associated with only suicidal attempts ($p < 0.001$). Also, adolescents who experienced truancy, amphetamine abuse, marijuana use, alcohol abuse, cigarette smoking, physical attack, physical fight, bullied on and off school property, cyberbullied, parental understanding of adolescents' problems and worries, seriously injured, loneliness and worrying were associated with all the three suicidal behaviours (suicide ideation, plan, and attempt). Parents/guardians' use of tobacco was significantly associated with only suicide plan ($p < 0.020$) and attempt ($p < 0.000$). Also, having multiple sexual partners was significantly associated with only suicidal ideation ($p < 0.041$) and plan ($p < 0.032$), while having more close

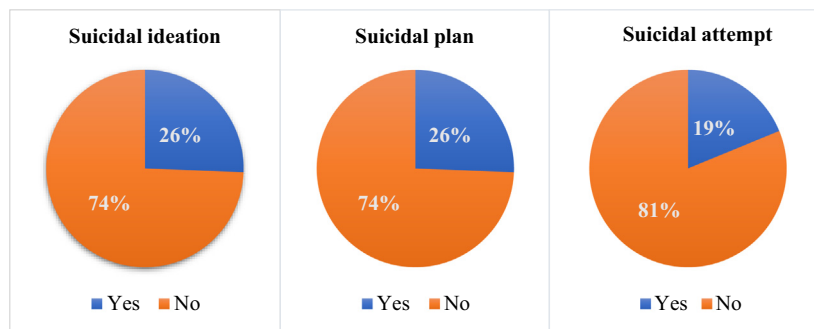


Fig. 1. Prevalence of suicidal behaviours (suicidal ideation, plan and attempt) among adolescents in Saint Vincent and the Grenadines

Table 2
Association of risk factors with suicidal ideation, plan and attempts among respondents.

Variables	Suicidal ideation (N = 1877)			Suicidal plan (N = 1877)			Suicidal attempt (N = 1877)			
	Yes	No	Chi-square (χ ²)	Yes	No	Chi-square (χ ²)	Yes	No	Chi-square (χ ²)	
Demographic										
Age (years)	≤ 15	298 (15.9%)	740 (39.4%)	1.27	277 (14.8%)	761 (40.6%)	1.33	202 (10.8%)	836 (44.6%)	0.74 ^N
	≥ 16	221 (11.8%)	617 (32.9%)		204 (10.9%)	634 (33.8%)		150 (8.0%)	688 (36.7%)	
Sex	Male	153 (8.2%)	731 (39.0%)	89.62***	160 (8.5%)	724 (38.6%)	49.11***	122 (6.5%)	762 (40.6%)	27.00***
	Female	366 (19.5%)	626 (33.4%)		321 (17.1%)	671 (35.8%)		230 (12.3%)	762 (40.6%)	
Grade	1-3	331 (17.6%)	889 (47.4%)	0.50	314 (16.7%)	906 (48.3%)	0.02	250 (13.3%)	970 (51.7%)	5.84**
	4-5	188 (10.0%)	468 (24.4%)		167 (8.9%)	489 (26.1%)		102 (5.4%)	554 (29.5%)	
Personal										
Truancy	Yes	193 (10.3%)	366 (19.5%)	18.73***	173 (9.2%)	386 (20.6%)	11.77**	137 (7.3%)	422 (22.5%)	17.20***
	No	326 (17.4%)	991 (52.8%)		308 (16.4%)	1009 (53.8%)		215 (11.5%)	1102 (58.7%)	
Drugs and substance use										
Amphetamine or methamphetamines use	Yes	53 (2.8%)	78 (4.2%)	11.52**	45 (2.4%)	86 (4.6%)	5.61*	54 (2.9%)	77 (4.1%)	46.60***
	No	466 (24.8%)	1279 (68.2%)		436 (23.2%)	1309 (69.8%)		298 (15.9%)	1447 (77.1%)	
Marijuana use	Yes	118 (6.3%)	202 (10.8%)	16.35***	109 (5.8%)	211 (11.2%)	14.36***	89 (4.7%)	231 (12.3%)	20.73***
	No	401 (21.4%)	1155 (61.6%)		372 (19.8%)	1184 (63.1%)		263 (14.0%)	1293 (68.9%)	
Alcohol	Yes	268 (14.3%)	610 (32.5%)	6.74*	268 (14.3%)	610 (32.5%)	20.65***	194 (10.3%)	684 (36.5%)	12.02**
	No	251 (13.4%)	747 (39.8%)		213 (11.4%)	785 (41.8%)		158 (8.4%)	840 (44.8%)	
Smoke cigarettes	Yes	69 (3.7%)	89 (4.7%)	22.09***	66 (3.5%)	92 (4.9%)	23.55***	58 (3.1%)	100 (5.3%)	36.45***
	No	450 (24.0%)	1268 (67.6%)		415 (22.1%)	1303 (69.5%)		294 (15.7%)	1424 (75.9%)	
Psychosocial										
Physically attacked	Yes	174 (9.3%)	329 (17.5%)	16.48***	162 (8.6%)	341 (18.2%)	15.55***	131 (7.0%)	372 (19.8%)	23.90***
	No	345 (18.4%)	1028 (54.8%)		319 (17.0%)	1054 (56.2%)		221 (11.8%)	1152 (61.4%)	
Physical fight	Yes	197 (10.5%)	407 (21.7%)	10.91**	194 (10.3%)	410 (21.9%)	19.62***	158 (8.4%)	446 (23.8%)	31.97***
	No	322 (17.2%)	950 (50.6%)		287 (15.3%)	985 (52.5%)		194 (10.3%)	1078 (57.5%)	
Bullied on campus	Yes	199 (10.6%)	249 (13.3%)	82.56***	177 (9.4%)	271 (14.4%)	59.38***	134 (7.1%)	314 (16.7%)	47.98***
	No	320 (17.1%)	1108 (59.1%)		304 (16.2%)	1124 (59.9%)		218 (11.6%)	1210 (64.5%)	
Bullied off school	Yes	149 (7.9%)	189 (10.1%)	55.53***	143 (7.6%)	195 (10.4%)	60.08***	109 (5.8%)	229 (12.2%)	49.19***
	No	370 (19.7%)	1168 (62.3%)		338 (18.0%)	338 (64.0%)		243 (13.0%)	1295 (69.0%)	
Cyber bullied	Yes	144 (7.7%)	172 (9.2%)	60.87***	134 (7.1%)	182 (9.7%)	56.97***	100 (5.3%)	216 (11.5%)	41.37***
	No	375 (20.0%)	1185 (63.2%)		347 (18.5%)	1213 (64.7%)		252 (13.4%)	1308 (69.7%)	
Parents/-guardians use of tobacco	Yes	87 (4.6%)	205 (10.9%)	0.78	90 (4.8%)	202 (10.8%)	4.87*	77 (4.1%)	215 (11.5%)	13.13***
	No	432 (23.0%)	1152 (61.4%)		391 (20.8%)	1193 (63.6%)		275 (14.7%)	1309 (69.8%)	
Understanding parents	Yes	113 (6.0%)	460 (24.5%)	26.02***	111 (5.9%)	462 (24.6%)	17.00***	84 (4.5%)	489 (26.1%)	9.11**
	No	406 (21.6%)	897 (47.8%)		370 (19.7%)	933 (49.7%)		268 (14.3%)	1035 (55.2%)	
Multiple sexual partners	Yes	198 (10.6%)	446 (23.8%)	4.65*	185 (9.9%)	459 (24.5%)	4.90*	134 (7.1%)	510 (27.2%)	2.69 ^N
	No	321 (17.1%)	911 (48.6%)		296 (15.8%)	936 (49.9%)		218 (11.6%)	1014 (54.1%)	
Serious injury	Yes	295 (15.7%)	652 (34.8%)	11.61**	278 (14.8%)	669 (35.7%)	13.85***	225 (12.0%)	722 (38.5%)	31.31***
	No	224 (11.9%)	705 (37.6%)		203 (10.8%)	726 (38.7%)		127 (6.8%)	802 (42.8%)	
Close friends	Yes	68 (3.6%)	131 (7.0%)	4.71*	61 (3.3%)	138 (7.4%)	2.94	53 (2.8%)	146 (7.8%)	9.05**
	No	451 (24.0%)	1226 (65.4%)		420 (22.4%)	1257 (67.0%)		299 (15.9%)	1378 (73.5%)	
Loneliness	Yes	197 (10.5%)	225 (12.0%)	98.40***	183 (9.8%)	239 (12.7%)	89.73***	134 (7.1%)	288 (15.4%)	60.28***
	No	322 (17.2%)	1132 (60.3%)		298 (15.9%)	1156 (61.6%)		218 (11.6%)	1236 (65.9%)	
Worried	Yes	160 (8.5%)	155 (8.3%)	101.19***	132 (7.0%)	183 (9.8%)	52.53***	117 (6.2%)	198 (10.6%)	83.90***
	No	359 (19.1%)	1202 (64.1%)		349 (18.6%)	1212 (64.6%)		235 (12.5%)	1326 (70.7%)	

notes: not significant.
* p < 0.05.
** p < 0.01.
*** p < 0.001.

friends was significantly associated with only suicidal ideation ($p < 0.026$) and suicidal attempt ($p < 0.002$) (See Table 2).

5.3. Multivariate analysis

Table three presents the logistic regression for predictors of suicidal ideation, plan and attempts. After adjusting for other factors, the results from the analysis showed that males were less likely to ideate (AOR = 0.34, 95%CI = 0.268-0.442), plan (AOR = 0.46, 95%CI = 0.362-0.593), or attempt (AOR = 0.49, 95%CI = 0.371-0.644) suicide, compared to females in Saint Vincent and the Grenadines. Students in lower grades (1-3) (AOR = 1.64, 95%CI = 1.229-2.177), experiencing serious injury (AOR = 1.503, 95%CI = 1.150-1.964) and having close friends (AOR = 1.53, 95%CI = 1.050-2.234) added significance to only suicidal attempt among respondents. Also, engaging in physical fights significantly increased the odds of suicidal plan (AOR = 1.46, 95%CI = 1.124-1.890) and suicidal attempt (AOR = 1.56, 95%CI = 1.120-1.995) only. Being cyberbullied significantly increased the odds of having suicidal ideation (AOR = 1.40, 95%CI = 1.047-1.879) and planning suicide (AOR = 1.43, 95%CI = 1.070-1.910) only. Other factors such as adolescents who were physically bullied (on-campus property and off-school property), parental understanding of adolescents' problems and worries, loneliness, and worrying about life's issues significantly contributed to the final model of suicidal behaviours (suicidal ideation, suicidal plan and suicidal attempt) (See Table 3).

6. Discussion

Our study analysed data from the 2018 GSHS to examine the prevalence and correlates (behavioural risk factors and protective factors) of suicidal behaviours (ideation, plan and attempt) among a nationally representative sample of adolescents in an Island country, Saint Vincent and the Grenadines. We found the prevalence of suicidal behaviours among the respondents as 26%, 26% and 19% for suicidal ideation, plan and attempt, respectively. Comparatively, the prevalence rates of suicide behaviours reported among adolescents in Saint Vincent and the Grenadines were

relatively high compared with the rates reported in the United States [37,50] and Vietnam [48]. Also, the prevalence of suicide behaviours among our study population was relatively higher than in other WHO member countries such as Mozambique [58] and Ethiopia [2], where the GSHS was utilised in assessing adolescent suicide behaviours.

Again, the prevalence rates reported for suicidal ideation and plan in our study were higher than a similar GSHS study in Ghana by Oppong Asante et al. [52]. They observed 18.2% and 22.5% prevalence for suicidal ideation and suicidal plan, respectively. However, Ghana's prevalence of suicidal attempt (22.2%) among the school-going adolescent population was higher than what we observed (19%) in Saint Vincent and the Grenadines. Furthermore, our study's participants presented a higher prevalence of suicidal behaviours than Uddin et al. [69] GSHS study. Uddin et al. [69] study reported a prevalence of 16.9% suicidal ideation, 17.0% plan, and 17.0% attempt. Arguably, the variance in the prevalence rates between these GSHS studies and our current research could be accounted for by the difference in study population size, study period and setting. For instance, while our study used a single country with a sample of 1,876 adolescents in 2018, Uddin et al. [69] obtained data from 229,129 adolescents from 59 low-and-middle-income countries between 2003 and 2015. Notwithstanding these variations, the growing cases of adolescent suicidal behaviours are alarming. Countries like Saint Vincent and the Grenadines require pragmatic interventions to control risk behaviours and strengthen the protective factors among the adolescent population to attain the global SDG targets [71].

Findings from this study further revealed that the sex of the adolescents was significantly associated with suicidal behaviours. In the bivariate analysis, we found that suicidal ideation, suicidal plan and suicidal attempt were less likely to occur among males than females. This finding sustains the results of previous studies that reported sex differences in suicidality tendencies, with females being the most predisposed [4,38,45,46,52]. Some theorists argue that in the progression of most mental health disorders, females tend to attempt suicide earlier than males. Nevertheless, this risk among females denotes less desire to die but more ambition to express their distress and change their social domain [1,65]. On the contrary,

Table 3
Logistic regression for predictors of suicidal ideation, plan and attempts.

Variable	Suicidal ideation	Suicidal plan	Suicidal attempt
	AOR (95%CI)	AOR (95%CI)	AOR (95%CI)
Demographic			
Sex	0.34 (0.268-0.442) ***	0.46 (0.362-0.593) ***	0.49 (0.371-0.644) ***
Grade	-	-	1.64 (1.229-2.177) **
Personal			
Truancy	1.41 (1.099-1.809) **	1.22 (0.948-1.558)	1.42 (1.076-1.873) *
Drugs and substance use			
Amphetamine or methamphetamines use	1.29 (0.830-2.014)	1.02 (0.652-1.590)	2.34 (1.498-3.662) ***
Marijuana use	1.36 (0.976-1.881)	1.21 (0.876-1.676)	1.14 (0.796-1.618)
Alcohol	0.95 (0.748-1.208)	1.25 (0.987-1.589)	1.12 (.853-1.463)
Smoke cigarettes	1.57 (1.056-2.348) *	1.62 (1.094-2.386) *	1.62 (1.069-2.447) *
Psychosocial			
Physically attacked	1.04 (0.787-1.362)	0.98 (.747-1.287)	0.987 (0.732-1.332)
Physical fight	1.28 (0.982-1.663)	1.46 (1.124-1.890) **	1.50 (1.120-1.995) **
Bullied on campus	1.95 (1.491-2.540) ***	1.65 (1.261-2.147) ***	1.55 (1.152-2.082) **
Bullied off school	1.36 (1.004-1.829) *	1.55 (1.154-2.079) **	1.44 (1.046-1.993) *
Cyber bullied	1.40 (1.047-1.879) *	1.43 (1.070-1.910) *	1.227 (0.891-1.689)
Parents/guardians use of tobacco	-	0.99 (0.733-1.346)	1.234 (0.887-1.717)
Understanding parents	0.60 (0.459-0.776) ***	0.68 (0.526-0.883) **	0.686 (0.511-0.921) *
Multiple sexual partners	1.26 (.973-1.629)	1.17 (0.909-1.515)	-
Serious injury	1.20 (0.95-1.51)	1.20 (0.945-1.513)	1.503 (1.150-1.964) **
Close friends	1.30 (0.912-1.840)	-	1.53 (1.050-2.234) *
Loneliness	2.07 (1.59-2.68) ***	2.23 (1.724-2.882) ***	1.81 (1.357-2.415) ***
Worried	2.07 (1.56-2.75) ***	1.41 (1.059-1.883) *	2.13 (1.570-2.879) ***
Constant	0.005***	0.012***	0.001***

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Campisi et al. [11], Amare et al. [2], and Seidu et al. [58] found no significant difference in suicidal attempts by sex. Similarly, Lindsey et al. [37] noted that female adolescents had substantially declined suicidal attempts over time. Some of these discrepancies on sex as a risk for suicide behaviours might be due to cross-cultural differences that our study could not explore.

In addition to sex (female), another demographic factor that was found to be predictive of suicidal attempts among the respondents was grade (1-3). Compared with adolescents in higher grades (4-6), those in lower grades (1-3) were more likely to attempt suicide. Although we observed no study conducted in Saint Vincent and the Grenadines with specific empirical evidence after a cursory review to explain grade, Björkenstam et al. [6] study noted a unique variance based on sex differences. Björkenstam et al. [6] observed a 4.57 incidence rate ratio for suicide deaths among male students, while the females in the highest grades had a 2.67 incidence rate ratio. Additionally, adolescents in higher grades in Saint Vincent and the Grenadines may have adopted better coping strategies and support than those in lower grades.

Aside from sex and grade differences, our study also reported truancy as a personal factor which predicted suicidal ideation and suicidal attempt. This finding is consistent with Oppong Asante et al. [52] study, in which truancy was associated with suicidal ideation. Synonymous with truancy, Amare et al. [2] found school absenteeism to be positively associated with suicide ideation, just as was reported in a systematic review and meta-analysis where school absenteeism was associated with higher odds for suicidal ideation [18]. Furthermore, evidence from Kearney [31] and Heyne et al. [29] suggested a relationship between school absenteeism and suicidal behaviours. These studies found mental disorders, specifically anxiety, depression and externalising disorders, which could trigger school absenteeism, and suicidal behaviours. Additionally, we could partly explain the association between absenteeism and suicidal behaviours from the perspectives of bullied victims. Studies have shown that bullied victims are usually absent themselves from school [5], a significant risk factor for suicidal behaviours [45].

Among our study population, drugs and substance use, specifically amphetamine or methamphetamine use, increased the odds by more than twice for suicidal attempts, whereas cigarette smoking also contributed positively to the experience of all three suicidal indices after adjusting for all other factors. Consistent with our study findings, Garcia-Fuentes et al. [21] also found an association between intravenous methamphetamine use and attempted suicide. Also, Breet et al. [8] systematic review added to the evidence of this association. However, they reported that most studies focused on alcohol and tobacco, which was contrary to our findings. Surprisingly, marijuana and alcohol use were not significant to suicidal behaviours in our regression model. Also, Lynch et al. [39] observed that substance use disorders (alcohol, drug, and tobacco use) were associated with suicide mortality, especially for females. Contrary to these associations, Oppong Asante et al. [52] observed no such associations between substance use and alcohol misuse.

Our study further found several psychosocial predictors of suicidal behaviours. For instance, our study found risk factors such as engagement in a physical fight, the experience of serious injuries, and being bullied (physically on-campus, physically off-campus or cyberbullied) as predictors of one, two or all indices of suicidal behaviours. This finding corroborates other studies [2,11,45,52,58]. Adolescents in this study might have experienced series of suicidal behaviours after being bullied (physically or cyberbullied) or subjected to serious injuries due to the cognitive disturbances and humiliations sometimes associated with these experiences [66,73,74]. Mozes [47] argued that severe injuries and physical attacks leading to brain injuries present with headaches, neck pains and thinking disorders that may trigger suicidal behaviours.

Regarding bullying on- and off-campus, findings from a systematic review of 28 articles concur with the evidence that teenagers' bullying experiences increase their likelihood of engagement in suicidal ideation and attempts [60]. There was no doubt that although our study found increased odds for all three indices of suicidal behaviours among adolescents who

were bullied, either on-campus or off-campus, on-campus bullying was a stronger predictor of suicidal behaviours. This finding may be due to the feelings of hopelessness and depression associated with long-term bullying of students while in school [60]. Cyberbullying, another form of bullying, was found in our study to predict all indices of suicidal behaviours. A systematic review using 33 articles alluded that cyberbullied teenagers have a greater risk for suicidal behaviours [30]. Similarly, Otchere et al. [53] noted that victims of cyberbullying reported several negative psychosocial experiences, including suicide behaviours.

Another key psychosocial predictor in our study was adolescents' number of close friends. Unlike Seidu et al. [58] study, which found having close friends as a protective factor against suicide, having more close friends in our study instead increased a person's risk for a suicide attempt. Additionally, Campisi et al. [11] found that having no close friends was a risk factor for suicide among adolescents. Our finding, however, confirms Oppong Asante et al. [52] results, where having more close friends increased adolescents' risk for suicide. A possible explanation for the difference in the study findings might be that close friends of adolescents in Saint Vincent and the Grenadines were not equipped to provide adequate peer support for their friends who attempted suicide [38,46].

In addition, loneliness was a strong predictor of all three indices of suicidal behaviours in our study but increased the odds by two for suicidal ideation and suicidal plan. However, we earlier reported that having close friends was a risk factor for a suicidal attempt. The extensive reviews by McClelland et al. [44], McKinnon et al. [45], and Shaw et al. [59] have laid strong support for loneliness as a predictor of suicidal behaviours. It is not too clear the mechanisms by which loneliness facilitates suicide behaviours. However, under this mechanism, it is essential first to delineate the terms living alone and loneliness. Although these two constructs depict social relationships, they are separate constructs with overlapping features [62]. Whereas people living alone can engage with other people outside their households, which provides emotional, financial and social support [3], this is not so for loneliness. Loneliness is a subjective perception of not having contact with people [28]. It is evident from the terminological differentiation between living alone and loneliness that people who experience loneliness may have a circle of friends or relatives but may not feel a sense of belonging to them. Living with this subjective sense of detachment or lack of sense of belongingness may trigger suicidal thoughts, plans or attempts.

Worrying among adolescents in Saint Vincent and the Grenadines contributed significantly to suicidal ideation, suicidal plan and suicidal attempt. After adjusting for odds, being so worried about something that prevented sleep at night increased the odds by two for adolescents' experience of suicidal ideation and suicidal attempt. Like some correlates, the empirical base for students' worrying level and their experience of suicidal behaviours is conflicting. Students' worry levels may be linked to their perception of their academic performance and the need to meet their academic demands. Many studies have found that low academic performance is linked to suicidal behaviours among school-going adolescents [24,36,57]. From our analysis, the associations between worrying and other negative experiences like cyberbullying, bullying, and physical attacks might have increased their risk for suicide [52,53].

Also, our study affirmed similar findings by agreeing with studies that reported understanding and supportive parents as protective factors for suicidal behaviours [45,52]. Transitioning from childhood to adolescence is a challenging moment for adolescents. Parenthood plays a significant role in the lives of these adolescents and how well they adapt to life's situations. With the necessary support from parents, children become safeguarded against mental and emotional distortions that could have resulted in suicide.

7. Conclusion

Using nationally representative data from the 2018 GSHS, our study found a relatively high prevalence of suicidal ideation, plan and attempt among school-going adolescents in Saint Vincent and the Grenadines.

This finding makes suicidal behaviours in the island country a major issue of public health concern. Aside from the comparatively higher prevalence rates of suicide behaviours, several explanatory factors correlated with suicide behaviours among adolescents in Saint Vincent and the Grenadines. Regarding the multivariate analysis, we found that adolescents in lower grades (1-3), who played truant from school, used amphetamine, smoked cigarettes, engaged in physical fights, experienced bullying (on school property, off school property, cyberbullied), serious injuries, had close friends, experienced loneliness, and worrying were at high-risk suicidal behaviours. Furthermore, sex (being male) and having parents or guardians who understand the problems and worries of adolescents served as protective factors against all three suicide behaviours. Meeting the SDG 3 target of promoting mental health by the year 2030 in Saint Vincent and the Grenadines requires that pragmatic programmes be implemented with much focus on the risk and protective factors observed in this study. Also, mental health services should be readily available to help address students' psychological and mental health needs whilst on campus.

7.1. Strengths and limitation

Using extensive data, our study is one of the initial primary studies to explore adolescents' suicidal behaviours in Saint Vincent and the Grenadines. Due to the representative nature of our sample, our paper increases the understanding of the risks and protective variables for suicide behaviours among these adolescents. Notwithstanding these benefits, there are certain limitations to note to guide the use of our findings. First, we could not anticipate causation between the numerous risk and protective variables and suicide behaviours since the GSHS is a cross-sectional database. Furthermore, mental health constructs like worrying, cyberbullying, and suicidal thoughts were measured using a single item. Such question structure may not fully capture full clinical disorders or symptoms for diagnostic purposes. Aside from these limitations, it is noteworthy that findings from our study serve as a basis for future studies and interventions among adolescents in Saint Vincent and the Grenadines.

7.2. Implications for research and intervention

In this study, we have endeavoured to respond to essential research questions associated with the prevalence and correlates of suicidal behaviours among adolescents in Saint Vincent and the Grenadines. Explicitly stating, we sought to determine the predisposing/risks and protective factors of suicidal ideations, suicidal plans, and suicidal attempts among adolescents. We conclude by briefly underscoring some possible research and suicide prevention interventions.

Our findings acknowledge demographic, personal, drug and substance use, and psychosocial factors associated with suicidal behaviours among students. Over the years, the school system has progressed to offer more contact hours between students and teachers. This situation has placed the school as a second home for students. Consequently, school personnel have assumed the role of second parents to students. Hence, schools in Saint Vincent and the Grenadines should provide mental health services and support systems for students through behaviour monitoring, guidance, and counselling on stress management and response to physical and cyberbullying [16]. To achieve this end, it would be imperative to select some school personnel as mental health focal persons or call points and train them on essential competencies in identifying students at risk of suicide [52].

Additionally, the school system in Saint Vincent and the Grenadines needs to abandon the simplistic approach to handling adolescent mental health concerns and explore a more comprehensive and multifaceted dimension. We hope the schools explore an online suicide risk assessment at specified periods where students can respond to standardised questionnaires regarding suicidality. The goal here is to determine the risk and protective factors of suicide for each student and recommend appropriate management and referrals based on their risk levels [25].

Another promising area for suicide prevention intervention should focus on drug and substance use behaviours among adolescents. More specifically,

amphetamine, marijuana, cigarette, and alcohol use were associated with suicidal behaviours. Also, many researchers have reported that drug and substance abuse among students negatively affects academic underperformance [7]. The ripple effect is that preventing substance use among students would decrease the degree of suicidality and improve academic outcomes. Botvin and Griffin [7] highlighted that the school system or setting could not be omitted to prevent students' alcohol and substance use.

More importantly, students should be empowered to boost their confidence and self-worth to transcend social influences from peers, role models and the media. Generally, we recommend that the schools provide avenues for skills training and development through sports, music, and other activities that bolster the students' interest and serve as an alternative to drug use. We are very optimistic that establishing collaborative efforts between policymakers, the school, and other relevant stakeholders, to mitigate the social and behavioural challenges, especially substance use among students, would reduce suicidality, improve mental health, and enhance academic outcomes to a significant extent.

Author contributions

JOS conceived the idea of the study. JOS and PO downloaded and analysed the data. All authors (JOS, PO, TPD, NIG, and AKF) wrote the manuscript. All authors read, edited, and approved the final version of the manuscript.

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Availability of data and materials

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Ethics approval and consent to participate

All procedures contributing to this project are per the ethical standards of the relevant national and institutional committees on human experimentation and the Helsinki Declaration of 1975, as revised in 2008. Ethical approval was obtained from the Institutional Review Boards of the Ministry of Health, Wellness, and Environment of Saint Vincent and the Grenadines, WHO, and CDC. Written and signed consent was obtained from all individual participants included in the study. Trail Registration for Global School-Based Student Health Survey 2018 (VCT_2018_GSHS_v01) was registered on August 20, 2021, <https://extranet.who.int/ncdsmicrodata/index.php/catalog/878>.

Consent for publication

Not applicable.

Declaration of Competing Interest

The authors declare no competing interests.

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