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Prevalence and factors associated with serious injuries and aggressive behaviours among in-school adolescents in Panama

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ABSTRACT

Introduction: Injuries during adolescence cause lifelong harm and death. Our study used a nationally representative sample to examine the prevalence and risk factors associated with serious injuries among in-school adolescents in Panama.

Methods: We analysed Panama's 2018 Global School-Based Student Health Survey data using SPSS. Percentages were used to summarise the results of the prevalence of serious injuries. Binomial logistic regression analysis was performed to examine the risk factors of serious injuries. The results were presented as an adjusted odds ratio (AOR) at a 95% confidence interval (CI).

Results: The prevalence of serious injury among in-school adolescents in Panama is 45%. Furthermore, the study found that males (AOR = 1.495, CI = 1.272–1.756), truancy (AOR = 1.493, CI = 1.249–1.785), overweight (AOR = 1.246, 95% CI = 11.057–1.469), drinking alcohol (AOR = 1.397, CI = 1.151–1.695), experiencing physical attack (AOR = 2.100, CI = 11.646–2.681), engaging in a physical fight (AOR = 1.586, CI = 1.289–1.952) and bullied outside school (AOR = 1.276, CI = 1.005–1.621) significantly predict serious injuries among adolescents in Panama.

Conclusion: Multidisciplinary approaches targeting the correlates observed will help reduce the high prevalence of serious injuries among in-school adolescents in Panama.

1. Introduction

Adolescents are young people between the ages of 10 and 19 years. Currently, the global adolescent population is larger than ever. Thus, about 1.2 billion young people are adolescents, accounting for almost a quarter of the world's population [35]. Though childhood mortality has declined by over 80 per cent over the past five decades globally, adolescent mortality has only declined by 50% in the same period [5]. Perhaps the discrepancy may be primarily due to growing injury-related deaths among the global adolescent population, especially in low-and middle-income countries (LMIC) [5,32].

Moreover, it is worth noting that injuries, including road traffic accidents and drowning, as well as violence and self-harm, are the leading cause of death among adolescents globally (WHO, 2022). For instance, almost 100,000 adolescents died from traffic accidents, and many of these victims were vulnerable road users in 2019 alone [35]. Also, the WHO further revealed that over 40,000 adolescents drowned in 2019. Consequently, nearly 40% of all young people's deaths are caused by traffic accidents, suicide, violence, drowning, and fires [22]. The high prevalence of injury among adolescent populations is a serious public health issue, mainly because injuries during adolescence may potentially cause lifelong harm, such as physical disabilities and behavioural problems.

Globally, LMICs have the highest burden of injury-related deaths [33]. For instance, some types of injuries (for example, road accidents and falls) have increased in LMICs since the 1950s [22]. In terms of interpersonal violence (child maltreatment, intimate partner violence, youth gang violence, and crime), Central America is the most violent region in the world [9]. As a result, adolescents in Central America are disproportionately affected. For instance, interpersonal violence is Central America's leading cause of adolescent morbidity [14]. Mejia et al. further reported that young people in Central American countries such as Panama account for 82% of all homicide cases.

The growing prevalence and correlates of injuries among adolescent populations pose global threats to achieving Sustainable Development Goal 3 (ensuring healthy lives and promoting well-being for all at all ages) [31]. For example, Denny et al. [3] observed 49.1%, 43.1% and 40.8% prevalence rates in Tonga, Cooks Island, and Niue. Among adolescents in Ghana, Ackah et al. [2] recorded as high as 66%, while Muula

Abbreviations: MoE, Ministry of Education; MoH, Ministry of Health; US CDC, US Centers for Disease Control and Prevention; WHO, World Health Organisation.

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et al. [16,17] observed 61% of serious injuries in Djibouti. Prevalence rates of serious injuries in other settings include 39% in Mauritius [15], 43.4% in Zambia [18], 65.8% in Botswana [24], and 68.5% in Egypt [34]. Across continents, there was a 13.1% to 30.4% prevalence of injury among European adolescents [12], while Sub-Saharan African adolescents recorded an average of 45% injury prevalence [1].

Furthermore, multiple risk factors like sociodemographic (sex, age, and grade), personal (missed school without permission), drugs and substance use (amphetamine use, current marijuana smoking, and current alcohol use), and psychosocial (physical attacks, suicidal ideation, planning, and attempt, bullying at school and bullying outside school) correlates have been associated with adolescent injury behaviours [2,15,18]. For example, male adolescents, those who are hungry, substance users, worrying, and suicidal behaviours have been reported in several national surveys as critical risk factors for serious injuries among adolescents [15,18]. On the other hand, Aboagye et al. [1] noted that parents who respected and cared for their adolescents were protected against serious injuries in Sub-Saharan Africa.

As suggested by Mireku et al. [15], a lack of evidence on the prevalence, risk and protective factors of serious injuries among in-school Adolescents in Panama could adversely impact the success of effective interventions. Beyond these interventions, the absence of such baseline evidence among adolescents living in Panama negatively affects national policies toward the attainments of the United Nations' Sustainable Development Goals, especially Goals 3 and 4 (promoting healthy lives and quality education for adolescents worldwide by 2030) [31]. Hence, this study examined the prevalence and correlates of serious injuries among in-school adolescents in Panama.

2. Methods

2.1. Research design

We selected and analysed data from the 2018 Global School-Based Student Health Survey (GSHS) on Panama to determine the prevalence and correlates of serious injuries among school-going adolescents in Panama. The GSHS is a school-based survey that employs a self-administered questionnaire to collect data on young people's health behaviours and protective factors associated with the primary causes of morbidity and mortality among children and adults globally. The GSHS uses a cross-sectional study design to collect data from WHO member nations interested in preventing adolescent injuries. GSHS collected data from school-going adolescents aged 13-17 years in Panama [35,36].

2.2. Ethical consideration

To ascertain the validity and reliability of the data collection instruments for the current study, the data collection instruments were pilot tested before the commencement of the study. The study also received required Institutional Review Board approvals from the Panama "Ministerio de Salud"/ Ministry of Health (MoH) and Ministry of Education (MoE) before the data collection was carried out. The researchers strictly followed the ethical policies recommended by the Panama's MoH and the MoE. Entry permission protocols were followed to seek permission from the MoH and the heads of the various schools included in the study. Informed consent, parental consent and child assent were solicited from adolescents 18 years and above and children below 18 years, respectively, using both verbal and written agreement.

2.3. Sampling

The 2018 Panama GSHS was a school-based survey of students in Eighth - Twelfth grades, which are typically attended by students aged 13-17. A two-stage cluster sample design was used to produce data representative of all students in Eighth - Twelfth grades in Panama. In the first stage, schools were selected with probability proportional to enrollment size. In the second stage, classes were randomly selected and all students in selected classes were eligible to participate. The school response rate was 91%, the student response rate was 78%, and the overall response rate was 71%. A total of 2,948 students participated in the survey.

2.4. Variables

In this study, the key outcome variable was "severe injuries identified or reported" among the pupils. The outcome variable was described as "whether or not the student was significantly hurt one or more times in the preceding twelve months." The response options ranged from 0 to 12 or more times. We then dichotomised the responses into two categories. Those who had no injuries (zero injuries) were labelled "no injury" and given the code zero. We further classified respondents who had at least one or more injuries as one. The independent variables were classified as sociodemographic (sex, age, and grade), personal (missed school without permission), drugs and substance use (amphetamine use, current marijuana smoking, and current alcohol use), and psychosocial (physical attacks, suicidal ideation, planning, and attempt, bullying at school and bullying outside school) (see Table 1).

2.5. Data analysis

We used IBM SPSS Statistics for Windows Version 24.0 [8] to conduct the analysis. To avoid bias on various trends and nonresponses, we used the sample weighting approach at the school, student, and sex within grade levels to make it representative of adolescents in Panama. In this study, we used a binary scale to record several factors. We employed the multiple imputation (MI) technique to deal with missing data. We used the MI approach when the missing values exceeded 1%. The missing data ranged from 1% to 10% and was missing at random. To preserve data quality in the presence of missing values, we performed five MIs using the automatic imputation approach. Using the complete case analysis, imputed values were appropriately compared to observed values and results. Additionally, we used bivariate analysis with Pearson Chi-square to determine the connection between major injuries and the explanatory variables. We next included the factors that revealed a significant correlation ($p < 0.05$) into a binomial logistic regression model. We reported our findings with the corresponding adjusted odds ratio (AOR) at a 95% confidence interval (CI) ($p < 0.05$).

3. Results

3.1. Background characteristics of the adolescents in Panama

The prevalence of serious injuries among in-school adolescents in Panama was 45% (see fig. 1). Significantly, serious injuries occurred more among male adolescents (22.8%). Also, most adolescents who missed school without permission significantly sustained serious injuries (14.2%). Similarly, serious injuries occurred among adolescents who went hungry most of the time (1.5%), used amphetamine (1.6%), smoked marijuana (2.9%), drunk alcohol (16.5%), ever got drunk after consuming alcohol (12.8%), smoked cigarette (5.0%), used other tobacco products apart from cigarettes (2.6%), and whose parents used tobacco (4.4%).

Also, serious injuries occurred among adolescents who were physically attacked (9.4%), engaged in a physical fight (11.6%), bullied at school (10.6%), bullied outside school property (8.9%), and mostly felt lonely (8.5%). Serious injuries further occurred among adolescents who were worried about academic and general life issues (6.0%), had suicidal ideation (10.3%), planned to commit suicide (8.9%), attempted suicide (8.6%) and had multiple sexual partners (10.0%). Besides, adolescents who were overweight (15.5%), and those who attended physical education classes for more than three days (17.2%), sustained serious injuries (see Table 2).

Table 1
Definition of explanatory and measurement coding of variables.

Variables	Questions	Options and codes
Sex	What is your sex?	1 = Male 2 = Female
Age	How old are you?	1 = 12-14 2 = 15-17
Grade	In what grade are you?	1 = 1-3 2 = 4-6
Hunger	Most of the time or always went hungry	1 = yes 2 = no
Physical attack	Have you been attacked physically before?	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
Ever got drunk after consuming alcohol	Have you ever drunk so much alcohol that you were really drunk?	1 = yes 2 = no
Marijuana smoking	During the past 30 days, did you use marijuana?	1 = yes 2 = no
Cigarette smoking	Do you currently smoke a cigarette?	1 = yes 2 = no
Use of tobacco products other than cigarette	Do you use any other tobacco product apart from a cigarette?	1 = yes 2 = no
Parental use of tobacco	Do you have parents or guardians who use any form of tobacco?	1 = yes 2 = no
Physical fight	Have you engaged in a physical fight before?	1 = yes 2 = no
Bullied at school	Have you been bullied at school in the past 12 months?	1 = yes 2 = no
Bullied outside school	Have you been bullied outside the school in the past 12 months?	1 = yes 2 = no
Attended physical education classes on ≥3 days	Did you attend physical education classes on three or more days?	1 = yes 2 = no
Attended physical education classes on ≥5 days	Did you attend physical education classes for five or more days?	1 = yes 2 = no
Overweight	Are you overweight	1 = yes 2 = no
Loneliness	Do you feel lonely most of the time or always?	1 = yes 2 = no
Worry	Do you, most of the time or always worry about something that you could not study?	1 = yes 2 = no
Sex with Multiple sexual partners	Have you slept with two or more partners before?	1 = yes 2 = no

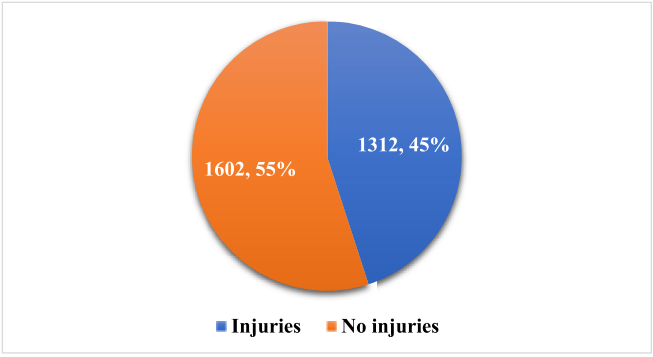

Fig. 1. Prevalence of serious injuries among adolescents in Panama.

3.2. Distribution and chi-square analysis of serious injuries across

The chi square test conducted showed that, sex ($\chi^2 = 28.17$, $p < 0.000$), missing class/school without permission ($\chi^2 = 46.66$, $p < 0.000$), mostly or always experiencing hunger ($\chi^2 = 4.71$, $p < 0.034$), overweight ($\chi^2 = 6.84$, $p < 0.009$), amphetamine use ($\chi^2 = 6.22$, $p < 0.013$), marijuana use ($\chi^2 = 4.82$, $p < 0.032$), currently drink alcohol ($\chi^2 = 41.14$, $p < 0.000$), ever got drunk after consuming alcohol ($\chi^2 = 18.42$, $p < 0.000$), smoked cigarettes ($\chi^2 = 16.36$, $p < 0.000$), use of tobacco product apart from cigarette ($\chi^2 = 5.91$, $p < 0.033$), physically attacked ($\chi^2 = 103.23$, $p < 0.000$), physical fight ($\chi^2 = 74.74$, $p < 0.000$), bullied at school ($\chi^2 = 21.17$, $p < 0.000$), bullied outside school ($\chi^2 = 40.80$, $p < 0.000$), loneliness ($\chi^2 = 15.05$, $p < 0.000$), worry ($\chi^2 = 16.31$, $p < 0.000$), suicidal ideation ($\chi^2 = 18.82$, $p < 0.000$), suicide plan ($\chi^2 = 24.98$, $p < 0.000$), suicide attempt ($\chi^2 = 41.65$, $p < 0.000$), attended PE classes on three or more days ($\chi^2 = 5.58$, $p < 0.000$) and having multiple sexual partners ($\chi^2 = 9.81$, $p < 0.002$).

3.3. Logistic regression analysis of significant factors associated with serious injuries

Table 3 shows the binomial logistic regression analysis results on the factors associated with serious injuries among adolescents in Panama. The results from our analysis show that being a male (AOR = 1.495, CI = 1.272–1.756), truancy (AOR = 1.493, CI = 1.249–1.785), overweight (AOR = 1.246, 95% CI = 11.057–1.469), drinking alcohol (AOR = 1.397, CI = 1.151–1.695), experiencing physical attack (AOR = 2.100, CI = 11.646–2.681), engaging in a physical fight (AOR = 1.586, CI = 1.289–1.952) and bullied outside school (AOR = 1.276, CI = 1.005–1.621) are associated with serious injuries among adolescents.

4. Discussion

4.1. Prevalence of serious injuries among adolescents in Panama

The study aimed to explore the prevalence and correlates of serious injuries among in-school adolescents in Panama. The prevalence of serious injury was 45% among adolescents. Thus, over 4 out of 10 in-school adolescents in Panama had experienced serious injury a year before the survey. Perhaps, the high interpersonal violence among young people in Panama may explain the high number of serious injuries among in-school adolescents. A similar prevalence of serious injuries has been reported in Polynesia (43.1% on Cooks Island, 40.8% in Niue and 49.1% in Tonga) [3]. In addition, Ghana has reported a similar prevalence (46.1%) of serious injuries among in-school adolescents using a national representative sample [21]. The current finding is also similar to the overall prevalence of serious injuries found in among adolescents in Malaysia [26] and four Southeast Asian countries (Indonesia, Myanmar, Sri Lanka, and Thailand) [25], which reported prevalence below 50 per cent. However, higher rates of serious injuries in a national representative sample of in-school adolescents have been found in Egypt (68.5%) [34], Djibouti (61.1%) [16,17], Botswana (65.8%) [24], and Timor-Leste (70%) [28,29]. Perhaps, the observed differences in prevalence rates could be explained by differences in school settings and external environmental factors.

4.2. Correlates of serious injuries among adolescents in Panama

In this current study, male in-school adolescents were more likely to sustain serious injuries in Panama. A similar finding has been reported by Mejia et al. [14] and Gao et al. [4], who showed that, unlike females, male in-school adolescents are more likely to sustain serious injuries. Compared to females, male in-school adolescents in Panama may be more violent and exposed to bullying, which might expose them to serious injuries (WHO, 2022). In addition, in-school adolescent males are more likely to engage in contact and aggressive sports, which might expose them to unintentional injuries [11].

Table 2
Bivariate analysis of injuries among in-school adolescents in Panama (n = 2914).

Variables		Serious injury		χ^2	*Phi*
		Injury (%)	No injury (%)		
Demographic					
Age (years)	13-15	707(24.3%)	858(29.4%)	0.031	0.003
	≥16	605(20.8%)	744(25.5%)		
Sex	Male	663(22.8%)	652(22.4%)	28.17***	0.098
	Female	649(22.3%)	950(32.6%)		
Grade	Grade 1-3	899(30.9%)	1092(37.5%)	0.042	0.004
	Grade 4-5	413(14.2%)	510(17.5%)		
Personal					
Truancy	Yes	414(14.2%)	328(11.3%)	46.66***	0.127
	No	898(30.8%)	1274(43.7%)		
Hunger	Yes	43(1.5%)	32(1.1%)	4.71*	0.040
	No	1269(43.4%)	1570(53.9%)		
Overweight	Yes	451(15.5%)	478(16.4%)	6.84**	0.048
	No	861(29.5%)	1124(38.6%)		
Drugs and substance use					
Amphetamine use	Yes	48(1.6%)	34(1.2%)	6.22*	0.046
	No	1264(43.4%)	1568(53.8%)		
Marijuana use	Yes	84(2.9%)	73(2.5%)	4.82*	0.041
	No	1228(42.1%)	1529(52.5%)		
Alcohol	Yes	481(16.5%)	411(14.1%)	41.14***	0.119
	No	831(28.5%)	1191(40.9%)		
Ever got drunk after consuming alcohol	Yes	372(12.8%)	344(11.8%)	18.42***	0.080
	No	940(32.3%)	1258(43.2%)		
Smoked cigarettes	Yes	145(5.0%)	109(3.7%)	16.36***	0.075
	No	1167(40.0%)	1493(51.2%)		
Use of tobacco products apart from cigarette	Yes	75(2.6%)	61(2.1%)	5.91*	0.045
	No	1237(42.5%)	1541(52.9%)		
Parental use of tobacco	Yes	129(4.4%)	121(4.2%)	4.78*	0.040
	No	1183(40.6%)	1481(50.8%)		
Psychosocial					
Physically attacked	Yes	274(9.4%)	126(4.3%)	103.23***	0.188
	No	1038(35.6%)	1476(50.7%)		
Physical fight	Yes	339(11.6%)	212(7.3%)	74.74***	0.160
	No	973(33.4%)	1390(47.7%)		
Bullied at school	Yes	310(10.6%)	269(9.2%)	21.17***	0.085
	No	1002(34.4%)	1333(45.7%)		
Bullied outside school	Yes	258(8.9%)	179(6.1%)	40.80***	0.118
	No	1054(36.2%)	1423(48.8%)		
Loneliness	Yes	248(8.5%)	218(7.5%)	15.05***	0.072
	No	1064(36.5%)	1384(47.5%)		
Worry	Yes	176(6.0%)	140(4.8%)	16.31***	0.075
	No	1136(39.0%)	1462(50.2%)		
Suicidal ideation	Yes	299(10.3%)	263(9.0%)	18.82***	0.080
	No	1013(34.8%)	1339(46.0%)		
Psychosocial					
Suicide plan	Yes	260(8.9%)	208(7.1%)	24.98***	0.093
	No	1052(36.1%)	1394(47.8%)		
Suicide attempt	Yes	251(8.6%)	171(5.9%)	41.65***	0.120
	No	1061(36.4%)	1431(49.1%)		
Attended PE classes on ≥3 days	Yes	500(17.2%)	543(18.6%)	5.58*	0.044
	No	812(27.9%)	1059(36.3%)		
Multiple sexual partners	Yes	290(10.0%)	280(9.6%)	9.81**	0.058
	No	1022(35.1%)	1322(45.4%)		

Note. *p < 0.05, **p < 0.01, ***p < 0.001

Furthermore, truant adolescents are vulnerable to serious injuries in Panama. Similar findings have been reported in Egypt [34], Malaysia [26] and Botswana [24]. Perhaps, truant adolescents are likely to exhibit risky behaviours such as violence, alcohol usage, drug use and illegal road traffic behaviours, which may expose them to serious injuries [28,29]. This study also found that overweight adolescents have higher odds of experiencing serious injuries. Current evidence shows that children and adolescents who are overweight and obese more sustain serious fractures than children with normal weight [19].

Additionally, this study found that in-school adolescents who use alcohol are likely to experience serious injuries. Studies have reported that substance use among adolescents makes them more vulnerable to serious injuries [6,16,17,23,26,28,29]. Evidence shows that adolescents who use alcohol are likely to report self-harm and unintentional injuries [20]. Perhaps, adolescents' alcohol use or misuse may increase their likelihood of having experienced violence, bullying and road traffic crashes [7].

Also, in this current study, aggressive behaviours among in-school adolescents, such as physical fights, attacks, and bullying, are significantly associated with higher odds of sustaining severe injuries. Scholars have reported an association between being bullied, engaging in a physical fight, and being physically attacked and the occurrence of injury [3,6,10,23]. Perhaps an adolescent displaying one type of aggressive behaviour could be a response or reaction to other violent behaviour directed at them. For instance, evidence suggests that being a victim or perpetrator of bullying increases the likelihood of engaging in a physical fight, which can result in an injury requiring medical treatment [10]. Besides, bullied adolescents are likely to attack or engage in physical fights, increasing their likelihood of sustaining serious injuries [27,30].

Table 3
Relationship between the significant variables and serious injuries among adolescents.

Variables	B	Wald test (z-ratio)	Adjusted Odds Ratio	95% Confidence Interval for Odds Ratio	
				Lower	Upper
Demographic					
Sex (male)	0.40***	23.81	1.50	1.27	1.76
Personal					
Truancy	0.40***	19.35	1.49	1.25	1.79
Hunger	0.23	0.85	1.26	0.77	2.07
Overweight	0.22**	6.89	1.25	1.06	1.47
Drugs and substance use					
Amphetamine use	0.01	0.00	1.01	0.61	1.68
Marijuana use	−0.28	1.94	0.76	0.51	1.12
Alcohol	0.33**	11.42	1.40	1.15	1.70
Ever got drunk after consuming alcohol	0.04	0.13	1.04	0.84	1.29
Smoke cigarette	0.02	0.012	1.02	0.74	1.41
Parental use of tobacco	0.05	0.132	1.05	0.80	1.40
Smoked cigarettes					
Use of tobacco products apart from cigarette	−0.18	0.69	0.84	0.55	1.27
Psychosocial					
Physically attacked	0.74***	35.54	2.10	1.65	2.68
Physical fight	0.46***	19.01	1.59	1.29	1.95
Bullied at school	0.16	2.34	1.18	0.96	1.45
Bullied outside school	.24*	4.00	1.28	1.01	1.62
Loneliness	0.16	1.83	1.17	0.93	1.48
Worry	0.19	1.86	1.20	0.92	1.57
Suicidal ideation	−0.07	0.26	0.94	0.72	1.21
Suicide plan	0.12	0.69	1.12	0.85	1.48
Suicide attempt	0.33	5.64	1.39	1.06	1.83
Attended PE classes on ≥3 days	0.11	1.95	1.12	0.96	1.32
Multiple sexual partners	−0.03	0.10	0.97	0.78	1.19
Constant	−6.28	55.62	0.00		

Note. *p < 0.05, **p < 0.01, ***p < 0.001; Hosmer and Lemeshow test (goodness of fit), χ^2 (8) = 35547.359, p = 0.000.

4.3. Limitations of the study

The GHSH data we used for this study were obtained through a cross-sectional survey design. As a result, causal inferences from the findings cannot be concluded. Furthermore, the self-report measures used to collect data from Panama adolescents were likely exposed to social desirability and nonresponse bias. Besides, using single items to assess constructs like anxiety and suicidal behaviours among adolescents may not be adequate to capture a comprehensive picture of the existing case. Notwithstanding these limitations, this study provides one of the first adolescent health research on serious injuries using a representative national sample from Panama. The use and interpretations of the study's findings should consider these limitations.

5. Conclusion and recommendations

This current study found a high prevalence of serious injuries among in-school adolescents in Panama. Furthermore, being a male, overweight, alcohol use, truants, bullying, physical attacks and fights are associated with increased odds of serious injury among adolescents in Panama. In a region of high interpersonal violence, building socio-emotional skills and providing psychosocial support to adolescents in schools and other community settings can help promote good interpersonal relationships. Also, programs that help adolescents and their families strengthen their bonds and improve the quality of their home environments are also important. Thus, school-based anti-bullying policies that promote self-esteem and violence-free relationships may play an important role in reducing injuries among adolescents in Panama.

Furthermore, alcohol and drug use prevention are essential areas of public health action. They may include population-based strategies and interventions and activities in schools, communities, families, and on an individual level. Hence, setting a minimum age for purchasing and consuming alcohol and eliminating marketing and advertising to minors are two key strategies that may effectively reduce adolescent alcohol use in Panama. Finally, our findings have implications for future research, policy, adolescent health interventions and pedagogy in Panama.

Data availability

The dataset used for this analysis for this study was obtained from the GSHS-Panama, 2018. Access to the data can be obtained at the WHO website: https://extranet.who.int/ncdsmicrodata/index.php/catalog/879.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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