ORIGINAL CONTRIBUTIONS

Prevalence and Social Correlates of Injury Among In-School Adolescents in Botswana

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ABSTRACT

Injury is a significant public health concern that has received limited attention in Africa. There is in particular a lack of data regarding injury and its social correlates among in-school adolescents in Botswana. This article discusses how cross-sectional data from the 2005 Botswana Global School-based Health Survey (GSHS) were analysed with the aim of estimating the incidence and social correlates of serious injury. Results indicated that of the 2 197 students, 65.8% (68.1% among boys and 63.8% among girls) had sustained at least one serious injury during the previous 12 months. Variables positively associated with the outcome of serious injury during the past 12 months in univariate analysis were current smoking, current alcohol use, excessive drinking, illicit drug use, truancy, bullied and having gone hungry, while in multivariate analysis being bullied, having gone hungry and truancy remained associated with serious injury during the past 12 months.

Key words:

Global School-based Health Survey, injury, prevalence, social correlates, school adolescents, Botswana

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Introduction

Unintentional injuries are the leading cause of death among children aged 10–19 years. Road traffic injuries alone are the leading cause of death among 15–19-year-olds and the second leading cause among 10–14-year-olds (Peden et al., 2008). The annual prevalence of medically treated injuries among 11-, 13- and 15-year-old youths in 11 industrialised countries was 41.3% (Molcho, Harel, & Pickett, 2006) and among 146 440 adolescents in 35 industrialised countries it ranged from 33%–64% of boys and 23%–51% of girls (Pickett et al., 2005). In a study of 13–15-year-old school adolescents from six African countries (Kenya, Namibia, Swaziland, Uganda, Zambia and Zimbabwe), the percentage of adolescents reporting one or more serious injuries within the past 12 months was 68.2% for all countries, ranging from 38.6% in Swaziland to 71.5% in Zambia (Peltzer, 2008).

The etiology of injury involves a complex interplay between human and environmental factors. Patterns of injury vary according to demographic factors including age, sex, residence and socioeconomic status, all of which are difficult to modify (Lescohier & Scavo-Gallagher, 1996). Graham and Uphold (1992) studied health perceptions, safety, lifestyle practices, and care of minor injuries among school-aged boys and girls. Findings indicated that most boys and girls viewed themselves to be healthy and managed their own care fairly well in the areas of seat belt use, exercise and dental health. Generally, children were found to be knowledgeable about the management of simple injuries and how to respond in the event of an emergency.

Adolescence, in particular, is an important period because it is the time when young people are experimenting with, and also establishing, their lifestyle, attitudes, concepts, beliefs and habits that may have long-term influences on their health (Geckova et al., 2001). It has become a more significant developmental stage in many African countries, whereas before there had been a more direct transition from childhood to adulthood (Lloyd, 2005). The rapid social, physical and mental development occurring during adolescence is important as many health behaviours, which become manifest in adulthood, have their origins during younger years (Nutbeam, 1997). A number of theories offer different explanations for the relationship between development and risk-taking among adolescent. For example, biologically-based theories attribute risk-taking behaviour to genetic predispositions and hormonal changes mediated through pubertal timing (Igra & Irwin, 1996). Psychological

theories suggest that sensation-seeking, reflecting a need for varied, novel and complex experiences, encourages a willingness to take physical and social risks (Zuckerman, 1979).

In a study among Canadian school youths aged 11–15 years, strong gradients in injury risk were observed according to the numbers of multiple risk behaviours reported, including smoking, drinking, non-use of seatbelts, bullying, excess time with friends, alienation at school and from parents, and unusually poor diet (Pickett, Garner, Boyce, & King, 2002). Frojd, Kaltiala-Heino and Rimpela (2007) also found an association of parental monitoring and family structure with diverse maladjustment outcomes in middle adolescent boys and girls. Youth reporting the largest number of risk behaviours experienced injury rates that were 4.1 times higher than those reporting no high-risk behaviours. Currie, Williams, Wright, Beattie and Harel (1996) measured the incidence, and age and sex distribution of self-reported experience of injuries among a representative national sample of Scottish school children aged 11–15 in the 12 months prior to the survey. They found that 41.9% of pupils reported an injury that required medical treatment, with injury incidence significantly higher among boys than girls. Sport-related injuries accounted for 32.2% of all medically-attended injuries (Williams, Wright, Currie, & Beattie, 1998). In a national study conducted in the United States of America (US), Cherpitel (1999) found that alcohol consumption was associated with injury occurrence and with risk-taking dispositions, and these dispositions, themselves, have been found to be associated with injury. Starkuviene and Zaborskis (2005) investigated links between accidents and lifestyle factors among Lithuanian school children. They found that risk-taking behaviours, such as smoking, alcohol and drug consumption; frequent participation in sport activities; involvement in a physical fight; longer time spent away from home with friends; the experience of bullying; poor self-assessed health and academic achievement; unhappiness, and feeling unsafe at school were associated with injury risk.

There is no or little information on injury and risk-taking behaviours among youth in Botswana. Botswana has transformed itself from one of the poorest countries in the world to a middle-income country with a per capita gross domestic product (GDP) of $16,450 in 2007 (International Monetary Fund, 2008).

Following the findings of the studies reviewed above the aim of this study was

to investigate the association between serious injuries and social factors among school adolescents in Botswana.

METHODS

This study involved secondary analysis of existing data from the 2005 Botswana GSHS. Details and data of the GSHS can be accessed at http://www.who.int/chp/gshs/methodology/en/index.html. The aim of the Botswana GSHS is to collect data from students aged 13–15 years. A two-stage cluster sample design was used to produce data representative of all students in forms 1, 2 and 3 in Botswana. At the first stage, schools were selected with a probability proportional to enrolment size. At 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 95%, and the overall response rate was 95%. A total of 2 197 students participated in the 2005 Botswana GSHS.

The GSHS 10 core questionnaire modules address the leading causes of morbidity and mortality among children and adults worldwide: tobacco, alcohol and other drug use; dietary behaviours; hygiene; mental health; physical activity; sexual behaviours that contribute to HIV infection, other sexually-transmitted infections, and unintended pregnancy; unintentional injuries and violence; hygiene; protective factors and respondent demographics (CDC, 2003).

For the main outcome, study participants were asked, "During the past 12 months, how many times were you seriously injured?" (Serious injury was defined as "when it makes you miss at least one full day of usual activities, such as school, sports, or a job, or requires treatment by a doctor or nurse.) Eight options were provided, ranging from 0–12 or more times. A zero response was described as not having sustained a serious injury, while a response of one or more times was classified as having experienced a serious injury.

Other questions in this analysis included: **Hunger:** A measure of hunger was derived from a question reporting the frequency that a young person went hungry because there was not enough food at home during the past 30 days (response options were from 1 = never to 5 = always) (Coded 1 = most of the time or always and 0 = never, rarely or sometimes). **Smoking cigarettes:** During the past 30 days, on how many days did you smoke cigarettes? (Response options

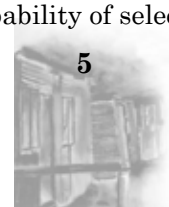
were from 1 = 0 days to 7 = all 30 days) (Coded 1 = 1 or 2 to all 30 days, and 0 = 0 days). **Excessive drinking:** During your life, how many times did you drink so much alcohol that you were really drunk? (Response options were from 1 = 0 times to 4 = 10 or more times) (Coded 1 = 1 or 2 to 10 or more times, and 0 = 0 times). **Drugs:** During your life, how many times have you used drugs, such as glue, benzene, marijuana, cocaine, or mandrax? (Response options were from 1 = 0 times to 4 = 10 or more times) (Coded 1 = 1 or 2 to 10 or more times, and 0 = 0 times). **Truancy:** During the past 30 days, on how many days did you miss classes or school without permission? (Response options were from 1 = 0 times to 5 = 10 or more times) (Coded 1 = 1 or 2 to 10 or more times, and 0 = 0 times). **Ever had sex?** (Response options were 1 = yes, and 2 = no) (Coded 1 = 1 and 2 = 0). **Bullied:** "During the past 30 days, on how many days were you bullied?" Response options were from 1 = 0 times to 7 = all 30 days (coded 1 = 1 or 2 to all 30 days, and 0 = 0 days).

Data analysis

Data analysis was performed using STATA software version 10.0 (Stata Corporation, College Station, Texas, US). This software has the advantage of directly including robust standard errors that account for the sampling design, that is, cluster sampling owing to the sampling of school classes. Descriptive statistics were used for prevalence estimates. In further analysis, the injury risk variable was recoded into two categories: not injured (0); injured at least once (1). Associations between potential risk factors and injuries among school children were evaluated calculating odds ratios (OR). Logistic regression was used to evaluate the impact of explanatory variables on risk for injury (binary dependent variable). The dependent variable was the injury event, and the independent variables were factors which significantly increased injury risk in the univariate analysis.

A weighting factor was used in the analysis to reflect the likelihood of sampling each student and to reduce bias by compensating for differing patterns of non-response. A weighting factor was used in the analysis to reflect the likelihood of selecting each student into the sample and to reduce bias by compensating for differing patterns of non-response. The weighting used to estimate prevalence estimates is given by the following formula:

W = W1 * W2 * f1 * f2 * f3 * f4 where
W1 = the inverse of the probability of selecting the school



W2 = the inverse of the probability of selecting the classroom within the school

fl = a school-level non-response adjustment factor calculated by school size category (small, medium, large)

f2 = a class-level non-response adjustment factor calculated for each school

f3 = a student-level non-response adjustment factor calculated by class

f4 = a post stratification adjustment factor calculated by grade

RESULTS

Sample characteristics

Table 1 shows selected characteristics of the study population of 2 197 Botswana students mainly attending Form 1 (Grade 7) to Form 3 (Grade 9) (99.7%). Most of the sample were female (51.4%), 68.2% were 15 years and above, and most (34.5%) were in Form 1.

TABLE 1
Sample characteristics

	***n* = 2 197 (Unweighted frequency)**	**% (Weighted percent) (CI 95%)**
Sex		
Male	979	48.6 (46.4–50.8)
Female	1 199	51.4 (49.2–53.6)
Age		
13 years or younger	211	9.4 (7.2–11.7)
14 years	495	22.4 (19.1–25.7)
15 years	694	32.7 (29.6–35.7)
16 years old or older	778	35.5 (31.7–39.2)
School grade		
Form 1	774	34.5 (27.8–41.1)
Form 2	664	33.0 (25.2–40.9)
Form 3	727	32.2 (27.8–36.7)
Some other form	6	0.3 (0.08–0.4)

Injury characteristics

Of the 2 197 students, 65.8% (68.1% among boys and 63.8% among girls) had sustained at least one and 39.1% more than one injury serious injury during the previous 12 months. The most frequently identified cause of injury was "I fell" (18.8%), followed by "Something fell on me or hit me" (11.1%), and "Motor vehicle accident" (6.2%), and the most sustained injury involved a "Cut, puncture, stab wound" (20.1%), followed by "Broken bone/dislocated joint" (15.0%), and "I had a bad burn" (8.1%). Boys had, more frequently than girls, been "Riding a bicycle or scooter", while girls were more frequently than boys involved in "Doing work" and "Was in a fire" when the injury happened (see Table 2).

TABLE 2
Injury characteristics

	Total **%[1] (CI 95%)**	**Male** **%[1] (CI 95%)**	**Female** **%[1] (CI 95%)**
Injury in past 12 months	65.8 (62.3–69.2)	68.1 (63.0–73.2)	63.8 (60.1–67.5)
Injury once in past 12 months	26.7 (24.2–29.3)	28.6 (24.3–32.9)	24.9 (20.4–29.4)
Injury more than once in past 12 months	39.1 (35.4–42.7)	39.5 (34.3–44.7)	38.9 (34.9–42.9)
Doing what during injury in past 12 months			
Playing a sport	21.5 (19.2–23.8)	25.6 (20.8–30.3)	17.8 (14.0–21.5)
Walking/running	10.0 (8.2–11.8)	9.7 (7.0–12.3)	10.3 (8.4–12.2)
Riding a bicycle or scooter	11.6 (9.9–13.3)	16.6 (13.3–20.0)	7.0 (5.2–8.7)
Riding/driving a motor vehicle	2.1 (1.6–2.6)	2.1 (1.1–3.0)	2.1 (1.5–2.7)
Doing work	9.2 (6.9–11.6)	4.9 (2.5–7.3)	13.3 (9.7–17.0)
Cause of injury			
Motor vehicle accident	6.2 (4.8–7.6)	7.1 (5.4–8.8)	5.2 (3.5–7.0)
I fell	18.8 (16.1–21.6)	20.9 (16.8–25.0)	16.8 (13.9–19.8)
Something fell on me or hit me	11.1 (8.1–14.1)	10.9 (7.3–14.4)	11.3 (8.3–14.4)
I was fighting with someone	5.5 (4.6–6.4)	5.6 (3.6–7.6)	5.4 (4.7–6.2)
Attacked or assaulted	5.3 (4.2–6.4)	6.0 (3.8–8.2)	4.7 (3.5–5.9)

Was in a fire	5.9 (4.5–7.2)	3.7 (2.0–5.4)	7.9 (5.9–9.9)
Type of injury			
Broken bone/dislocated joint	15.0 (11.5–18.6)	17.9 (13.5–22.3)	12.2 (8.4–16.0)
Cut, puncture, stab wound	20.1 (17.7–22.5)	23.0 (19.7–26.4)	17.2 (14.0–20.5)
Concussion/head injury	5.8 (4.1–7.6)	5.7 (3.6–7.9)	6.0 (3.7–8.4)
I had a gunshot wound	2.1 (1.3–2.9)	2.8 (0.9–4.7)	1.4 (0.6–2.3)
I had a bad burn	8.1 (6.5–9.7)	5.5 (3.5–7.5)	10.7 (8.5–12.8)
Lost foot, leg, hand, or arm	2.7 (1.7–3.7)	2.4 (1.3–3.6)	3.0 (1.7–4.4)

1 Weighted percent

Table 3 presents results from univariate and multivariate analysis. Current smoking, current alcohol use, excessive drinking, illicit drug use, truancy, bullied and having gone hungry were positively associated with serious injury during the past 12 months in univariate analysis, while in multivariate analysis being bullied, having gone hungry and truancy remained associated with serious injury during the past 12 months.

TABLE 3
Univariate and multivariate analysis with annual injury prevalence and risk variables

	All	**Injury prevalence**	**Univariate analysis**	**Multivariate analysis**
Variable	**%**		**Crude OR (95% CI)**	**Adjusted OR (95% CI)[1]**
Age (years)				
≤ 13	9.4	65.0	1.00	
14	22.4	63.8	0.95 (0.64–1.40)	
15	32.7	67.8	1.13 [0.76–1.69]	
≥ 16	35.5	65.4	1.02 [0.62–1.67]	
Current smoking				
No	92.2	64.1	1.00	1.00
Yes	7.8	71.4	1.93 [1.21–3.08]**	0.73 [0.28–1.91]
Used other tobacco				
No	87.3	64.9	1.00	
Yes	12.7	73.0	1.46 [0.98–2.18]	
Current alcohol use				
No	77.5	60.7	1.00	
Yes	22.5	74.7	1.91 [1.41–2.57]***	1.50 [0.98–2.29]

Ever drunk				
No	77.0	63.1	1.00	
Yes	23.0	74.1	1.73 [1.32–2.27]***	1.23 [0.74–2.07]
Ever used drugs				
No	90.9	64.3	1.00	
Yes	9.1	82.2	2.66 [1.62–4.36]***	1.50 [0.62–3.64]
Ever had sex				
No	76.4	60.4	1.00	
Yes	23.6	66.7	1.31 [0.99–1.76]	
Truancy				
No	75.3	61.4	1.00	1.00
Yes	24.7	80.0	2.60 [1.93–3.50]***	1.60 [1.09–2.36]*
Bullied				
No	46.6	52.8	1.00	1.00
Yes	53.4	74.9	2.75 [2.19–3.46]***	1.96 [1.49–2.57]***
Went hungry most of the time/always in past 30 days				
No	86.0	63.1	1.00	1.00
Yes	14.0	84.4	3.16 [2.04–4.90]***	2.16 [1.33–3.51]**

1 Adjusted by age, sex and all risk variables

***P < .001; **P < .01; *P < .05

DISCUSSION

The 2005 Botswana GSHS of in-school adolescents revealed an overall prevalence of having sustained at least one serious injury during the past 12 months of 65.8%. This annual prevalence of injuries was higher compared with Canadian youth (36%) (King, Pickett, & King, 1998), South African Grade 8 students (52% among boys and 33% among girls) (Peltzer, 2006), Lithuanian school adolescents (59% among boys and 40% among girls) (Starkuviene & Zaborskis, 2005), and similar to 13–15-year-old school adolescents (68.2%) from six other African countries (Kenya, Namibia, Swaziland, Uganda, Zambia and Zimbabwe) (Peltzer, 2008).

In the study, variables in univariate analysis were found to be current smoking, current alcohol use, excessive drinking, illicit drug use, truancy, bullied and having gone hungry, while in multivariate analysis, being bullied, having gone hungry and truancy remained associated with serious injury during the past 12 months. These findings resonate with a study among South African school adolescents where, among boys, drunkenness and the experiences of bullying

were found to be predictors for injuries (Peltzer, 2006), while Starkuviene and Zaborskis (2005) found that alcohol use, frequent participation in sport activities, the experiences of bullying, poor self-assessed health, and unhappiness were associated with increased risk for injury among Lithuanian school adolescents. Pickett et al. (2002) also observed strong gradients in risk for injury according to the numbers of multiple risk behaviours reported among Scottish school adolescents. Youth who reported the largest number (7) of risk behaviours experienced injury rates that were 4.1 times higher than those reporting no high risk behaviours in the Scottish study. These analyses suggest that multiple risk behaviours may play an important role in the social etiology of youth injury. In this study one strong predictor for serious injury occurrence was having gone hungry, which is a major indicator for low socioeconomic status (SES). Other studies have also found a significant associated between low SES and injury (Faelker, Pickett, & Brison, 2000; Peltzer, 2008). In this study, age and sex were not significantly associated with injury rates, while other studies have found such differences (Peltzer, 2008; Yang, Yeh, Cheng, & Lin, 1998).

CONCLUSION AND RECOMMENDATIONS

The results of the 2005 Botswana GSHS suggest the need to carefully consider the timing and content of educational interventions so as to improve their relevance and fit with critical periods of development related to individual health behaviours. There is also a need to consider an integrated approach to injury etiology in planning injury prevention and safety promotion activities among schoolchildren, paying particular attention to those lifestyle factors which have the potential to influence risk for injuries. Educational programmes that address the underlying causes and determinants of behaviour, rather than individual behaviours themselves, may therefore offer an effective and efficient method of organising health education for young people.

Limitations of the study

This study had several limitations. Firstly, the GSHS only enrols adolescents who are in school. School-going adolescents may not be representative of all adolescents in a country as the health behaviours of the two groups may differ. As the questionnaire was self-completed, it is possible that some study participants may have misreported, either intentionally or inadvertently, on any of the questions asked. Intentional misreporting was probably minimised

by the fact that study participants completed the questionnaires anonymously. Furthermore, this study was based on data collected in a cross-sectional survey. Causality cannot, therefore, be ascribed to any of the associated factors in the study (Rothman & Greenland, 2005). Finally, the analysis was limited to the risk factors included in the GSHS. There are many other potentially important risk factors (e.g., parental education, wealth, urban/rural situation) that could be associated with these health behaviours that were not measured.

COMPETING INTERESTS

The author has no competing interests to declare.

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