

# Unintentional injuries and socio-psychological correlates among school-going adolescents in four ASEAN countries

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**Objectives:** The study aimed to report the prevalence and socio-psychological correlates of non-fatal injury among school adolescents in four ASEAN countries.

**Materials and methods:** Cross-sectional research data from the 2015 “Global School-based Health Survey (GSHS)” included 29,480 school adolescents (mean age 14.5 years, standard deviation=1.6) that were representative of all students in secondary school.

**Results:** The proportion of participants with one or multiple serious past-year injuries was 36.9% (21.4% once and 15.4% multiple times). The most frequent cause of the reported injury was “I fell” (10.2%) and motor vehicle (5.8%) and the most common form of injury was “a broken bone or dislocated joint” (8.1%) and “cut, puncture or stab wound” (3.4%). In adjusted multinomial logistic regression analysis, male sex, experiencing hunger, substance use (alcohol, tobacco, cannabis, amphetamine and soft drinks), school truancy, participating in physical education classes and psychological distress were associated with one and/or multiple injuries. Parental or guardian support decreased the odds of one annual injury. Compared to students from Indonesia, students from Laos had a lower odd for injury and students from the Philippines and Thailand had higher odds for injury.

**Conclusion:** Several variables, such as male sex, food insecurity, substance use, truancy, physical education and psychological distress, were identified that could be targeted in injury prevention programs in this school population.

**Keywords:** psychosocial factors, injury, substance use, school adolescents, ASEAN

## Introduction

“Unintentional injuries are the largest source of premature morbidity and mortality and the leading cause of death among adolescents 10–19 years of age.”<sup>1</sup> The South-East Asian region is disproportionately affected by the world’s unintentional injury-related deaths.<sup>2</sup> The prevalence of past 12-month serious injuries among adolescents in “Association of Southeast Asian Member States (ASEAN)” was for example, in 20.1% in 2013 Cambodia,<sup>3</sup> 45.9% in 2008 in Indonesia,<sup>4</sup> 34.9% in 2012 in Malaysia,<sup>5</sup> 27.0% in 2007 in Myanmar,<sup>4</sup> 39.1% in 2003, 54.2% in 2007 and 54.3% in 2011 in the Philippines,<sup>6</sup> 46.8% in 2008 in Thailand<sup>4</sup> and 29.7% in 2013 in Vietnam,<sup>3</sup> while it was 40% (median) in “47 low- and middle-income countries.”<sup>7</sup>

The two most frequent external injury causes in investigations in South-East Asian countries included “fall”<sup>3–5</sup> and vehicle or transport-related injuries.<sup>3–5</sup> In the “47 low- and middle-income countries” study, 9.2% had their injuries caused by motor vehicles.<sup>7</sup>

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As previously reviewed,<sup>5</sup> risk factors for unintentional injuries in adolescents may include, sociodemographic variables, such as male sex and lower economic status and socio-psychological factors such as psychological distress, alcohol and tobacco use, soft drink consumption and risk-taking behaviors. The study aimed to report on the prevalence and socio-psychological correlates of non-fatal injury among school-going adolescents in four ASEAN countries using the latest data (2015) available from the “Global School-based Health Survey (GSHS)”. Using the available sociodemographic and psychosocial study variables associated with the occurrence of injuries from the ASEAN GSHS data, findings may generate strategic information for injury prevention in the adolescent population.

Knowing the occurrence and risk factors injury in young person can help in designing intervention strategies of injury prevention.<sup>8</sup>

## Methods

### Sample and procedure

The purpose of the GSHS is to periodically assess the prevalence of various health behaviors in order to set priorities for school health promotion programs in low- and middle-income countries.<sup>9</sup> This analysis utilizes 2015 ASEAN GSHS cross-sectional data; more details and the dataset can be publicly accessed.<sup>9</sup> The conduct of the most recent GSHS in ASEAN countries, namely in 2015, was used as country inclusion criteria to select Indonesia, Laos, Philippines and Thailand for inclusion in this paper. The GSHS utilized a uniform two-stage probability sampling design (schools were selected by probability to size sampling and random selection of classrooms with students 13–15 years old) to produce a nationally representative sample of middle school students in each study country.<sup>9</sup> All students attending a selected class were eligible to participate, regardless of their age, and completed a self-administered questionnaire in their language under the supervision of trained external survey administrators.<sup>9</sup> The study proposal was approved by the Ministry of Education or Health, or/and a national ethics committee, and verbal or written informed consent was obtained from the participating schools, parents and students prior to survey administration.<sup>9</sup>

### Measures

The study questionnaire used was from the GSHS,<sup>9</sup> as shown in the [Table S1](#), and included the following variables: country, age, sex, experience of hunger, current tobacco use, current alcohol use, ever cannabis use, ever

amphetamine use, soft drink consumption, attendance of physical education classes, school truancy, psychological distress, peer and parental support. The psychological distress items (no close friends, loneliness, anxiety, suicidal ideation and suicide attempt) were summed, and grouped into 0=0 low, 1=1 medium and 2–5=2 high. The four items on parental or guardian support were summed, and classified into three groups, 0–1 low, 2 medium and 3–4 high support. The reliability of GSHS was in an Asian country satisfactory (“77% agreement between test and retest and average Cohen’s kappa 0.47”).<sup>10</sup>

### Data analysis

Data analysis was done with STATA software version 15.0 (Stata Corporation, College Station, TX, USA), taking the complex sampling design of the GSHS dataset into account. This includes three weighting variables, stratum, primary sampling unit and weight, with the aim of adjusting differences between the “sampled populations and the national student population as a whole and to account for the two-stage sampling method used to select participating schools and classrooms.”<sup>9</sup> Data results were described with descriptive statistics. Unadjusted and adjusted multinomial logistic regression was used to estimate associations between independent variables (country, age, gender, hunger, current tobacco use, current alcohol use, ever cannabis use, ever amphetamine use, soft drink consumption, attending physical education classes, truancy, psychological distress, peer and parental support) and one and multiple injuries in the past year, with no injuries in the past year as reference category. Independent variables included were based on a literature review.<sup>5</sup> Missing cases were excluded from the analysis.  $P < 0.05$  was considered significant.

## Results

### Sample characteristics

The study sample consisted of 29,480 middle school students (mean age 14.5 years, SD=1.6) from four ASEAN countries, ranging from 3,683 in Laos to 11,142 in Indonesia. The overall response rate ranged from 70% in Laos to 94% in the Philippines.<sup>9</sup> The proportion of male students was 48.9% and that of female students 51.1%, and the net enrolment rate in lower secondary school in 2015 in the study countries ranged from 57.1% in Laos to 77.8% Indonesia (see [Table 1](#)).

**Table 1** Sample characteristics, Global School-based Health Survey, Indonesia, Laos, Philippines and Thailand, 2015

Variables	N (%)	Study year	Overall response rate (%)	Age M (SD)	Boys (%)	Girls (%)	Net enrolment rate, lower secondary, 2015 (%) <sup>11</sup>	Country income classification <sup>12</sup>
Country								
Indonesia	11,142 (37.8)	2015	94.0	14.0 (1.6)	48.9	51.1	77.8	Lower middle income
Laos	3,683 (12.5)	2015	70.0	15.8 (1.2)	53.3	46.7	57.1	Lower middle income
Philippines	8,761 (29.7)	2015	79.0	14.6 (1.5)	49.5	50.5	62.4	Lower middle income
Thailand	5,894 (20.0)	2015	89.0	14.6 (1.7)	47.1	52.9	75.1	Upper middle income
All	29,480			14.5 (1.6)	48.9	51.1		

**Notes:** Lower middle income=Gross National Income (GNI)/Capita (current US\$): 996–3,895; upper middle income=GNI/Capita (current US\$): 3,896–12,055.

## Descriptive results on injury characteristics

The proportion of participants with one or multiple injuries in the past 12 months was 36.9%, 21.4% once and 15.4% multiple times. The most frequent cause of the reported injury was “I fell” (10.2%), followed by motor vehicle (5.8%), “something fell on me or hit me” (2.5%), and “was attacked or abused or was fighting with someone” (2.0%). Boys were more likely to experience one or multiple injuries, motor vehicle, fall and violence-related injuries than girls. The most common injury

type was “a broken bone or dislocated joint” (8.1%), followed by “cut, puncture or stab wound” (3.4%), concussion (2.0%) and burns (1.1%). Male students were more likely than female students to have a broken bone or a dislocated joint, a cut, puncture or stab wound and a gunshot wound (see Table 2).

## Associations with one and multiple injuries

In adjusted multinomial logistic regression analysis, sociodemographic factors (male sex and experience of hunger, a proxy

**Table 2** Past 12-month prevalence of injury events, cause and type of injury by sex in four ASEAN countries, 2015

Variables	Total % (95% CI)	Boys % (95% CI)	Girls % (95% CI)
<b>Injury (in the past 12 months)</b>			
Injured once	21.4 (20.3, 22.6)	25.2 (23.9, 26.6)	17.8 (16.6, 19.2)
Injured multiple times	15.4 (14.5, 16.4)	19.3 (18.0, 20.7)	11.7 (10.6, 12.8)
Injured once or more times	36.9 (35.1, 38.7)	44.5 (42.4, 46.6)	30.0 (27.7, 32.3)
<b>Cause (of most serious injury)</b>			
“I was in a motor vehicle accident or hit by a motor vehicle”	5.8 (5.2, 6.4)	7.1 (6.4, 7.9)	4.4 (3.7, 5.2)
“I fell”	10.2 (9.4, 11.0)	12.2 (11.1, 13.5)	8.3 (7.6, 9.1)
“Something fell on me or hit me”	2.5 (2.2, 2.8)	2.9 (2.5, 3.3)	2.2 (1.9, 2.5)
“I was attacked or abused or was fighting with someone”	2.0 (1.7, 2.2)	2.7 (2.3, 3.1)	1.3 (1.0, 1.5)
“I was in a fire or too near a flame or something hot”	0.5 (0.4, 0.6)	0.6 (0.4, 0.9)	0.4 (0.3, 0.5)
“I inhaled or swallowed something bad for me”	0.6 (0.5, 0.8)	0.7 (0.5, 0.9)	0.6 (0.5, 0.8)
“Something else caused my injury”	4.9 (4.4, 5.4)	5.9 (5.1, 6.8)	4.0 (3.5, 4.5)
<b>Type of injury (of most serious injury)</b>			
“I had a broken bone or a dislocated joint”	8.1 (7.3, 9.0)	11.2 (10.2, 12.4)	5.1 (4.4, 6.0)
“I had a cut, puncture, or stab wound”	3.4 (2.9, 4.0)	4.3 (3.7, 5.0)	2.5 (2.1, 3.1)
“I had a concussion or other head or neck injury, was knocked out, or could not breath”	2.0 (1.8, 2.2)	2.1 (1.8, 2.5)	1.9 (1.7, 2.2)
“I had a gunshot wound”	0.3 (0.26, 0.44)	0.5 (0.4, 0.7)	0.2 (0.1, 0.3)
“I had a bad burn”	1.1 (0.9, 1.3)	1.2 (1.0, 1.6)	1.0 (0.8, 1.2)
“I was poisoned or took too much of a drug”	0.2 (0.1, 0.3)	0.2 (0.1, 0.3)	0.2 (0.1, 0.3)
“Something else happened to me”	10.5 (9.9, 11.1)	12.1 (11.4, 12.9)	8.9 (8.2, 9.7)

**Notes:** The annual prevalence of injury ranged from 16.8% in Laos to 49.3% in the Philippines. Among the four study countries, fall-related injuries were the highest in Indonesia (12.3%) and Thailand (9.6%); motor vehicle-related injuries in Thailand (8.8%) and the Philippines (5.5%); broken bone or dislocated joint was the highest in the Philippines (9.3%) and Indonesia (8.7%); cut, puncture, or stab wound in Thailand (6.5%) and the Philippines (4.2%) (see Table 3).

**Table 3** Past 12-month prevalence of injury events, cause and type of injury by country, 2015

Variables	Indonesia % (95% CI)	Laos % (95% CI)	Philippines % (95% CI)	Thailand % (95% CI)
<b>Injury (in the past 12 months)</b>				
Injured once	18.6 (17.2, 20.0)	13.1 (11.6, 14.7)	26.9 (25.1, 28.8)	21.3 (19.4, 23.3)
Injured multiple times	11.0 (10.0, 12.1)	3.7 (2.9, 4.7)	22.4 (20.4, 24.5)	18.3 (15.9, 21.1)
Injured once or more times	29.6 (27.5, 31.8)	16.8 (14.9, 18.8)	49.3 (46.4, 52.2)	39.6 (35.9, 43.5)
<b>Cause (of most serious injury)</b>				
"I was in a motor vehicle accident or hit by a motor vehicle"	5.2 (4.6, 5.8)	3.0 (2.3, 3.8)	5.5 (3.9, 7.7)	8.8 (7.5, 10.3)
"I fell"	12.3 (11.1, 13.4)	1.2 (0.9, 1.7)	7.3 (6.2, 8.7)	9.6 (8.3, 11.2)
"Something fell on me or hit me"	1.6 (1.3, 2.0)	0.5 (0.3, 0.8)	4.2 (3.6, 4.8)	2.5 (1.9, 3.4)
"I was attacked or abused or was fighting with someone"	1.2 (0.9, 1.5)	0.5 (0.3, 1.0)	3.3 (2.8, 3.9)	2.1 (1.5, 2.9)
"I was in a fire or too near a flame or something hot"	0.3 (0.2, 0.4)	0.03 (0.0, 0.2)	0.7 (0.5, 0.1)	0.7 (0.4, 0.1)
"I inhaled or swallowed something bad for me"	0.6 (0.4, 0.8)	0.1 (0.05, 0.3)	0.6 (0.5, 0.9)	0.7 (0.5, 0.1)
"Something else caused my injury"	0.3 (0.27, 0.35)	3.9 (3.0, 5.1)	6.7 (5.7, 7.9)	8.3 (7.2, 9.5)
<b>Type of injury (of most serious injury)</b>				
"I had a broken bone or a dislocated joint"	8.7 (7.9, 9.6)	1.6 (1.1, 2.2)	9.3 (7.4, 12.2)	3.6 (2.9, 4.6)
"I had a cut, puncture, or stab wound"	2.2 (1.8, 2.8)	1.2 (0.8, 1.7)	4.2 (3.0, 5.7)	6.5 (5.6, 7.6)
"I had a concussion or other head or neck injury, was knocked out, or could not breath"	0.9 (0.8, 1.2)	0.7 (0.4, 0.1)	3.8 (3.2, 4.4)	2.5 (1.9, 3.4)
"I had a gunshot wound"	0.3 (0.2, 0.5)	0.08 (0.02, 0.3)	0.2 (0.1, 0.4)	0.8 (0.5, 0.1)
"I had a bad burn"	0.6 (0.4, 0.8)	0.05 (0.0, 0.3)	1.9 (1.6, 2.3)	1.4 (0.9, 2.0)
"I was poisoned or took too much of a drug"	0.1 (0.08, 0.2)	0.08 (0.02, 0.3)	0.2 (0.1, 0.3)	0.5 (0.2, 1.0)
"Something else happened to me"	9.4 (8.8, 10.2)	4.5 (3.6, 5.6)	11.3 (10.3, 12.4)	13.2 (11.6, 15.0)

for low socioeconomic status) and residing in the Philippines and Thailand were positively and residing in Laos was negatively associated with both one and multiple injuries. Substance use (alcohol, tobacco, cannabis, amphetamine and soft drinks) was associated with one and/or multiple injuries. Participating in physical education classes for three or more days a week increased the odds for multiple injuries. Truancy and psychological distress increased the odds for both one and multiple injuries. High parental or guardian support decreased the odds for one annual injury. Age and peer support were not associated with the prevalence of annual injury (see Table 4).

## Discussion

The study provided updated new results and important new observations of the occurrence and socio-psychological correlates of non-fatal injuries in in-school adolescents in the GSHS in four ASEAN countries in 2015. Results indicate a high annual prevalence of injury (36.9%) among school-going adolescents in four ASEAN countries, ranging from 16.8% in Laos and 29.6% in Indonesia to 49.3% in the Philippines and 39.6% in Thailand, which is similar to the annual injury prevalence (40%) in "47 low- and middle-income countries,"<sup>7</sup> and lower than in 35 high-income countries (47%).<sup>13</sup> The high injury prevalence in the 2015 GSHS in the Philippines

(49.3%) was similarly high as found in the 2007 (54.2%) and 2011 (54.3%) GSHS in the Philippines<sup>6</sup> and the high injury prevalence in the 2015 GSHS Thailand (39.6%) was lower than in the 2008 GSHS in Thailand (46.8%).<sup>4</sup> Compared to the 2008 Indonesia GSHS (45.9%),<sup>3</sup> the 2015 GSHS in Indonesia found a lower annual injury prevalence (29.6%). Possible reasons for this decline seem not clear. For example, although from 1990 to 2016 Disability Adjusted Life Years due to injuries decreased, they remain a leading cause of death and disability in Indonesia. The annual injury prevalence in Laos (16.8%) was lower than in any other ASEAN country (Cambodia, Indonesia, Malaysia, Myanmar, Thailand, Vietnam).<sup>3-5</sup> This finding needs further research. Particularly fall injuries were low in Laos (1.2%), but also motor vehicle-related injuries were lower than in any other of the four countries (3.0%). The lower road traffic injuries may be explained by the low vehicle motorization index, 61.4 vehicles/1,000 population in Laos, compared to 241.6/1,000 population in Thailand in 2015;<sup>14</sup> although there has been a stiff increase in vehicle motorization as well as in years of life lost (YLLs) because of road injury from 1990 (rank 20, 1.1% of total YLLs) to 2010 (rank 8, 3% of total YLLs) in Laos.<sup>15</sup>

Consistent with previous studies,<sup>4,16-18</sup> the study found that among different causes of injuries, the highest

**Table 4** Multinomial logistic regression analysis for associations with one and multiple injuries in the past 12 months, with no injury as reference category

Variables	All injuries		All injuries	
	One	Multiple	One	Multiple
	Unadjusted RRR (95% CI)	Unadjusted RRR ratio (95% CI)	Adjusted RRR ratio <sup>a</sup> (95% CI)	Adjusted RRR ratio <sup>a</sup> (95% CI)
Country				
Indonesia	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Laos	0.60 (0.51, 0.70)***	0.28 (0.21, 0.38)***	0.58 (0.49, 0.68)***	0.25 (0.18, 0.33)***
Philippines	2.02 (1.74, 2.34)***	2.82 (2.34, 3.40)***	1.57 (1.36, 1.82)***	1.78 (1.48, 2.14)***
Thailand	1.34 (1.14, 1.57)***	1.94 (1.53, 2.46)***	1.24 (1.05, 1.45)**	1.46 (1.21, 1.76)***
Age in years				
13 or younger (35.8%)	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
14 (23.4%)	1.18 (1.05, 1.34)**	1.14 (0.98, 1.32)	1.09 (0.95, 1.24)	0.98 (0.86, 1.12)
15 (17.8%)	1.20 (0.98, 1.47)	1.24 (1.05, 1.46)*	0.93, 0.79, 1.09)	0.91 (0.77, 1.07)
16 or older (23.0%)	1.00 (0.85, 1.19)	1.11 (0.90, 1.35)	0.87 (0.69, 1.02)	0.80 (0.69, 2.02)
Gender				
Female (51.1%)	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Male (48.9%)	1.76 (1.57, 1.95)***	2.11 (1.87, 2.40)***	1.64 (1.49, 1.81)***	1.81 (1.64, 2.02)***
Hunger				
Never (40.4%)	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Rarely (20.0%)	1.41 (1.20, 1.66)***	1.62 (1.39, 1.88)***	1.29 (1.12, 1.47)***	1.40 (1.21, 1.61)***
Sometimes/always (39.6%)	1.57 (1.40, 1.76)***	1.84 (1.59, 2.14)***	1.63 (1.45, 1.83)***	1.72 (1.49, 1.99)***
Current tobacco use (13.9%)	2.04 (1.64, 2.54)***	3.34 (2.67, 4.19)***	1.45 (1.23, 1.72)***	1.58 (1.33, 1.88)***
Current alcohol use (12.5%)	2.37 (2.01, 2.79)***	3.77 (3.20, 4.44)***	1.27 (1.08, 1.49)**	1.44 (1.25, 1.65)***
Ever cannabis use (4.0%)	4.57 (3.18, 6.56)***	9.00 (6.58, 12.3)***	0.93 (0.68, 1.28)	1.37 (1.01, 1.87)*
Ever amphetamine use (3.0%)	7.33 (4.73, 11.35)***	12.88 (8.49, 19.52)***	2.46 (1.42, 4.27)***	2.07 (1.18, 3.62)**
Soft drink consumption (≥2/day) (15.1%)	1.60 (1.43, 1.80)***	2.21 (1.93, 2.53)***	1.29 (1.15, 1.46)***	1.59 (1.40, 1.81)***
Physical education (three or more days/week) (22.8%)	1.46 (1.27, 1.66)***	1.85 (1.59, 2.14)***	1.10 (0.99, 1.22)	1.36 (1.21, 1.53)***
Truancy in the past month (25.2%)	1.79 (1.56, 2.05)***	2.62 (2.26, 3.04)***	1.58 (1.39, 1.78)***	1.92 (1.71, 2.15)***
Psychological distress				
0 (76.8%)	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
1 (14.6%)	1.58 (1.40, 1.79)***	2.35 (2.01, 2.72)***	1.29 (1.16, 1.44)***	1.62 (1.40, 1.87)***
2 or more (8.6%)	2.75 (2.34, 3.22)***	4.83 (4.06, 5.75)***	2.04 (1.74, 2.40)***	3.04 (2.51, 3.68)***
Peer support (mostly or always) (36.8%)	0.79 (0.71, 0.87)***	0.65 (0.58, 0.74)***	0.97 (0.89, 1.05)	0.93 (0.83, 1.03)
Parental or guardian support				
Low: 0-1 (51.5%)	1 (Reference)	1 (Reference)	1 (Reference)	1 (Reference)
Medium: 2 (27.0%)	0.76 (0.67, 0.86)***	0.63 (0.55, 0.71)***	0.97 (0.88, 1.06)	0.93 (0.85, 1.03)
High: 3-4 (21.5%)	0.60 (0.54, 0.67)***	0.61 (0.52, 0.71)***	0.81 (0.74, 0.89)***	0.90 (0.79, 1.02)

**Note:** <sup>a</sup>All variables in the table were included in the adjusted model; \*\*\* $P < 0.000$ , \*\* $P < 0.01$ , \* $P < 0.05$ .

**Abbreviation:** RRR, relative risk ratio.

prevalence was fall- and motor vehicle-related injuries. Similar to what was found in other studies,<sup>4</sup> this study found that the two most common injury types were “a broken bone or dislocated joint” and “cut, puncture or stab wound.” This underlines the severity of the reported injuries in this population.<sup>7</sup>

Consistent with previous studies,<sup>3,7,8,19,20</sup> male sex increased the odds for one and multiple injuries as well as injuries caused by motor vehicles, fall and being attacked. No sex differences were found for other external causes of injuries (“something fell on me or hit me”, “I was in a fire or too near a flame or something hot” and “I inhaled or

swallowed something bad for me"). Further, hunger as an indicator of lower socioeconomic status increased the odds for annual injury prevalence in this study. Similar findings were identified in previous studies.<sup>8,18</sup> It is possible that school adolescents with a lower socioeconomic status may experience larger economic deprivation and societal barriers than students from higher socioeconomic backgrounds making them more vulnerable to injuries.<sup>21</sup>

Consistent with previous studies,<sup>4,5,7,20,22,23</sup> this study found an association between psychological distress (loneliness, anxiety, suicidal ideation, suicide attempt and school truancy) and substance use (tobacco, cannabis, amphetamine and soft drinks) were associated with one and/or multiple injury. Some studies<sup>24,25</sup> found a link between "frequent soft drink consumption and violent behaviour in adolescents". Therefore, it may be possible adolescents who frequently drink soft drinks may be more vulnerable to sustain injuries. Increased socio-psychological stress and substance use may have an influencing role in adolescent injury. This finding increased support for adolescent injury interventions that incorporate socio-psychological and legal and illegal drug use issues.<sup>26</sup> A previous study<sup>20</sup> found a correlation between school and/or home environmental factors and the risk of injury, while this study only found such an association with parental support. The high burden of "injuries on morbidity and mortality" among adolescents and potentially successful prevention activities such as safety training constitutes a high public health priority.<sup>1</sup>

## Study limitations

The study only focused on school-going adolescents which is not representative of all adolescents (including non-school-going adolescents) in ASEAN. The questionnaire utilized was by self-report, which may have introduced a reporting bias, especially the long recall period (12 months) for the occurrence of injuries. Study data were cross-sectional and no causative inferences can be made. Some information, such as the location of the injury, was not assessed and should be assessed in future studies.

## Conclusion

This investigation found a high past 12-month prevalence of injury (once and multiple) among a national sample of school adolescents in four ASEAN countries. The study identified several socio-psychological risk factors (male sex, hunger, substance use, truancy, and psychological

distress), which may be targeted in an integrated injury prevention program among school adolescents.

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## Disclosure

The authors declare that they have no competing interests in this work.

## References

1. Sleet DA, Ballesteros MF, Borse NN. A review of unintentional injuries in adolescents. *Annu Rev Public Health*. 2010;31:195–212. doi:10.1146/annurev.publhealth.012809.103616
2. Pant PR, Towner E, Pilkington P, Ellis M. Epidemiology of unintentional child injuries in the South-East Asia Region: a systematic review. *Int J Inj Contr Saf Promot*. 2015;22(1):24–32. doi:10.1080/17457300.2013.842594
3. Peltzer K, Pengpid S. Nonfatal injuries and psychosocial correlates among middle school students in Cambodia and Vietnam. *Int J Environ Res Public Health*. 2017;14(3):pii: E280. doi:10.3390/ijerph14030280
4. Peltzer K, Pengpid S. Injury and social correlates among in-school adolescents in four Southeast Asian countries. *Int J Environ Res Public Health*. 2012;9:2851–2862. doi:10.3390/ijerph9082851
5. Peltzer K, Pengpid S. Unintentional injuries and psychosocial correlates among in-school adolescents in Malaysia. *Int J Environ Res Public Health*. 2015;12(11):14936–14947. doi:10.3390/ijerph121114936
6. Peltzer K, Pengpid S. Health risk behaviour among in-school adolescents in the Philippines: trends between 2003, 2007 and 2011, a cross-sectional study. *Int J Environ Res Public Health*. 2015;13(1):73. doi:10.3390/ijerph13010073
7. Street EJ, Jacobsen KH. Injury incidence among middle school students aged 13–15 years in 47 low-income and middle-income countries. *Inj Prev*. 2016;22:432–436. doi:10.1136/injuryprev-2015-041944
8. Molcho M, Walsh S, Donnelly P, Matos MG, Pickett W. Trend in injury-related mortality and morbidity among adolescents across 30 countries from 2002 to 2010. *Eur J Public Health*. 2015;25 Suppl 2:33–36. doi:10.1093/eurpub/ckv026
9. World Health Organization (WHO). Global school-based student health survey (GSHS). Available from: <https://www.who.int/ncds/surveillance/gshs/en/>. Accessed March 20, 2019.
10. Becker AE, Roberts AL, Perloe A, et al. Youth health-risk behavior assessment in Fiji: the reliability of Global School-based Student Health Survey content adapted for ethnic Fijian girls. *Ethn Health*. 2010;15(2):181–197. doi:10.1080/13557851003615552
11. UNESCO. Education: net enrolment rate by level of education. 2019. Available from: <http://data.uis.unesco.org/Index.aspx?queryid=144>. Accessed March 20, 2019.
12. World Bank Country and Lending Groups. Available from: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>. Accessed March 20, 2019.
13. Pickett W, Molcho M, Simpson K, et al. Cross national study of injury and social determinants in adolescents. *Inj Prev*. 2005;11(4):213–218. doi:10.1136/ip.2004.007021
14. Greater Mekong Subregion Information Portal. Vehicle motorization index (vehicles/1000 population). Available from: <http://portal.gms-eoc.org/charts/overview/vehicle-motorization-index>. Accessed March 20, 2019.

15. Institute for Health Metrics and Evaluation. Global Burden Disease PROFILE: LAOS. Available from: [http://www.healthdata.org/sites/default/files/files/country\\_profiles/GBD/ihme\\_gbd\\_country\\_report\\_laos.pdf](http://www.healthdata.org/sites/default/files/files/country_profiles/GBD/ihme_gbd_country_report_laos.pdf). Accessed March 20, 2019.
16. Sun YH, Yu IT, Zhang Y, Fan YP, Guo SQ, Wong TW. Unintentional injuries among primary and middle school students in Maanshan City, eastern China. *Acta Paediatr.* 2006;95:268–275. doi:10.1080/08035250500312171
17. Kelishadi R, Qorbani M, Motlagh ME, et al. Frequency, causes, and places of unintentional injuries in a nationally representative sample of Iranian children and adolescents: the CASPIAN-IV study. *Int J Prev Med.* 2014;5:1224–1230.
18. Poudel-Tandukar K, Nakahara S, Ichikawa M, Poudel KC, Joshi AB, Wakai S. Unintentional injuries among school adolescents in Kathmandu, Nepal: a descriptive study. *Public Health.* 2006;120:641–649. doi:10.1016/j.puhe.2006.01.012
19. Pickett W, Garner MJ, Boyce WF, King MA. Gradients in risk for youth injury associated with multiple-risk behaviours: a study of 11,329 Canadian adolescents. *Soc Sci Med.* 2002;55:1055–1068.
20. Mytton J, Towner E, Brussoni M, Gray S. Unintentional injuries in school-aged children and adolescents: lessons from a systematic review of cohort studies. *Inj Prev.* 2009;15:111–124. doi:10.1136/ip.2008.019471
21. Faelker T, Pickett W, Brison BJ. Socioeconomic differences in childhood injury: A population based epidemiologic study in Ontario, Canada. *Inj Prev.* 2000;6:203–208. doi:10.1136/ip.6.3.203
22. Peltzer K. Injury and social determinants among in-school adolescents in six African countries. *Inj Prev.* 2008;14:381–388. doi:10.1136/ip.2008.018598
23. Starkuniviene S, Zaborski A. Links between accidents and lifestyle factors among Lithuanian school children. *Medicina.* 2005;41:73–80.
24. Solnick SJ, Hemenway D. The ‘Twinkie Defense’: the relationship between carbonated non-diet soft drinks and violence perpetration among Boston high school students. *Inj Prev.* 2012;18:259–263. doi:10.1136/injuryprev-2011-040117
25. Solnick SJ, Hemenway D. Soft drinks, aggression and suicidal behaviour in US high school students. *Int J Inj Contr Saf Promot.* 2014;21:266–273. doi:10.1080/17457300.2013.815631
26. Asbridge M, Azagba S, Langille DB, Rasic D. Elevated depressive symptoms and adolescent injury: examining associations by injury frequency, injury type, and gender. *BMC Public Health.* 2014;14:190. doi:10.1186/1471-2458-14-190

## Supplementary material

**Table S1** Description of variables and response options analyzed in this paper

Variables	Question	Response options (coding scheme)
Age	"How old are you?"	"11 years old or younger to 18 years old or older"
Sex	"What is your sex?"	"Male, Female"
Hunger	"During the past 30 days, how often did you go hungry because there was not enough food in your home?"	"1= never to 5= always (coded 1-3=0 and 4-5=1 mostly or always)"
Injury	"During the past 12 months, how many times were you seriously injured?" "(An injury is serious 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.)"	"1=0 times to 8=12 or more times (coded 1=0 times and 2-8=1 at least once)"
Past month or current tobacco use	"During the past 30 days, on how many days did you smoke cigarettes/use any tobacco products other than cigarettes, such as such as country examples ... ?"	"1=0 days to 7= All 30 days (coded 1=0 days and 2-7=1 at least one day)"
Current alcohol use	"During the past 30 days, on how many days did you have at least one drink containing alcohol?"	"1=0 days to 7= All 30 days (coded 1=0 days and 2-7=1 at least one day)"
Cannabis use	"During your life, how many times have you used marijuana (also called country examples)?"	"1=0 times to 5=20 or more times (coded 1=0 times and 2-5=1 one or more times)"
Amphetamine use	"During your life, how many times have you used amphetamines or methamphetamines (also called ... .country specific names)?"	"1=0 times to 5=20 or more times (coded 1=0 times and 2-5=1 one or more times)"
Soft drinks	"During the past 30 days, how many times per day did you usually drink carbonated soft drinks, such as country examples ... ? (Do not include diet soft drinks.)?"	"1=not in the past days to 7=5 or more times per day (coded 1-3=0 zero to 1 time and 4-7=1 2 or more a day)"
Physical education	"During this school year, on how many days did you go to physical education (PE) class each week?"	"1=0 days to 6=5 or more days (coded 1-3=0 zero to two days/week and 4-6=1 three or more days a week)"
School truancy	"During the past 30 days, on how many days did you miss classes or school without permission?"	"1=0 days to 5=10 or more days (coded 1=0 days and 2-5=1 at least one day)"
No close friends	"How many close friends do you have?"	"1=0 to 4=3 or more (coded 1+=0, 0=1 none)"
Loneliness	"During the past 12 months, how often have you felt lonely?"	"1= never to 5= always (coded 1-3=0 and 4-5=1 mostly or always)"
Anxiety	"During the past 12 months, how often have you been so worried about something that you could not sleep at night?"	"1= never to 5= always (coded 1-3=0 and 4-5=1 mostly or always)"
Suicide ideation	"During the past 12 months, did you ever seriously consider attempting suicide?"	"Yes, No"
Suicide attempt	"During the past 12 months, how many times did you actually attempt suicide?"	"1=0 times to 5=6 or more times (coded 1=0 and 2-5=1 at least once)"
Peer support	"During the past 30 days, how often were most of the students in your school kind and helpful?"	"1=never to 5=always (coded 1-3=0 and 4-5=1 mostly or always)"

(Continued)



**Table S1** (Continued).

Variables	Question	Response options (coding scheme)
Parental supervision	"During the past 30 days, how often did your parents or guardians check to see if your homework was done?"	"1=never to 5=always (coded 1-3=0 and 4-5=1 mostly or always)"
Parental connectedness	"During the past 30 days, how often did your parents or guardians understand your problems and worries?"	"1=never to 5=always (coded 1-3=0 and 4-5=1 mostly or always)"
Parental bonding	"During the past 30 days, how often did your parents or guardians really know what you were doing with your free time?"	"1=never to 5=always (coded 1-3=0 and 4-5=1 mostly or always)"
Parental respect for privacy	"During the past 30 days, how often did your parents or guardians go through your things without your approval?"	"1=never to 5=always (coded 1-3=0 and 4-5=1 mostly or always)"

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