

## Research Article

# Unintentional Injuries among School-Aged Children in Palestine: Findings from the National Study of Palestinian Schoolchildren (HBSC-WBG2006)

Christine Jildeh,<sup>1</sup> Ziad Abdeen,<sup>2,3</sup> Haleama Al Sabbah,<sup>4,5</sup> and Anastas Philalithis<sup>1</sup>

<sup>1</sup> Department of Social Medicine, School of Medicine, University of Crete, P.O. Box 2208, 71003 Iraklion, Crete, Greece

<sup>2</sup> The Al-Quds Nutrition and Health Research Center, Al-Quds University, P.O. Box 20760, Jerusalem, Palestine

<sup>3</sup> Faculty of Medicine, Al-Quds University, P.O. Box 51000, Jerusalem, Palestine

<sup>4</sup> Faculty of Medicine, An-Najah National University, P.O. Box 7, Nablus, West Bank, Palestine

<sup>5</sup> Jean Mayer USDA Human Nutrition Research Centre, Tufts University, 711 Washington street, Boston, MA 02111, USA

Correspondence should be addressed to Ziad Abdeen; [zabdeen@planet.edu](mailto:zabdeen@planet.edu)

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**Purpose.** This study describes the nonfatal injuries among adolescents in Palestine. **Methods.** The 2006 Palestinian Health Behaviour in School-aged Children (HBSC) is a cross-sectional survey. Students of grades 6, 8, 10, and 12 completed a modified version of the international HBSC questionnaire, resulting in 15,963 students (47.3% boys and 52.7% girls) included in this study (56.9% from the West Bank and 43.1% from Gaza). **Results.** Of the total 15,963 adolescents, 47.6% were injured, with boys (53.5%) being statistically higher than girls (42.1%) ( $P < 0.001$ ). The prevalence of those injured more than once decreased by age and was also found significantly higher in boys than in girls (27.3% and 17.9%, resp.) ( $P < 0.001$ ). Children living in low FAS families showed significantly lower ratios of injuries than those living in moderate and high FAS families ( $P < 0.001$ ). Injuries while biking were significantly higher among boys (46.3%) than girls (41.7%) ( $P < 0.001$ ), and injuries while walking/running were more prevalent among girls (32.5%) than boys (28.0%) ( $P < 0.001$ ). **Conclusion.** Despite these considerably high rates, injury remains relatively underappreciated. Results of this study are useful to develop a national injury prevention program aimed at enhancing the safety of Palestinian adolescents.

## 1. Introduction

Injuries are the world's leading cause of morbidity and mortality among children and adolescents [1]. According to the World Health Organization report of 2008, injury is a leading cause of the global burden of disease; injuries are responsible for more than 950,000 deaths every year among those under 19 years of age, from which at least 60 percent are attributed to unintentional causes. However, the differences such as the extent, pattern, distribution, risk, and determinants between the intentional and unintentional home, school and road-related childhood, and young adulthood injury hazards are not well understood [2].

Many studies had focused on the typology of injuries and their socio-economic status correlates [3, 4] particular types of injuries, such as sport injuries [5], the association between

family stress and injuries [6], risk behaviors and injuries [7], violence and injuries [4, 8], and other psychosocial determinants [4, 9, 10]. Despite the enormous public health burden imposed by child and adolescent injury, several studies had shown that 71–95% of injuries could be prevented by simple and reasonable means [11, 12]. In developed countries such as Australia, Sweden, Britain, and Canada, injury rates has been reduced by up to 50% over the past three decades using multisectoral approaches to prevention [13]. In developing countries, studies have been largely limited to hospital-based information which provides information on severe injuries [14, 15].

A population-based survey of adults 18–65 years residing in Aleppo, Syria, conducted in 2004 founds that falls and traffic injuries have caused the highest morbidity ratios

among the injured, while burns, although not frequently reported, were associated with the severity of injury in the majority of cases [16]. A recent report in 2008 about the incidence of home accidents in Palestinian and Israeli communities stated that falls were the most common cause of injury reported by parents surveyed (35% in the Palestinian community and 31% in the Bedouin community); the majority of these accidents occurred among boys (60% in the Bedouin community and 70% in the Palestinian community) with the yard, living room, and kitchen as places with greatest number of accidents [17]. Another main site of accidents for the Palestinian population was the stairs—a site not relevant in the Bedouin homes. In the Bedouin community, burns represented an equal proportion of injuries to falls, significantly higher than the proportion found in the Palestinian survey (31% versus 11%) or in the international literature. Analysis of the circumstances of these accidents reveals that most were related to the use of an open fire for cooking and heating, which are common to the Bedouin lifestyle [17].

The Palestinian Ministry of Health (PMOH) reported that in 2004 accidents were the leading cause of death for children aged 1–4 and 5–19 years with a proportion of 24.2%, and 29.2%, respectively of the total deaths [18]. And although children constitute 52.6% of the Palestinian total population [19], there is little literature on unintentional injuries in Palestine. Therefore, the Palestinian Health Behavior in School-aged Children (PHBSC) survey offers for the first time the opportunity to study the Palestinian adolescents' unintentional injuries in grades 6, 8, 10, and 12. The intent of this analysis was to estimate the prevalence rate of injuries, severity of injuries, settings in which injuries occur, and the activity context of injury events occurring to Palestinian adolescents as well as to compare the results of this study with studies from other countries which used similar type of research and target group to be used as a model to develop future injury surveillance methods to track injuries and their risk factors. This study is essential for understanding the extent of the injuries problem to inform both public policy and prevention strategies.

## 2. Methods

**2.1. Target Population and Sample.** The estimated population of Palestine in 2006 was 3,761,646 people (West Bank = 2,345,107 and Gaza Strip = 1,416,539) [20]; the total numbers of youth aged 10–14 and 15–19 were 514,997 and 429,276, respectively. The schooling system in Palestine is comprised of two stages: a basic stage that involves children aged 6 to 16 years and a secondary stage of children aged 17 to 18 years. In 2006, there were 2,277 schools in Palestine (1726 government-run, 279 United Nations Relief and Works Agency (UNRWA), which provides education, among other services, to Palestinian refugees living in the Gaza Strip and the West Bank, and 272 private schools) with a total number of 31,019 classes (22,110 government, 6107 UNRWA, 2802 private) [21]. The total number of children enrolled in basic education during the scholastic year 2005/2006

was 944,713, while 122,776 students were enrolled in the secondary education [21].

Selected students were chosen using a stratified, two-stage cluster sampling. The sample was stratified according to region (West Bank and Gaza Strip), school types (government, private, and UNRWA), and school grades (6th, 8th, 10th, and 12th). Assuming an average class size of 35 students, the aim was to recruit 4,000 students at each grade level, from both regions, to produce a sample size of around 16,000 students. A two-stage cluster sampling technique was used with the school as the primary sampling unit. In the first stage, 405 schools were selected randomly with probability proportional to their size (size defined as number of classes in the school). The list of the schools and number of classes in each school, for the academic year 2005/2006, were obtained from the Ministry of Education. All of the randomly selected schools ( $n = 405$ ) agreed to participate. The response rate was 97.3% among 16,400 students who participated on data collection, leaving a sample size of 15,963. In the second stage, one class was selected at random from each school. Each of these classes was defined as a cluster, where all the students in the selected class were eligible for inclusion. The aim was to survey one class per school. However, in schools where boys and girls were studying in separate classes, two classes were selected, one for boys and another for girls. This resulted in a total of 481 classes being selected overall.

**2.2. Data Collection and Questionnaire.** The questionnaire was developed using the WHO international HBSC questionnaire (2001–2002) including all mandatory HBSC questions [22]. The questionnaire was double cross translated to Arabic; it was tested in two independent preliminary studies using in-class administration as well as focus-group discussions to demonstrate reliability and validity prior to the administration of the national representative full survey.

In addition to the major variables addressed in the survey (demographics, general health, well-being, family and peer relationships, school environment, exercise and leisure-time activities, diet, smoking, exposure to political violence, and mental health) [23–25], the questionnaire contained additional optional packages; half of the optional components of the questionnaire (Form A) contained optional questions on violence, injuries, and social inequalities, and the other half of the questionnaire (Form B) contained optional questions on physical activity, eating, dieting, and mental and physical health. Equal numbers of Form A and Form B were randomly distributed in each school class. However, the injury filter items were asked to all sampled students. The survey was conducted anonymously in the West Bank and Gaza through self-completed questionnaires between April–May of 2006.

In each school, the student advisor distributed the questionnaires in the classroom and was instructed to respond to the students' enquiries about the procedure. School children completed the questionnaires independently during one school period, lasting 45 minutes. Data collection was conducted by Al-Quds Nutrition and Health Research Institute (ANAHRI) in Al-Quds University.

### 2.3. Main Measures

**2.3.1. Injury.** Students were asked to report injury events that required medical attention from a doctor or a nurse in the past 12 months [26]. Response options were “I was never injured in the past 12 months,” “once,” “twice,” “three times” and “four times or more”. Students who reported one or more injuries were defined as being injured. Respondents who reported at least one injury were requested to answer a series of questions related to the circumstances and consequences of the injury event. Respondents who reported two or more injuries were asked to select the “single most serious injury during the past 12 months” and were requested to answer the following questions referring to that “most serious injury”. The most serious injury was defined as the injury that took the most time to get better [10, 27–29].

The information obtained referred to the timing of the injury (month and year), setting where the injury occurred (e.g., home, school, street), the activity context (e.g., biking, sports, fighting), and consequence (e.g., loss of activity days or school days, hospitalization, etc.).

**2.3.2. Family Affluence Scale (FAS).** Family Affluence Scale (FAS) was developed by the WHO Health Behaviour in School-Aged Children Study. This scale deduced the levels of material wealth by calculating points to “owning a car,” “owning a computer,” “sharing a bedroom,” and “travelling while on holiday.” A sum score was calculated for each student and categorized as (i) low FAS (score = 0–2); (ii) medium FAS (score = 3–5); (iii) high FAS (score = 6–9) [30].

**2.3.3. Parents’ Educational Level.** This is based on adolescents self-reports and is divided into four levels: (1) did not graduate from high school; (2) graduated from high school; (3) continued studies after high school but not in the university; (4) studied in university or graduated from university. Responses are categorized into (A) low education—a combination of 1 + 2 and (B) high education—a combination of 3 + 4.

**2.3.4. Parents’ Occupation.** A more direct measure of the family economic situation was derived from a question reporting the current occupation status of the parents. This is based on adolescents self-reports and responses were 1—yes; 2—no; 3—do not know; 4—do not have/do not see the father/mother. In the analysis, do not know or do not have/do not see the father/mother were combined in one category.

**2.3.5. Activity During Injuries.** Participants were asked to choose their activity when the accident occurred. Response options included “biking/cycling, sports activity/recreational activity, walking/running (not for a sports team or exercise), fighting, paid or unpaid work, and other.” Location of injuries was asked, and the response options included “home or yard, school, including school grounds, sports facilities, or fields, street, and road.”

**2.4. Ethical Considerations.** The 2006 Palestinian HBSC survey was approved by Al-Quds University Ethical Committee

and the Research Ethics Board of the Palestinian Ministry of Education.

**2.5. Statistical Analysis.** Percentages for injuries have been calculated on the basis of sociodemographic characteristics (grade, gender, region, school ownership, and FAS). Chi-square test was used to compare differences in injuries among adolescents by sociodemographic characteristics. Analysis was performed using SPSS Version 20. A significance level of  $P < 0.05$  was used.

## 3. Results

The total number of students included in this study is 15,963, from which 52.7% are girls and 47.3% are boys. More than half the participants resided in the West Bank (56.9%). The majority of the students’ fathers and mothers had low education level (75.6% and 65.5%, resp.), and 71.8% of the fathers were working, while 71.5% of mothers were housewives. Based on the Family Affluence Scale (FAS), 66.6% of the students’ families have low economic situation and 79.5% of the adolescents attend government schools (Table 1).

Table 2 presents the percent of students reporting one or more medically attended injury during the past 12 month by grade, gender, region, school ownership, and FAS. Of the total (15,963) participants, 47.6% were injured (53.5% boys versus 42.1% girls). About one quarter (25.2%) of the participants reported one injury and with boys higher than girls (26.2% and 24.2%, resp.) ( $P < 0.001$ ). Whereas, 22.4% reported two or more medically attended injuries during the past 12 months. The prevalence of those injured more than once decreased by age and was found significantly higher in boys than in girls (27.3% and 17.9%, resp.) ( $P < 0.001$ ). Adolescents attending UNRWA schools showed significantly higher ratios of injuries in both single and multiple injures than other schools. Adolescents living in families with low FAS reported significantly lower ratios of injuries than those living with moderate and high FAS families ( $P < 0.001$ ).

Loss of activity days due to the injury was used as an indicator of more severe injuries. About half of all reported injuries (42.4%) were severe enough to cause loss of at least one day of school or other activities. This proportion significantly decreased by grade ( $P < 0.001$ ) and was significantly higher among boys than girls (47.2% and 37.0% resp.) ( $P < 0.001$ ).

The most frequent activity in which injuries occurred was biking (44.2%) and among boys (46.3%) more than among girls (41.7%). Injuries while walking/running were more prevalent among girl (32.5%) than among boys (28.0%). About one out of every five injury events occurred during fighting.

Home injuries has the highest ratio (78.5%) followed by school (9.0%) and streets (4.2%) (Figure 1). There was no significant difference between the injury setting (home, school, sport facility, and street) and the sociodemographic characteristics (age, gender, region, school ownership, and FAS), while there was significant difference between organized activity and injury setting with sport facilities being the highest 47.0% (Figure 2).

TABLE 1: Characteristics of participants (n = 15963).

Characteristics	n	%
<b>Grade</b>		
6th	4263	26.7
8th	4124	25.8
10th	4113	25.8
12th	3463	21.7
<b>Gender</b>		
Boys	7551	47.3
Girls	8412	52.7
<b>Region</b>		
West Bank	9077	56.9
Gaza Strip	6886	43.1
<b>School ownership</b>		
Private	1243	7.8
Government	12688	79.5
UNRWA*	2032	12.7
<b>Family Affluence Scale (FAS)</b>		
FAS 1 (low)	9494	66.6
FAS 2 (moderate)	3259	22.9
FAS 3 (high)	1502	10.5
<b>Father's education</b>		
Low education	10833	75.6
High education	3488	24.4
<b>Mother's education</b>		
Low education	9466	65.5
High education	4980	34.5
<b>Father's occupation</b>		
Yes	10398	71.8
No	3006	20.8
Do not know or do not have/do not see the father	1075	7.4
<b>Mother's occupation</b>		
Yes	3054	21.2
No	10280	71.5
Do not know or do not have/do not see the mother	1044	7.2

\*UNRWA: United Nation Relief Working Agency.

**4. Discussion**

The overall prevalence of Palestinian adolescents who were injured at least once during the past 12 months from conducting the survey was 47.6% of the total, and injuries among boys (53.5%) were higher than among girls (42.1%). These results are consistent with results from European countries, USA, and Israel that boys have more injuries than girls [4, 9, 10, 16, 31–33].

Although there was variation between countries, injuries between Palestinian adolescents were less than Spain (63.9% boys and 50.7% girls), Germany (58.1% boys and 50.3% girls), Austria (58.0% boys and 47.9% girls), USA (56.9% boys and

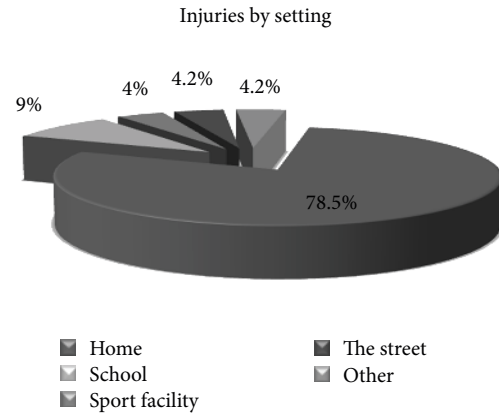


FIGURE 1: This graph shows the prevalence of injury by setting.

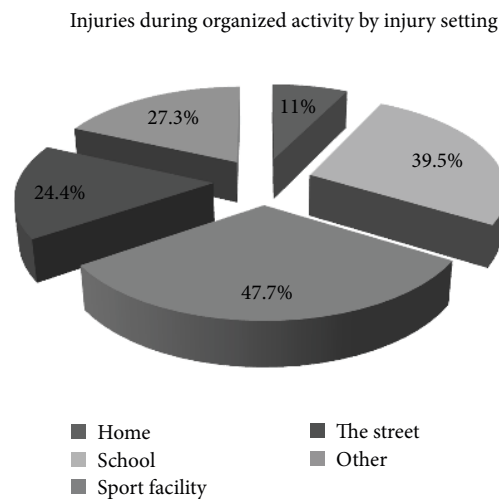


FIGURE 2: This graph shows the prevalence of injury according to injury setting as well as the percentage of injuries during organized activity in each category.

47.6% girls), and Israel (62.1% boys and 46.3% girls) [4]. While the results from this study were closer to results from Slovenia (54.3% boys and 40.3% girls) and Switzerland (54.0% boys and 43.1% girls). Furthermore, this showed higher prevalence of injuries than Poland (33.4% boys and 23.3% girls), Ukraine (37.2% boys and 24.6% girls), and Greenland (36.4% boys and 25.5% girls) [4].

The operational definition of an injury in this study is an injury that was treated by a doctor or a nurse. Therefore, the relatively lower-than-expected injury rate shown for Palestinian students compared to some other European countries, Israel, and USA can be explained by one or more of the following reasons: (1) lower injury rates, (2) less access to medical care, and (3) less utilization of medical care. Consequently, unattended Palestinian adolescents' injuries might be underreported.

This study found that adolescents living in high FAS families reported high prevalence of injures (51.9%) while those living in low FAS families reported low injuries (45.1%), which is consistent with the results from the cross-national

TABLE 2: Distribution of students reporting medically attended injuries during the past 12 months by number of injuries, activity context, and selected sociodemographic variables.

	Number of injuries		Treated by cast, stitches, operation, or overnight hospitalization		Lost days of activity		Biking		Sport		Activity context		P value
	Injured 1	Injured >1	n (%)	P value	n (%)	P value	n (%)	P value	Walking/running	Fighting	Work	Other	
<b>Grade</b>													
6th	1117 (26.2)	1260 (29.5)	422 (39.2)		964 (45.7)		1131 (47.6)	267 (11.2)	656 (27.6)	109 (4.6)	47 (2.0)	167 (7.0)	
8th	1149 (27.9)	1028 (25)	361 (33.7)	<0.001	842 (43.2)		966 (44.4)	288 (13.2)	643 (29.5)	79 (3.6)	35 (1.6)	166 (7.6)	<0.001
10th	927 (22.5)	738 (17.9)	230 (32.1)		601 (41.3)		643 (38.6)	202 (12.1)	580 (34.8)	73 (4.4)	30 (1.8)	137 (8.2)	
12th	822 (23.7)	551 (15.9)	203 (29.4)		418 (36.5)		613 (44.6)	160 (11.7)	408 (29.7)	53 (3.9)	32 (2.3)	107 (7.8)	
<b>Total</b>	<b>4015 (25.2)</b>	<b>3577 (22.4)</b>	<b>1216 (34.2)</b>		<b>2825 (42.4)</b>		<b>3353 (44.2)</b>	<b>917 (12.1)</b>	<b>2287 (30.1)</b>	<b>314 (4.1)</b>	<b>144 (1.9)</b>	<b>577 (7.6)</b>	
<b>Gender</b>													
Male	1976 (26.2)	2060 (27.3)	757 (40.2)	<0.001	1669 (47.2)		1870 (46.3)	476 (11.8)	1130 (28.0)	177 (4.4)	92 (2.3)	291 (7.2)	<0.001
Female	2039 (24.2)	1547 (17.9)	459 (27.5)		1156 (37.0)		1483 (41.7)	441 (12.4)	1157 (32.5)	137 (3.9)	52 (1.5)	286 (8.0)	
<b>Total</b>	<b>4015 (25.2)</b>	<b>3577 (22.4)</b>	<b>1216 (34.2)</b>		<b>2825 (42.4)</b>		<b>3353 (44.2)</b>	<b>917 (12.1)</b>	<b>2287 (30.1)</b>	<b>314 (4.1)</b>	<b>144 (1.9)</b>	<b>577 (7.6)</b>	
<b>Region</b>													
West Bank	2221 (24.5)	1989 (21.9)	666 (34.0)	0.780	1565 (42.2)		1836 (43.6)	512 (12.2)	1257 (29.9)	189 (4.5)	86 (2.0)	330 (7.8)	0.352
Gaza Strip	1794 (26.1)	1588 (23.1)	550 (34.5)		1260 (42.7)		1517 (44.9)	405 (12.0)	1030 (30.5)	125 (3.7)	58 (1.7)	247 (7.3)	
<b>Total</b>	<b>4015 (25.2)</b>	<b>3577 (22.4)</b>	<b>1216 (34.2)</b>		<b>2825 (42.4)</b>		<b>3353 (44.2)</b>	<b>917 (12.1)</b>	<b>2287 (30.1)</b>	<b>314 (4.1)</b>	<b>144 (1.9)</b>	<b>577 (7.6)</b>	
<b>School ownership</b>													
Private	303 (24.4)	268 (21.5)	915 (33.2)		2187 (42.2)		280 (49.0)	62 (10.9)	153 (26.8)	25 (4.4)	9 (1.6)	42 (7.4)	
Government	3148 (24.8)	2731 (21.5)	192 (37.4)	0.045	460 (45.1)	0.001	2502 (42.6)	729 (12.4)	1830 (31.1)	252 (4.3)	124 (2.1)	442 (7.5)	<0.001
UNRWA*	564 (27.8)	578 (28.4)	109 (38.8)		178 (39.1)		571 (50.0)	126 (11.0)	304 (26.6)	37 (3.2)	11 (1.0)	93 (8.1)	
<b>Total</b>	<b>4015 (25.2)</b>	<b>3577 (22.4)</b>	<b>1216 (34.2)</b>		<b>2825 (42.4)</b>		<b>3353 (44.2)</b>	<b>917 (12.1)</b>	<b>2287 (30.1)</b>	<b>314 (4.1)</b>	<b>144 (1.9)</b>	<b>577 (7.6)</b>	
<b>FAS**</b>													
Low	2345 (24.7)	1942 (20.4)	650 (32.8)		1521 (39.7)		1915 (44.7)	507 (11.8)	1307 (30.5)	169 (3.9)	73 (1.7)	316 (7.4)	
Moderate	818 (25.1)	824 (25.4)	284 (37.0)	<0.001	674 (45.4)	0.008	733 (44.6)	202 (12.3)	468 (28.5)	78 (4.8)	38 (2.3)	123 (7.4)	0.648
High	363 (24.2)	417 (27.7)	146 (40.1)		327 (45.9)		343 (44.0)	92 (11.8)	229 (29.4)	32 (4.1)	17 (2.2)	67 (8.6)	
<b>Total</b>	<b>3526 (24.7)</b>	<b>3183 (22.3)</b>	<b>1080 (34.7)</b>		<b>2522 (41.8)</b>		<b>2991 (44.6)</b>	<b>801 (11.9)</b>	<b>2004 (29.9)</b>	<b>279 (4.2)</b>	<b>128 (1.9)</b>	<b>506 (7.5)</b>	

\*UNRWA: United Nation Relief Working Agency.

\*\*FAS: Family Affluence Scale.

Chi-square test.

analyses that students living in low income countries reported low injury rates (e.g., Bulgaria, Romania, Slovenia) [4]. However, some researchers found contradictory results which showed that the higher the income is, the lower the death and injuries are [34, 35]. This is the same argument used to explain the difference of injury rates among US adolescents with different SES levels [34] and undergraduate students from China [35]. As well, this study found that those living in families with higher FAS suffered from more injuries during organized activities than other students. This may be explained by the fact that richer students tend to participate more in organized activities. These results are consistent with results from another study [4].

This study shows that injury rates decreased by age: 55.7% for 6th grade to 39.6% for 12th grade students. These results are concurrent with most previous studies of nonfatal injuries among school adolescents [9, 10, 27]. Since Gaza Strip is a high density area with poor infrastructure, it was quite astonishing to find that injury rates were similar in both the West Bank and Gaza Strip. However, a significant difference was found ( $P < 0.001$ ) in the probability of being injured between the different types of schools: private schools (45.9%), government schools (46.3%), and URWA schools (56.2%). Most likely, this is a reflection of the composition of populations and types of neighborhoods that are served by each type of school.

In Palestine, the home was the commonest place where injuries occurred (78.5%) to be followed by the school (9%). Many authors in this field documented the importance of the home environment in the causation of injuries [36, 37]. And although the streets are dangerous for adolescents, this study shows that there are more hazards at home.

The vast majority of injuries among the participants were due to biking (44.2%; boys: 46.3% and girls: 41.7%) to be followed by running/walking (30.1%; boys: 28.0% and girls: 32.5%). The predominance of sport injury among boys is consistent with many previous studies [10, 27, 32]. In this context, studies from Jordan and Israel reported falls as the predominant cause of injury among adolescents [38, 39].

This is the first study to investigate unintentional injuries in Palestine. It looked at a large population of school-aged children and is considered to be the baseline for future studies. The HBSC questionnaire items were developed continuously over several years and are supported by validation efforts [26, 40]. The ability to examine relations between different social measures and a variety of injury types is an additional strength. Despite the strength of this study, it was a cross-sectional study, which is not strong enough to draw any causal inferences. As well, it was a self-reported school-based survey that suffers from several methodological limitations mainly: (1) recall bias, (2) “soft” measures of injury, and (3) lack of detailed etiology [29].

The problem of recall bias was discussed in depth in Harel et al., (1994) [29] showing two distinct reasons for recall bias—memory decay, resulting in loss of memory of injury events and “telescoping,” resulting in inclusion of injury events that occurred outside the recall period (e.g., 13 months ago). The conclusions of Harel et al., [29] were that using a 12-month recall measure results in conservative annual

estimates due to memory loss regarding minor injuries that occurred more than 3-4 months ago.

The “soft” nature of the injury measures was also discussed in previous studies [10, 28, 29]. During the past two decades, these survey items have been validated and used on many national and international surveys and have become the international standard for calculating childhood injury rates based on survey methodology [3, 8, 33].

As a comprehensive survey, the HBSC includes a breath of topics related to the health and well-being of schoolchildren. As such, in-depth information on the exact circumstances (such as burns and poisoning) leading to individual injury events cannot be obtained. Therefore, the depth of the analyses, in terms of the etiological circumstances, is quite limited.

Injuries are a major public health issue and one that can be addressed like any other disease process that can be studied, treated, and most importantly, prevented. This study provides the first estimates of injuries among school-aged children in Palestine. It shows that injuries are common among Palestinian adolescents and despite these alarming statistics, injury remains relatively underappreciated by Palestinian health care providers, government, and the general public. We propose that Palestinian health and educational authorities should initiate the development of a national injury prevention program aimed at enhancing the safety of Palestinian school adolescents and educating the families on how to make the homes environment as safe as possible.

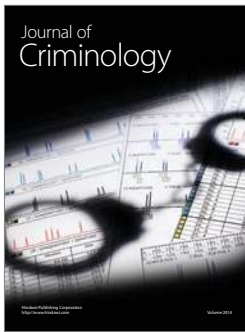
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