Injury in Canadian Youth: A Brief Report from the *Health Behaviour in School-Aged Children* Survey

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Although patterns of injury among Canadian youth have been described previously,^{1,2} current population-based estimates describing the full burden of youth injury are unavailable. We had the opportunity to address this issue via the *World Health Organization - Health Behaviour in School-Aged Children* Survey (WHO-HBSC) – a multinational initiative of which Canada is a member. The WHO-HBSC survey was designed to provide information on the health practices and well-being of youth (grades 6-10; ages 11-15 years).³ In this brief report we describe population-based rates, two dimensions of external cause (activity, location) and the immediate sequelae of injuries among the representative sample of Canadian youth that participated in the 1997-98 WHO-HBSC, expanding upon the injury-related analyses presented in a national health trends report.⁴ Our hope was that these data would provide further evidence of the importance of youth injury as a health and prevention priority in Canada.

METHODS

The WHO-HBSC is a collaborative project that involves 28 countries and is administered every four years to nationally representative samples. The 1997-98 Canadian WHO-HBSC survey was administered to 11,415 youth from public and separate school boards, of whom 11,329 completed the questionnaire. The

survey methodology and approach to sampling are described elsewhere.³⁻⁶ The Canadian sample is representative of approximately 95% of students from grades 6-10 (ages 11-15), and reflects national demographics in terms of geography, religion, and language of instruction. Youth from home-schools, privately funded schools, the incarcerated and those not attending school were not surveyed.

Participating students were asked to answer several questions about injury events experienced during the previous 12 months. Those who sought medical attention for an injury were asked further questions about the injury event and its sequelae.

Incidence rates of medically treated injuries were described. Confidence intervals were calculated using the normal approximation of the binomial.⁷ Impacts of injuries were summarized according to the number of school days or usual activities missed. Medically treated injuries were further described by activity, location, nature of injury, and their immediate treatment. Subsets of severe injuries were identified using a version of the *Modified Abbreviated Injury Score (MAIS)*, [M. Overpeck, personal communication, 2000; as applied by Overpeck and Kotch⁸]. Severe injuries were operationally defined as those that met any one of the following: a) missed at least one full day of school or usual activities, b) got stitches, c) had an operation, or d) stayed in a hospital overnight. All analyses were stratified by sex. Sub-analyses were conducted for a range of grades (6-10) covered by the WHO-HBSC, although select grades are presented for reasons of brevity.

Statistics Canada reports that in 1997-98, there were 2,025,520 children nation-wide enrolled in grades 6-10.⁹ This figure includes all youth registered in all schools, with the exception of those in hospital settings and

others in correctional facilities. Grade-based rates of injury and associated lost time were applied to the Statistics Canada population estimates in order to provide national projections of the burden of youth injury in Canada. Some of these projections were conservative, as lost-time data were only collected for up to one injury per respondent.

RESULTS

Table I describes the sex-specific rates of medically treated injuries, and time lost from school or usual activities. The injury rates were higher in boys (40/100/yr reported at least one injury) than in girls (33/100/yr), and increased slightly with increasing grade. Approximately half of the injured youth reported serious injuries according to the modified version of the MAIS criteria, and the median time lost per injury was 2 or 3 days depending upon grade level and sex. In all grade and sex groups, the rates for “2 or more” injuries were less than half of the rate for single injuries. The only difference in lost time across grade and sex groups was in Grade 6, where more males lost at least one day than females.

Table II presents annual rates of youth injury by activity, location, nature of injury and treatment. In general, sports-related injuries were predominant in all age groups. Males were most commonly injured in sports and athletic areas while girls were most commonly injured at home. Common injuries included sprains and strains, bruises or internal bleeding, broken bones or dislocations, and lacerations. Immediate treatments for these injuries were consistent with their natures. By self-report, 6% of males and 4% of females required an overnight hospital stay, and 5% of males and 2% of females required an operation for their injury.

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TABLE I
Annual Rates (per 100) of Medically Treated and Severe Injuries, by Sex and Grade, Canada 1997-98

	Overall (Grades 6-10 inclusive)			Grade 6		Grade 8		Grade 10	
	n	N=5455 Youth Rate (95% CI)		N=1018 Youth Rate (95% CI)		N=1090 Youth Rate (95% CI)		N=1196 Youth Rate (95% CI)	
Males									
Medically Treated Injuries									
One	1095	20	(19,21)	18	(16,21)	21	(19,24)	21	(19,23)
Two	479	9	(8,10)	6	(5,8)	10	(8,12)	9	(8,11)
Three	253	5	(4,5)	4	(3,6)	5	(4,6)	5	(4,6)
Four or more	348	6	(6,7)	6	(4,7)	5	(4,6)	7	(6,9)
At least one	2175	40	(39,41)	35	(32,38)	41	(38,44)	42	(39,45)
Severe Injuries (MAIS criteria)	1409	26	(25,27)	23	(23,26)	26	(24,29)	25	(23,28)
Females									
Medically Treated Injuries									
One	1030	18	(17,19)	17	(14,19)	17	(15,19)	18	(16,20)
Two	455	8	(7,9)	6	(5,8)	8	(6,9)	8	(7,10)
Three	179	3	(3,4)	2	(2,3)	4	(3,5)	3	(2,4)
Four or more	273	5	(4,5)	3	(2,4)	5	(4,7)	6	(5,7)
At least one	1937	33	(32,35)	29	(26,31)	34	(31,37)	35	(33,38)
Severe Injuries (MAIS criteria)	1177	20	(19,21)	16	(14,18)	21	(19,24)	22	(20,24)

DISCUSSION

During 1997-98, 33% of Canadian girls and 40% of boys surveyed during the WHO-HBSC experienced at least one medically treated injury. Approximately one half of these injuries were severe injuries according to the MAIS criteria. By

extrapolation, 736,000 young Canadians in grades 6-10 require medical treatment for at least one injury annually, and a cumulative total of 2.2 million days of school/usual activities are lost in these grades per year. The latter estimates are extremely conservative, as they only account for time lost in association with

the one "most serious" injury among respondents who reported multiple injuries.³⁻⁶

The purpose of this short report was to provide an updated description of the extent and nature of the youth injury problem in Canada. Clearly, youth injuries contribute a substantial burden to the

TABLE II
Annual Rates (per 100) of Medically Treated Injuries by Activity, Location, Nature, and Treatment, by Sex and Grade, Canada 1997-98

	n	Male				Female			
		Overall* Rate (95% CI)	Grade 6 Rate (95% CI)	Grade 8 Rate (95% CI)	Grade 10 Rate (95% CI)	Overall* Rate (95% CI)	Grade 6 Rate (95% CI)	Grade 8 Rate (95% CI)	Grade 10 Rate (95% CI)
Activity									
Sports, organized or other	1043	19 (18, 20)	13 (11, 15)	19 (16, 21)	25 (23, 27)	774	13 (12, 14)	9 (7, 11)	14 (12, 16)
Travel	470	9 (8, 9)	8 (7, 10)	10 (8, 11)	8 (6, 9)	487	8 (8, 9)	9 (7, 10)	8 (7, 10)
Leisure	182	3 (3, 4)	5 (3, 6)	4 (3, 5)	2 (1, 3)	188	3 (3, 4)	3 (2, 5)	3 (2, 4)
Paid or unpaid work	107	2 (2, 2)	2 (1, 3)	2 (1, 3)	3 (2, 3)	121	2 (2, 2)	2 (1, 2)	3 (2, 4)
Other†	283	5 (5, 6)	5 (4, 7)	6 (4, 7)	3 (2, 5)	309	5 (5, 6)	5 (4, 6)	7 (7, 7)
Location									
Sports and athletics area	772	14 (13, 15)	9 (7, 11)	15 (12, 17)	19 (16, 21)	515	9 (8, 10)	6 (5, 7)	9 (8, 11)
Home	464	9 (8, 9)	10 (8, 11)	9 (8, 11)	6 (5, 7)	563	10 (9, 10)	9 (8, 11)	11 (9, 12)
School, educational area	408	8 (7, 8)	7 (6, 9)	7 (6, 9)	9 (7, 10)	475	8 (8, 9)	7 (5, 8)	8 (7, 10)
Street or highway	294	5 (5, 6)	5 (4, 6)	6 (5, 7)	4 (3, 6)	209	4 (3, 4)	4 (3, 6)	4 (3, 5)
Other‡	249	5 (4, 5)	4 (3, 6)	4 (3, 5)	5 (3, 6)	191	3 (3, 4)	3 (2, 4)	4 (3, 5)
Nature of Injury									
Sprain or strain	914	17 (16, 18)	12 (10, 14)	19 (16, 21)	19 (17, 21)	977	17 (16, 17)	12 (10, 14)	17 (15, 20)
Bruise or internal bleeding	791	15 (14, 15)	11 (9, 13)	15 (13, 17)	16 (14, 18)	811	14 (13, 15)	10 (8, 12)	14 (12, 16)
Broken bone or dislocation	788	15 (14, 15)	11 (9, 12)	15 (13, 17)	16 (14, 18)	613	11 (10, 11)	8 (6, 10)	11 (9, 13)
Cut, puncture, stab wound	719	13 (12, 14)	12 (10, 14)	13 (11, 15)	13 (11, 15)	482	8 (8, 9)	7 (6, 9)	8 (7, 10)
Head or neck injury	382	7 (6, 8)	6 (5, 8)	7 (5, 8)	8 (7, 10)	243	4 (4, 5)	4 (3, 5)	4 (3, 5)
Burn	188	3 (3, 4)	4 (2, 5)	4 (2, 5)	3 (2, 3)	133	2 (2, 3)	2 (1, 3)	2 (1, 3)
Other	422	8 (7, 8)	8 (6, 9)	8 (6, 9)	7 (6, 9)	404	7 (6, 8)	7 (6, 9)	6 (5, 8)
Immediate Treatment									
Stitches	556	10 (9, 11)	10 (8, 12)	11 (9, 13)	9 (8, 11)	307	5 (5, 6)	5 (4, 7)	5 (4, 6)
Cast	503	9 (9, 10)	8 (7, 10)	9 (8, 11)	9 (7, 10)	372	6 (6, 7)	6 (5, 7)	6 (4, 7)
Crutches or wheelchair	405	7 (7, 8)	5 (4, 7)	7 (6, 9)	9 (7, 10)	428	7 (7, 8)	5 (3, 6)	8 (5, 8)
Hospital stay overnight	329	6 (5, 7)	6 (4, 7)	6 (5, 8)	5 (4, 6)	246	4 (4, 5)	5 (3, 6)	5 (4, 6)
Operation	244	5 (4, 5)	4 (3, 5)	5 (3, 6)	4 (3, 5)	132	2 (2, 3)	3 (2, 3)	2 (1, 3)

* Grades 6-10 inclusive

† includes education, health care, vital activity, being taken care of, and other unspecified activities

‡ includes medical service, other transportation, industrial and construction, farm, recreational or cultural centre, commercial, countryside, and other unspecified areas

medical and education systems and must continue to be acknowledged as a priority health issue. A full and informed commentary about the implications of these results for prevention is required, but is beyond the scope of this report.

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