

A CANADIAN PICTURE OF MATERNAL REPORTS OF CHILDHOOD INJURIES

Dafna E. Kohen, Hassan Soubhi,
& Parminder Raina

B.C. *Injury* Research
A N D • P R E V E N T I O N • U N I T

1999

The British Columbia Injury Research and Prevention Unit (BCIRPU) directed by Dr. Parminder Raina, was established by the Minister of Health and the Minister's Injury Prevention Advisory Committee in August 1997. BCIRPU opened its doors in January 1998. It is housed within the Centre for Community Child Health Research (CCCHR) at Children's & Women's Health Centre of British Columbia and supported by BC Research Institute for Children's & Women's Health. The primary purpose of the Unit includes "The reduction of unintentional injuries among children and youth in BC, through the support and evaluation of effective prevention measures, and the establishment of ongoing injury surveillance across the province."

Authors: *Dafna E. Kohen, Hassan Soubhi, and Parminder Raina*

Acknowledgements: The production of this document has been made possible by a financial contribution from the Office for Injury Prevention, BC Ministry of Health and Ministry Responsible for Seniors and the support of Dr. Shaun Peck. We are also grateful to Kevin Walsh for his desktop publishing work.

BC Injury Research and Prevention Unit

L408-4480 Oak Street,
Vancouver, BC. V6H 3V4
Email: injury@cw.bc.ca
Phone: (604) 875-3776 Fax: (604) 875-3569
Webpage: www.injuryresearch.bc.ca

Reproduction, in its original form, is permitted for background use for private study, educational instruction and research, provided appropriate credit is given to the BC Injury Research and Prevention Unit. Citation in editorial copy, for newsprint, radio and television is permitted. The material may not be reproduced for commercial use or profit, promotion, resale, or publication in whole or in part without written permission from the BC Injury Research and Prevention Unit.

November, 1999



BRITISH COLUMBIA
Research Institute For
Children's & Women's Health



Table of Contents

Abstract	7
Report	9
Characteristics Associated with Childhood Unintentional Injuries	11
Methods	13
Survey	13
Sample Selection	13
Variables	13
Analyses	14
Results	15
Sample	15
Injury Status	15
Family Socio-Economic Indicators	17
Limitations in Activities	19
Health Care Utilization	19
Discussion	22
References	24

List of Tables

Table 1: Cause, Nature, Body Part, and Location of Injury by Gender.	16
Table 2: Cause, Nature, Body Part, and Location of Injury by Age Group.	17
Table 3: Odds Ratios and Confidence Intervals by Injury Status, Gender, and Age Group.	18
Table 4: Odds Ratios and Confidence Intervals by Injury Status for Males by Age Group.	18
Table 5: Odds Ratios and Confidence Intervals by Injury Status for Females by Age Group.	19
Table 6: Percentages Reporting any Contact with Health Professionals in Past 12 Months.	20
Table 7: Mean Visits (Standard Deviations) by Age Group and Injury Status.	20
Table 8: Adjusted Multivariate Analysis of the Relationship between Injury Status and Health Care Contacts by Age Group.	21

TABLE OF CONTENTS

Abstract

OBJECTIVES

This study examines gender and age differences in maternal reports of injuries in a cross sectional group of children aged 0-11 years. The cause, nature, body part injured, and location of injury are explored, as are the associations with family socioeconomic indicators and associations with limitations in activities. In addition, we report patterns of health care use for injured and non-injured children by examining contacts with a variety of medical health care professionals by child age group and gender.

METHODS

Data for 22,831 children and their families were used from cycle 1 of the Canadian National Longitudinal Survey of Children and Youth (NLSCY) collected in 1995. Descriptive analyses and chi-squared tests for trends were used to examine injury variations by child gender and age. Logistic regressions were used to examine the relationship between socioeconomic indicators and injury, and associations between injury and limitations in activities. Descriptive statistics and logistic regressions were used to examine the relationship between injury status and contact with various health care professionals. Linear regressions were also used to examine associations between injury status and average number of health care contacts.

RESULTS

Consistent with findings based on hospital data, boys experience more injuries than

girls and injuries increase with age of child. Falls are the most common sources of maternally reported injuries followed by environmental hazards for young children and sports injuries for school aged children. The majority of injuries occur in or around the home for young children and at school for older children. For maternal reports of non-severe injuries, single marital status is a risk factor for boys. In addition, maternally reported childhood injuries are associated with increased use of health care services by various health care professionals and overnight hospitalizations. This pattern is consistent for infants and toddlers, preschoolers and school aged children, and remains consistent across both genders.

CONCLUSIONS

Maternally reported injuries occur in 10% of Canadian children and many of these result in limitations of activities. Preventive strategies should take both child age and child gender into consideration. Children who suffer from injuries are more likely to have contacts and more numerous visits with a variety of health care professionals as well as overnight hospitalizations. These results demonstrate the importance of examining injuries treated at home or those that are untreated in addition to injuries treated in hospitals and emergency rooms.

ABSTRACT

REPORT

In 1995, injuries were responsible for 57% of all deaths among Canadian children under the age of 20, whereas 5% of deaths were due to cancer and 2% were due to infectious diseases¹. In British Columbia, it is estimated that on average 250 children die from unintentional injuries annually. An additional 12,000 are hospitalized annually as a result of injuries, while tens of thousands more are treated in emergency departments². Much of the information about the prevalence and causes of unintentional injuries comes from mortality and hospital data, which capture the most severe forms of injury. Mortality data, for example, show that in many industrialized countries, unintentional injuries represent the leading cause of death for children and youth under the age of 20³⁻⁵.

For Canadian infants, one hospitalization in 20 is injury related, while the rate increases to 1 in 9 for 1-4 year olds, and 1 in 6 for 5-9 year olds. For 10-14 year olds injuries are the leading cause of hospitalization; almost 1 in 4 hospitalizations are injury related. According to Canada's 1993 General Social Survey, 11% of children aged 0-15 years old sustained an injury severe enough to require a doctor's visit. In contrast to our knowledge of hospital use among injured children, we know relatively little about the use of other medical practitioners.

Much of our current knowledge of the medical services used to treat injuries at the population level comes from hospital data (e.g. provincial hospital databases, CIHI). Structured to deal with issues of incidence and prevalence, mortality and hospital data are of inconsistent quality and do not provide the detail necessary to inform prevention policies⁶. There is a lack of population-based emergency room data as well as population-based information on injuries at the community level.

A gap in our knowledge also exists concerning minor and common types of injuries: those that are treated at home or those that go untreated and are missed by hospital and emergency room data. Studies have shown that injuries frequently occur in the home, accounting for 44.8% of all serious injury cases for children aged 0-20 years⁷. Minor injuries often result in pain and temporary loss of abilities and can be potential precursors to more significant injuries. Children who have been injured in the past are more likely to be exposed to hazards and injury in future situations^{8, 9}. In addition, the impact of injury includes costs and services beyond those offered in hospitals, particularly for those recovering from injury and requiring ongoing treatment from health care providers. Children who have a history of injury experiences are more likely to encounter future injuries and severe injuries requiring medical care¹⁰. However, we know less about the patterns of health service utilization associated with children who suffer injuries that are cared for in the home and are not seen at the hospital.

CHARACTERISTICS ASSOCIATED WITH CHILDHOOD UNINTENTIONAL INJURIES

The types of injuries children suffer show distinct patterns across age groups and gender^{3, 11-13}. These patterns reflect both the location and activities where children spend a majority of their time, as well as a child's level of development^{13, 14}. Falls, for example, are the major source of non-fatal injuries for infants and young children¹⁵⁻¹⁷ with sports and recreational activities being the leading cause of injuries for school aged children and adolescents.

The frequency and severity of injury varies with gender. From birth to 24 years of age, boys are more likely

than girls to sustain injuries. Boys are more likely to be hospitalized due to injuries and are also more likely to suffer the most severe forms of injury². Furthermore, gender differences in injuries become more pronounced with age^{3, 12, 13}.

There is a steep social class gradient in mortality for unintentional injuries. That is, children living in low income families are more likely to suffer severe types of injury than children from higher income families¹⁸⁻²⁰. Socio-economic indicators such as single marital status, low levels of maternal education, and poverty have been shown to be associated with childhood injuries²¹⁻²³. Parents with lower levels of education are less likely to use safety devices such as helmets, car seats, smoke detectors, and other devices due to a combination of financial barriers, lack of information about their importance, and lack of belief in their efficacy²¹⁻²³. Other studies suggest that socio-economic status exerts an influence via the surrounding environment or the community a child lives in. Children who live in disorganized environments are at increased risk for injury²⁴⁻²⁶ as are children who live in low income neighbourhoods¹⁹.

The focus of the present study is on maternal reports of child unintentional injuries using data from the first cycle of the National Longitudinal Survey of Children and Youth (NLSCY), a Canadian prospective study following a nationally representative sample of 22,831 children and their families. We examine a cross-sectional sample of children aged 0-11 years who participated in cycle 1 of the NLSCY and characterize maternal reports of child injury by gender and age. We also examine injury status including the causes and types of injuries, body parts injured, and the location of the injury event. In our characterization of maternal reports of child injury, a second objective is to examine how socio-economic indicators such as marital sta-

tus, household income, and maternal education are related to injury status. A third objective is to examine the association between childhood injury and limitations in daily activities.

We also examine maternal reports of childhood injuries and visits to various medical practitioners and again consider associations separately by child age group and gender. In our analyses we include socio-economic indicators described above that have been shown to influence both injuries and health service use. These include child gender and number of siblings as well as family socio-demographic indicators such as marital status, household income, and maternal levels of education²⁷.

SURVEY

Data for this study come from Cycle 1 of the National Longitudinal Survey of Children and Youth (NLSCY) collected in 1995. The NLSCY is a national prospective study designed to measure child well being, health and development and is based on a random probability sample of Canadian residential households of children aged 0-11 years. Excluded households are those situated in remote areas, those on First Nations Peoples' reserves, and institutional settings. Sampling frames for the first Cycle of the NLSCY included a main component based on households participating in Statistics Canada's Monthly Labour Force Survey (excluding the Territories) and an integrated component based on households participating in the 1994 National Population and Health Survey. In total, 15,579 households were selected to participate: 12, 879 for the main component and 2,700 for the integrated component. Responses were obtained from 13,439 participants, resulting in an overall response rate of 86.3 percent. An analysis of responding versus non-responding households revealed a slight under-representation of households in Census Metropolitan Areas, households with parents aged 40 and over, and households with a parent with 8 or fewer years of education. Sample weights were applied to the data to take sampling features into account including unequal probabilities of selection, non-response (person and household level), and an adjustment making the age and gender distributions of the sample correspond to the age and gender distributions of the Canadian population. The current study focuses on a cross-sectional sample of children aged 0-11 years from Cycle 1 of the NLSCY.

SAMPLE SELECTION

In each eligible household, one index child aged 0-11 years was randomly selected. Information was obtained from the person most knowledgeable about that child (PMK). For the majority of children in the NLSCY (91.3%) the PMK was the mother. In 89.9% of the children the PMK was the child's biological mother and in 1.4% the PMK was the step, adoptive, or foster mother. For ease of discussion the PMK will be referred to as the mother. Other children were then selected at random, to a maximum of four per household. The mother was asked to complete a general questionnaire, a parent questionnaire and a child questionnaire. These questionnaires asked for basic demographic information about all household members, socio-economic information about the mother and her spouse, and extensive information about the selected child. As a result, a cross sectional sample of 22,831 children aged 0-11 years was initially surveyed from November 1994 to June 1995 and will be followed into adulthood with reassessments every two years.

VARIABLES

Family Socio-Economic Indicators included marital status (two parent family, single parent family), household income (low, middle, and high), and maternal level of education (some high school, completed high school, more than high school).

Limitations of Activities assessed whether the child has any long-term conditions or health problems, which prevent or limit participation in school, at play, or in any other activity for a child of his/her age (yes/no).

Injury Status was assessed using five questions. The first question addressed whether the child was injured in the past 12 months (yes/no). The second question asked for the number of times the child was injured.

The third question addressed the nature of injury and included eleven response categories which were aggregated into the following five categories: broken/fractured bones; burns or scalds; dislocations, sprains, or strains; cuts, scrapes or bruises; or “other”. “Other” included concussions, poisonings, internal injury, dental injury, and multiple injuries. The fourth question addressed which body parts were injured and included ten categories which were reduced to the following five: facial (eyes, face), head or neck, upper extremities (arms, hands), lower extremities (hip, legs, feet) or “other” (back, spine, trunk, and multiple sites). The fifth and final question asked respondents to categorize the cause of injury into one of fifteen causes. The causes were grouped into six categories which included: motor vehicle collision (passenger, pedestrian, bicycle rider); bicycle accident; fall (excluding bicycle or sports); sports (excluding bicycle); environmental hazards (scalded by hot liquids or foods, accidental poisoning); environmental factors (animal bite, sting, fire, flames or fumes, or near drowning); and an “other” category not specified by the parent.

Health Care Use: Mothers reported on children’s health care utilization by specifying the number of consultations with each type of the following health professionals: general practitioner, pediatrician, nurse practitioner, dentist/orthodontist, welfare or case worker, other medical professional (not specified), and other specialist (e.g. social worker, speech therapist). Mothers were also asked about children’s hospitalizations, “In the past 12 months, was the child ever an overnight patient in a hospital?” The response choices were “yes” or “no”.

Covariates included gender (male, female) and the number of siblings (0,1+).

ANALYSES

Three strategies were used for analyses. The first objective was to provide injury status informa-

tion by child gender and child age. Descriptive analyses and chi-square tests for trends were conducted for the causes and nature of injuries, body part injured, and location of injuries to examine variations by gender and by age group (infants/toddlers, 0-3 years; preschoolers, 4-5 years; and school-aged children, 6-11 years). The second objective was to examine the association of socio-economic indicators with injury status by using a series of logistic regressions. Family socio-economic indicators (independent variables) and the association with injury status (dependent variable) were examined by gender and by age group. The third objective was to examine the association of injury status and limitations in daily activities. Logistic regression analyses examined the relationship between injury status (independent variable) and limitations in daily activities (dependent variable). For the regression analyses, variables were included into the regression equations based on theoretical findings in the injury literature. All analyses were weighted to take into account non-response rates and sampling biases.

To examine patterns of health care use by injured and non-injured children, descriptive statistics were calculated for health care use by age group and injury status. Logistic regressions were used to examine the relationship between injury status (independent variable) and reports of any contacts with each type of health care professional (dependent variable) in the past year. Linear regressions were used to examine the relationship between injury status (independent variable) and the average number of contacts with each type of health care professional (dependent variable) in the past twelve months. Both regression analyses adjusted for child age, gender, number of siblings, marital status, household income level, and maternal education. Additionally, differences were examined by child age group (infants/toddlers, aged 0-3 years; preschoolers, 4-5 years; and school aged children, 6-11 years) and separately for boys and girls.

Results

SAMPLE

The total sample was almost equally divided between boys (51.1%) and girls (48.9%). Most children lived with one or more siblings (82.9%) and in two parent families (85.4%). Approximately 15% of children lived in female headed households. The majority of children (74%) lived in families with high levels of household income (more than \$30,000) and 8.1% lived in families with low levels of household income (less than \$14,999). The majority of mothers (66%) had more than a high school level of education. Less than a high school level of education was found in 16.3% of mothers.

INJURY STATUS

From the total NLSCY sample of 22,831 children, 10% were reported as having been injured in the last 12 months ($n=2,288$). Injury proportions were 9.1% for girls ($n=999$) and 11.2% for boys ($n=1,289$). Injuries increased with child age ($\chi^2(\text{trend}, df=1) = 53.22$, $p < .05$) and were reported in 8.5% infants/toddlers, 8.9% of preschoolers, and 11.7% of school-aged children. School-aged children had significantly more injuries than the infant/toddler group or the preschooler group ($p < .01$) while there was no statistically significant difference between infants/toddlers and preschoolers ($p > .05$).

The following analyses were conducted by gender (boys, $n=1,289$; girls, $n=999$) and by age group where sample sizes were large enough (infants/toddlers, $n=631$; preschoolers, $n=343$; and school-aged, $n=1,314$). Gender analyses presented in *Table 1* reveal that the most common cause of injury for both boys (50%) and girls (53%) was falls. The next most common cause was sports injury, 15% for boys and

16% for girls. The most frequent types of injuries reported included cuts/ scrapes/bruises for both boys (45%), and girls (34%) ($p > .05$), followed by broken and fractured bones (22% for boys and 27% for girls; $p > .05$) and dislocations, sprains, and strains (19% vs. 12%, $p > .05$). The body parts most commonly injured were similar for boys and girls. Injuries most commonly occurred in the upper extremities (boys, 34% and girls, 40%; $p > .05$) followed by the lower extremities (23% for boys and 26% for girls, $p > .05$) then the face (22% for boys, 17% for girls, $p < .05$). Boys as compared to girls experienced significantly more facial injuries as well as more injuries to the head and neck (18% vs. 12%, $p < .05$). For both boys (31%) and girls (33%) ($p > .05$) injuries most frequently occurred in the child's own home, followed by injuries outside the home (20% for boys and 21% for girls, $p > .05$) and injuries in school or daycare (16% for boys and 15% for girls, $p > .05$).

Table 2 presents analyses by child age grouping. Falls were the most common cause of injury for each of the three age groups, but decreased as children got older ($\chi^2(\text{trend}, df=1) = 72.83$, $p < .01$). Environmental hazards were the next most frequent cause of injury for infants/toddlers (11%) and for preschoolers (7%; $p < .01$) while for school-aged children sports were frequent causes of injury (26%). The number of cuts/ scrapes/bruises ($\chi^2(\text{trend}, df=1) = 65.72$, $p < .01$) as well as burns ($\chi^2(\text{trend}, df=1) = 19.39$, $p < .01$) decreased as children got older. However, the more severe injuries such as broken and fractured bones increased with child age ($\chi^2(\text{trend}, df=1) = 78.25$, $p < .01$). For infants/toddlers, the most serious type of injury after cuts/scrapes/bruises (reported by 50% of mothers) were broken/fractured bones (13%) and dis-

Table 1: Cause, Nature, Body Part, and Location of Injury by Gender

	Male (%)	Female (%)
<u>CAUSE OF INJURY</u>		
Motor Vehicle	1+	2+
Bicycle	6	4
Fall	50	53
Sports	15	16
Environmental Hazards	8	7
"Other" not specified by parent.	21	18
<u>NATURE OF INJURY</u>		
Broken / Fractured Bones	22	27
Burn / Scald	5	4
Dislocation / Sprain / Strain	12	19
Cut / Scrape / Bruise	45	34
"Other" includes concussion, poison, internal injury, dental injury, multiple injuries, and other not specified by parent.	16	16
<u>BODY PART INJURED</u>		
Facial	22	17*
Head or Neck	18	12*
Upper Extremities	34	40
Lower Extremities	23	26
"Other" includes back, spine, trunk, and multiple sites.	3	5
<u>LOCATION OF INJURY</u>		
Own Home	31	33
Outside Home	20	21
In or Around Private Residence	10	8
School / Day Care	16	15
Sports Facility	8	10
"Other" category not specified by parent.	15	13

+ = Sample size < 30, estimates may be unreliable

* = $p < .05$

locations/sprains (13%). A similar pattern emerged for pre-schoolers, although pre-schoolers (19%) exhibited a higher incidence of broken and fractured bones as compared to infants/toddlers (13%) ($p < .01$). For school-aged children cuts/scrapes/bruises were the most common injury (33%), followed by broken/fractured bones (30%) and dislocations/sprains (19%). Broken/fractured bones were reported more frequently for school-aged children (30%) than for preschoolers (19%) and infants/toddlers (13%) ($\chi^2(\text{trend}, df=1) = 78.25, p < .01$). Nineteen percent of school-aged children incurred dislocation/sprain injuries as compared to 8% of preschoolers and 13% of infants/toddlers ($\chi^2(\text{trend}, df=1) = 15.45, p < .01$). Cuts/scrapes/bruises were reported less frequently for school-aged children (33%) as compared to preschoolers (51%) and infants/toddlers (50%) ($\chi^2(\text{trend}, df=1) = 65.72, p < .01$).

The body part that sustained most frequent injury also varied based on child age. For infants and toddlers facial injuries were most common (31%), followed by injuries to the upper extremities (29%), and injuries to the head and neck (23%). For preschoolers injuries most commonly occurred in the same areas. However, for school-aged children, the majority of injuries occurred in the upper (42%) and lower (32%) extremities, followed by the face (12%). The location of the injury occurrence varied based on the child's age. For the youngest group of children most injuries occurred inside (63%) and outside (12%) the home, but the home was less frequently associated with injuries as children got older ($\chi^2(\text{trend}, df=1) = 413.62, p < .01$). For preschoolers the home was still the most frequent area of injury occurrence with 35% of injuries occurring inside and 32% occurring outside the home. For school-

Table 2: Cause, Nature, Body Part, and Location of Injury by Age Group

	Infants & Toddlers	Preschoolers	School Aged
<u>CAUSE OF INJURY</u>			
Motor Vehicle	1+	3+	1+
Bicycle	2+	4+	6
Fall	63	61	43**
Sports	2+	2+	26
Environmental Hazards	11	7+ **	6
“Other” not specified by parent.	21	23	18
<u>NATURE OF INJURY</u>			
Broken / Fractured Bones	13	19	30**
Burn / Scald	8	3+	3**
Dislocation / Sprain / Strain	13	8+	19**
Cut / Scrape / Bruise	50	51	33**
“Other” includes concussion, poison, internal injury, dental injury, multiple injuries, and other not specified by parent.	16	19	15
<u>BODY PART INJURED</u>			
Facial	31	28	12
Head or Neck	23	27	9
Upper Extremities	29	28	42
Lower Extremities	14	14	32
“Other” includes back, spine, trunk, and multiple sites.	3+	3+	5
<u>LOCATION OF INJURY</u>			
Own Home	63	35	17**
Outside Home	12	32	21
In or Around Private Residence	10	11	8
School / Day Care	4+	8+	23
Sports Facility	1+	2+	15
“Other” category not specified by parent.	10	12	16

+ = Sample size < 30, estimates may be unreliable

** = $p < .01$

aged children, however, injuries occurred most often at school or at day care (23%), with outside (21%) and inside (17%) the home the next most frequent locations.

FAMILY SOCIO-ECONOMIC INDICATORS

For the total group, female gender was associated with lower injury rates (OR: 0.78, 95% CI: 0.72-0.85). Living in a single female headed family (OR: 1.28, 95% CI: 1.11-1.47), household incomes of \$15-29,999 (OR: 1.24, 95% CI: 1.02-1.52), and maternal levels of education greater than high school (OR: 1.14, 95% CI: 1.04-1.25) were associated with an increased risk of injury for the total group.

Table 3 presents associations between family socio-economic indicators and injury status by gender and

age groups. The associations between socio-economic indicators and unintentional childhood injury differed between boys and girls. Boys living in single female headed families (OR: 1.66, 95% CI: 1.38-1.99) were at greater risk of injury, but for girls injury was associated with high levels of maternal education (OR: 1.17, 95% CI: 1.01-1.35).

Girls were less likely than boys to be injured regardless of age. Maternal levels of education greater than high school were associated with increased risk of injury for the oldest group of children (OR: 1.24, 95% CI: 1.09 to 1.41).

Analyses examining socio-demographic characteristics by child gender and by age indicated that for boys, single female headship was associated with 59% greater likelihood of being injured regardless of child

Table 3: Odds Ratios and Confidence Intervals by Injury Status, Gender, and Age Groups

Population Characteristic	GENDER				AGE GROUP					
	Males (n=11,677)		Females (n=11,154)		Infants & Toddlers (n=7,545)		Preschoolers (n=3,909)		School Aged (n=11,378)	
	Percent Injured*	Odds Ratio (95% CI)	Percent Injured*	Odds Ratio (95% CI)	Percent Injured*	Odds Ratio (95% CI)	Percent Injured*	Odds Ratio (95% CI)	Percent Injured*	Odds Ratio (95% CI)
<u>GENDER</u>										
Male	N/A	N/A	N/A	N/A	9.3	Ref.	9.7	Ref.	12.7	Ref.
Female					7.4	.76 (.66,.91)	7.8	.78 (.62,.98)	10.4	.78 (.69,.88)
<u>NUMBER OF SIBLINGS</u>										
0	10.5	Ref.	9.0	Ref.	8.7	Ref.	9.1	Ref.	12.2	Ref.
1+	11.4	1.10 (.94,1.2)	9.1	1.01 (.85,1.21)	8.4	.96 (.81,1.15)	8.9	.98 (.70,1.37)	11.6	.96 (.79,1.17)
<u>MARITAL STATUS</u>										
Two Parent Family	10.6	Ref.	9.2	Ref.	8.3	Ref.	8.9	Ref.	11.4	Ref.
Single Female	14.9	1.66 (1.38,1.99)	8.2	.91 (.73,1.13)	9.6	1.25 (.95,1.64)	9.3	1.27 (.85,1.89)	13.4	1.19 (.99,1.43)
<u>INCOME LEVEL</u>										
< \$10,000-14,999 (Low)	10.3	Ref.	8.0	Ref.	8.1	Ref.	7.8	Ref.	11.1	Ref.
15-29,999 (Middle)	12.7	1.10 (.66,1.85)	8.6	1.21 (.91,1.61)	8.9	1.21 (.86,1.70)	7.9	1.12 (.67,1.87)	13.2	1.21 (.91,1.60)
30-\$40,000+ (High)	11.0	1.38 (.82,2.33)	9.3	.99 (.74,1.31)	8.4	1.20 (.86,1.68)	9.3	1.40 (.83,2.35)	11.4	1.03 (.78,1.37)
<u>EDUCATION LEVEL</u>										
< = High School	10.7	Ref.	8.2	Ref.	8.6	Ref.	8.1	Ref.	10.3	Ref.
> = High School	11.6	1.12 (.98,1.27)	9.5	1.17 (1.01,1.35)	8.5	.99 (.83,1.19)	9.5	1.16 (.91,1.49)	12.4	1.24 (1.09,1.41)

*Note: Each odds ratio was adjusted for the other variables in this table.
Ref.=Reference Category

age. Moderate and high levels of income were associated with an increased risk of injury for boys with the highest risks associated with infants/toddlers and preschoolers. Maternal levels of education greater than high school were associated with an increased risk of injury for the oldest group of children. For school-aged boys, high levels of maternal education served as a

risk factor, increasing the likelihood of injury by 29% [See Table 4].

For girls, single female headship was not associated with an increased risk of injury. Although not statistically significant, high levels of household income served as a protective factor for female infants/toddlers and preschoolers, but as a risk factor for the old-

Table 4: Odds Ratios and Confidence Intervals by Injury Status for Males by Age Group

Population Characteristic	Infants & Toddlers (n=3,795)		Preschoolers (n=1,965)		School Aged (n=5,728)	
	Percent Injured*	Odds Ratio (95% CI)	Percent Injured*	Odds Ratio (95% CI)	Percent Injured*	Odds Ratio (95% CI)
<u>GENDER</u>						
Male	N/A	N/A	N/A	N/A	N/A	N/A
Female						
<u>NUMBER OF SIBLINGS</u>						
0	9.1	Ref.	11.4	Ref.	12.8	Ref.
1+	9.6	1.05 (.83,1.33)	9.6	.77 (.50,1.18)	12.9	1.06 (.82,1.38)
<u>MARITAL STATUS</u>						
Two Parent Family	9.0	Ref.	9.8	Ref.	12.0	Ref.
Single Female	12.3	1.59 (1.13,2.24)	10.5	1.59 (.94,2.70)	18.0	1.60 (1.25,2.04)
<u>INCOME LEVEL</u>						
< \$10,000-14,999 (Low)	8.5	Ref.	---	Ref.	13.9	Ref.
15-29,999 (Middle)	11.4	1.65 (1.05,2.58)	18.2	1.47 (.72,3.00)	15.4	1.23 (.85,1.76)
30-\$40,000+ (High)	9.1	1.48 (.94,2.34)	72.6	2.14 (1.03,4.43)	12.2	1.06 (.73,1.53)
<u>EDUCATION LEVEL</u>						
< = High School	10.5	Ref.	9.2	Ref.	11.2	Ref.
> = High School	9.0	.88 (.69,1.12)	10.4	1.08 (.78,1.49)	13.8	1.29 (1.09,1.54)

* Note: Each odds ratio was adjusted for the other variables in this table.

Table 5: Odds Ratios and Confidence Intervals by Injury Status for Females by Age Group

Population Characteristic	Infants & Toddlers (n=3,630)		Preschoolers (n=1,876)		School Aged (n=5,500)	
	Percent Injured*	Odds Ratio (95% CI)	Percent Injured*	Odds Ratio (95% CI)	Percent Injured*	Odds Ratio (95% CI)
<u>GENDER</u>						
Male	N/A	N/A	N/A	N/A	N/A	N/A
Female						
<u>NUMBER OF SIBLINGS</u>						
0	8.3	Ref.	---	Ref.	11.7	Ref.
1+	7.2	.88 (.67,1.15)	8.2	1.41 (.79,2.52)	10.4	.86 (.64,1.15)
<u>MARITAL STATUS</u>						
Two Parent Family	7.7	Ref.	8.0	Ref.	10.7	Ref.
Single Female	6.4	.82 (.52-1.32)	---	1.00 (.55-1.83)	9.3	.84 (.63,1.11)
<u>INCOME LEVEL</u>						
< \$10,000-14,999 (Low)	7.8	Ref.	---	Ref.	---	Ref.
15-29,999 (Middle)	6.3	.75 (.44,1.27)	---	.81 (.39,1.71)	10.9	1.17 (.74,1.83)
30-\$40,000+ (High)	7.8	.87 (.53,1.44)	8.1	.85 (.41,1.78)	10.6	1.04 (.67,1.62)
<u>EDUCATION LEVEL</u>						
< = High School	6.7	Ref.	6.7	Ref.	9.4	Ref.
> = High School	7.9	1.15 (.87,1.53)	8.5	1.32 (.90,1.95)	10.9	1.18 (.98,142)

* Note: Each odds ratio was adjusted for the other variables in this table.

est group of school-aged girls. Greater than high school levels of maternal education were associated with higher risks of injuries for girls of all ages, although these only approached statistical significance [See Table 5].

LIMITATIONS IN ACTIVITIES

In the total sample, 3.9% of children (n=856) had limitations in daily activities. Both boys and girls who were reported as being injured were more likely to have limitations in daily activities than children who were not injured. These differences were marginally significant for boys (OR:1.28, 95% CI:0.98 to 1.64) and statistically significant for girls (OR:1.46, 95% CI:1.06 to 2.03). Injuries were significantly associated with limitations in daily activities for the oldest group of children (OR:1.54, 95% CI:1.22 to 1.95) but not statistically significant for preschoolers (OR:1.20, 95% CI:0.69 to 2.08) or for infants/toddlers (OR:0.52, 95% CI:0.26 to 1.03).

When gender and age groupings were examined together injuries were associated with limitations in daily

activities for preschool and school-aged boys. Due to the small sample size of preschoolers, this effect only reached statistical significance for school-aged boys (OR: .57, 95% CI: .25 to 1.30 for infants/toddlers; OR: 1.49, 95% CI: .83 to 2.69 for preschoolers; and OR: 1.38, 95% CI: 1.01 to 1.88 for school-aged). Similarly, injuries were associated with an increased likelihood of limitations in daily activities for school aged girls (OR: .44, 95% CI: .13 to 1.48 for infants/toddlers; OR: .33, 95% CI: .05 to 2.18 for preschoolers; and OR: 1.85, 95% CI: 1.29 to 2.64 for school-aged girls).

HEALTH CARE UTILIZATION

The percentage of children who reported any contact with health care professionals by age group and injury status is shown in Table 6.

Also shown in Table 6 are the results of the logistic regression analyses. Injured children of all age groups were more likely to have consulted with a variety of medical practitioners. Injured infants and toddlers had an increased likelihood of having consulted general practitioners (OR: 1.53, 95% CI: 1.23,1.89),

Table 6: Percentages Reporting any Contact with Health Professionals in Past 12 Months

	Infants & Toddlers			Preschoolers			School Aged		
	Not Injured (n+=6,789) (n++=1,389,126)	Injured (n+=631) (n++=129,136)	Odds Ratio* (95% CI)	Not Injured (n+=3,494) (n++=715,184)	Injured (n+=343) (n++=70,198)	Odds Ratio* (95% CI)	Not Injured (n+=9,905) (n++=2,027,592)	Injured (n+=1,312) (n++=268,488)	Odds Ratio* (95% CI)
General Practitioner	76	83	1.53 (1.23, 1.89)	73	78	1.38 (1.05, 1.81)	65	80	2.22 (1.92, 2.56)
Paediatrician	38	43	1.20 (1.02, 1.42)	28	31	1.14 (0.89, 1.45)	20	24	1.23 (1.07, 1.41)
Nurse Practitioner	22	21	0.95 (0.78, 1.16)	16	16	1.06 (0.78, 1.44)	10	13	1.46 (1.23, 1.74)
Dentist / Orthodontist	13	18	1.57 (1.27, 1.95)	66	65	0.91 (0.72, 1.16)	83	86	1.27 (1.07, 1.52)
Other Medical	12	22	2.06 (1.68, 2.53)	20	24	1.20 (0.92, 1.57)	26	40	1.84 (1.63, 2.08)
Overnight Visit	8	15	1.87 (1.48, 2.38)	4	11	2.81 (1.91, 4.13)	3	7	2.38 (1.87, 3.04)

* = Sample weighted by sample weight

** = Sample weighted by population weight

*Note: Each odds ratio was adjusted for gender, household size, marital status, household income, and maternal levels of education

pediatricians (OR: 1.20, 95% CI: 1.02,1.42), dentists and orthodontists (OR: 1.57, 95% CI: 1.27, 1.95), and other medical specialists (OR: 2.06, 95% CI: 1.68, 2.53) than uninjured infants and toddlers. Injured infants and toddlers were also more likely to have spent an overnight visit at the hospital as compared to uninjured infants and toddlers (OR: 1.87, 95% CI: 1.48,2.38).

Injured preschoolers were more likely to have had one or more contacts with general practitioners (OR: 1.38, 95% CI: 1.05, 1.81) than uninjured preschoolers. Injured preschoolers were more than twice as likely to have spent a night at the hospital than uninjured preschoolers (OR: 2.83, 95% CI: 1.91, 4.13).

School aged children who were injured were more than twice as likely to have had contact with a general practitioner (OR: 2.22, 95% CI: 1.92, 2.56), and were more likely to have consulted with pediatricians (OR: 1.23, 95% CI: 1.07, 1.41), nurse practitioners (OR: 1.46, 95% CI: 1.23, 1.74), dentists or orthodontists (OR:1.27, 95% CI: 1.07, 1.52), and “other” medical specialists (OR: 1.84, 95% CI: 1.63, 2.08) than their non-injured peers. School aged children who had experienced injury were also more than twice as likely to have spent a night at the hospital as compared to children who were not injured (OR: 2.38, 95% CI: 1.87, 3.04).

Table 7: Mean Number of Visits (Standard Deviations) by Age Group and Injury Status

	Injured				Non-Injured			
	Infants & Toddlers (n+=631) (n++=129,136)	Preschoolers (n+=343) (n++=70,198)	School Aged (n+=1,312) (n++=268,488)	F (df)	Infants & Toddlers (n+=6,789) (n++=1,389,126)	Preschoolers (n+=3,494) (n++=715,184)	School Aged (n+=9,905) (n++=2,027,592)	F (df)
General Practitioner	5.64 ± (6.58)	4.50 ± (5.26)	3.66 ± (3.80)	28.35*** (2, 1840)	4.41 ± (4.96)	3.41 ± (3.83)	2.84 ± (3.39)	208.80*** (2, 14069)
Paediatrician	3.53 ± (3.58)	4.68 ± (7.75)	0.67 ± (2.05)	7.27*** (2, 686)	3.69 ± (5.40)	2.54 ± (2.85)	0.51 ± (1.65)	54.44*** (2, 5594)
Nurse Practitioner	2.29 ± (2.43)	1.91 ± (4.05)	0.24 ± (1.32)	0.96 (2, 361)	2.83 ± (4.70)	1.39 ± (1.96)	0.15 ± (0.98)	47.36*** (2, 2984)
Dentist / Orthodontist	1.68 ± (1.47)	1.77 ± (.92)	1.92 ± (1.95)	10.30*** (2, 1464)	1.32 ± (0.74)	1.58 ± (0.92)	1.74 ± (1.83)	161.30*** (2, 11391)
Other Medical	2.20 ± (2.97)	1.86 ± (1.88)	0.69 ± (1.54)	2.42 (2, 741)	2.26 ± (3.44)	2.30 ± (5.37)	.41 ± (1.30)	23.60*** (2, 4102)

*** = p<.001

+ = Sample weighted by sample weight

** = Sample weighted by population weight

For both injured and non-injured children, the mean number of visits to general practitioners, pediatricians, and dentists and orthodontists also varied by child age group [see Table 7]. The number of visits to general practitioners was inversely related to the age of the child, with injured infants and toddlers making the most frequent visits. Injured preschoolers made the most frequent contact with pediatricians, followed by infants and toddlers, and school aged children. For the non-injured group, infants and toddlers reported the most frequent visits with pediatricians, followed by preschoolers, and school aged children. Patterns for visits with dentists and orthodontists by child age were similar for injured and non-injured children. The mean number of visits increased as child age increased.

Linear regression results [see Table 8], adjusted for gender, household size, marital status, household income, and maternal levels of education showed that injured infants and toddlers had a higher than average number of contacts with general practitioners [$\beta=1.20$ (95% CI: 0.73-1.66)] and dentists [$\beta=0.35$ (95% CI: 0.18-0.52)] than uninjured infants and toddlers. Preschoolers had a higher number of contacts with general practitioners [$\beta=1.07$ (95% CI: 0.57-1.56)], pediatricians [$\beta=1.99$ (95% CI: 1.26-2.73)], and dentists [$\beta=0.18$ (95% CI: 0.07-0.30)] than uninjured

preschoolers. Injured children of school age had more visits to general practitioners [$\beta=0.84$ (95% CI: 0.61-1.07)] and dentists [$\beta=0.14$ (95% CI: 0.03-0.26)].

The association between injury status and child gender in relation to any contact with health care professionals indicated that injured boys were more likely to have a visit with a dentist (OR: 1.28, 95% CI: 1.09, 1.49) or a nurse (OR: 1.42, 95% CI: 1.22, 1.67) as compared to non-injured boys. Injured boys as compared to non-injured boys made more numerous visits to pediatricians [$\beta= 0.55$ (95% CI:0.07,1.02)], dentists [$\beta=0.24$ (95% CI: 0.15, 0.37)], and other medical professionals [$\beta= -0.40$ (95% CI: -7.69, -0.32)]. These associations were not significantly different for injured as compared to non-injured girls.

Both injured boys and girls were more likely to have visited general practitioners (OR: 2.03, 95% CI: 1.75, 2.36 for boys; OR: 1.80, 95% CI: 1.53, 2.12 for girls), pediatricians (OR: 1.21, 95% CI: 1.07, 1.38 for boys; OR:1.32, 95% CI: 1.14, 1.53 for girls), and other medical professionals (OR:1.60, 95% CI: 1.40, 1.82 for boys; OR:1.86, 95% CI: 1.61, 2.15 for girls) than their non-injured counterparts. In addition, injured boys and girls made more numerous visits to general practitioners [$\beta=1.06$ (95% CI: 0.79,1.35) for boys, ($\beta=1.04$ (95% CI:0.73,1.35) for girls].

Table 8: Adjusted Multivariate Analysis⁺ of the Relationship Between Injury Status and Health Care Contacts by Age Group

	Infants & Toddlers		Preschoolers		School Aged	
	β	95% (CI)	β	95% (CI)	β	95% (CI)
General Practitioner	1.20	(0.73, 1.66)	1.07	(0.57, 1.56)	0.84	(0.61, 1.07)
Pediatrician	-0.15	(-0.81, 0.51)	1.99	(1.26, 2.73)	0.33	(-0.03, 0.69)
Nurse Practitioner	-0.55	(-1.36, 0.26)	0.45	(-0.19, 1.09)	0.28	(-0.16, 0.72)
Dentist / Orthodontist	0.35	(0.18, 0.52)	0.18	(0.07, 0.30)	0.14	(0.03, 0.26)
Other Medical	0.04	(-0.57, 0.66)	-0.47	(-1.66, 0.73)	0.18	(-0.02, 0.39)

⁺ = Analysis adjusted for gender, household size, marital status, household income, and maternal levels of education.

Discussion

The purpose of this study was to examine maternal reports of non-severe injuries in a cross-section of a nationally representative sample of Canadian children aged 0-11 years, and also describe the association between maternal reports of childhood injuries and visits to health care professionals. The strengths of this study included a description of the characteristics of children who sustained injuries as well as those who did not, as well as a description of the cause, type, incidence and prevalence of maternal reported injuries. This kind of information is not captured by health care records obtained from hospital or emergency room data. Additionally, the data set allowed us to examine injuries and associated family socio-economic indicators by child age, whereas studies often group infants, pre-schoolers, school-aged children, and adolescents together²⁸.

Our findings for non-severe forms of injury are consistent with the findings of studies on more severe forms of injury²⁹. For both severe and non-severe injuries, boys experience more injuries than girls and these differences increase as children get older. Boys are more likely to be seen in emergency rooms, more likely to be hospitalized due to injury, and more likely to suffer the most severe forms of injury. Gender differences for severe injuries tend to become more pronounced with age. Gender differences may be attributed to boys displaying higher activity levels³⁰⁻³², engaging in more injury-risk behaviour than girls^{8, 12, 33}, rating injuries as less severe, and being more likely to attribute injuries to bad luck rather than their own behaviour^{34, 35}.

Based on maternal reports, the most common types of injuries for all children are falls followed by environmental hazards for young children and sports injuries

for school aged children. The frequency of falls decreases with child age. These findings are consistent with US studies using emergency room data indicating that the types of activities leading to nonfatal injuries also vary by child age. These studies indicate that falls represent the major source of severe and non-severe injuries for infants and young children¹⁵⁻¹⁷ but as children get older, sports and recreational activities are responsible for many injuries to school-aged and adolescent children.

Patterns of injury reflect both the location and activities where children spend a majority of their time, as well as a child's level of development. As children get older injuries tend to be more severe and are less likely to occur in the home and more likely to occur at school, particularly during sport activities. Fifty-two percent of non-severe injuries occur in or around the home. This number is comparable to the number of severe injuries (44.8%) that occur in the home for children aged 0-2 years^{2, 7}. The place of occurrence of injury changes as children get older and spend more time outside the home, particularly during leisure or recreational activities³⁶. For school aged children, injuries may be underestimated according to maternal reports since injuries frequently occur at school or at child care making school-aged children's parents more poorly informed about injury occurrences than the parents of younger children³⁷.

For minor injuries, living in a single female headed family is a risk factor particularly for boys. Maternal education greater than high school is also a risk factor, particularly for school-aged children. Numerous studies have found maternal education to be inversely associated with risk of injury²¹ and knowledge of risk hazards associated with safety behaviours^{22, 23}. Low lev-

els of household income were not significantly associated with injury status, contrary to findings from other studies. Studies of severe childhood injuries report that living in impoverished socio-economic conditions are associated with higher rates of childhood injuries^{18, 19}. While it is possible that impoverished socio-economic conditions are not associated with minor injuries, a different explanation is that the findings in the present study may reflect a reporting bias with poor families under-reporting injuries. However, the associations of increased injuries in single female headed families, which in the NLSCY tend to be economically disadvantaged relative to two-parent families, indicates that this may not be the case.

Despite the lower severity of injuries in self-reported data, we found that injured children were more likely to have visited a variety of medical practitioners and to have made more numerous visits to general practitioners, pediatricians, dentists and orthodontists as well as other medical practitioners than non-injured children. Children who had suffered injuries were also twice as likely to have spent a night in the hospital. It was not possible to determine from the NLSCY data whether the health care use reported was specifically due to injury incident. However, the relatively higher use of a variety of health services by the injured compared to the non-injured and the consistent pattern by child age group and gender indicate that increased health care use may be attributable to injury.

Maternal reports of childhood injuries are associated with an increased use of health care services. This pattern is consistent for infants/toddlers, preschoolers, and school-aged children, and across both genders. Our analyses show that larger differences exist between injured and non-injured boys than injured and non-injured girls. Injured boys are more likely to visit dentists and nurses and to make more numerous visits to

pediatricians, dentists, and other medical professionals. These results demonstrate the importance of examining maternal reported injuries, not only those that get treated in hospitals and emergency rooms. Injuries that are treated at home or those that go untreated may be considered less severe than those that get medical attention in the hospital. However, maternal reported injuries that are likely to be treated in the home are associated with increased visits with medical practitioners and this pattern holds true for children of various age groups.

In the interpretation of these results, a few limitations need to be considered. Retrospective interview methods used to gather information on childhood injury involve certain assumptions. The first is that parents can accurately recall injury (particularly non-severe) events over a period of twelve months. Studies have shown that parents tend to report fewer injuries than children, possibly due to forgetting or never knowing about the event³⁷. In addition, girls are more likely than boys to tell their parents about injuries³⁵. Our data based on retrospective maternal reports may be an underestimate of injury status, particularly for boys. An additional shortcoming is that the association between injury status and limitations in activities is correlational, as mothers did not report that limitations were specifically due to injury occurrence. Similarly, we cannot determine the directionality of the associations between childhood injuries and visits to medical practitioners.

The findings of this study have implications for the prevention of childhood injuries. Minor injuries occur in approximately 10% of Canadian children and should not be ignored. Children who suffer minor injuries, particularly older children, are likely to also be limited in their daily activities. Many of these injuries particularly for young children occur in the home and are due to falls and environmental hazards suggesting

that parental education is an important aspect of injury reduction. For school aged children sports are frequent causes of injury suggesting that children need to be protecting while participating in sporting activities and that sporting environments need to be made safe. Developmental differences in cause of injury, nature of injury and body part injured suggest that policy and

educational interventions should take the children's developmental level into account. The severity and the number of injuries a child experiences increase with child age demonstrating that education needs to be geared towards children, particularly those of school age.

References

1. Canadian Council on Social Development. The progress of Canada's children; 1996.
2. BC Ministry of Health. A report on the health of British Columbians. Provincial health officer's annual report. Feature report: The health and well-being of British Columbia's children. Victoria, BC: BC Ministry of Health; 1997.
3. Baker SP, O'Neill B, Karpf RS. *The injury fact book*. Lexington, MA: Lexington; 1984.
4. Budnick LD, Chaiken BP. The probability of dying of injuries by the year 2000. *Journal of the American Medical Association*. 1985;254 (23)(December):3350-3352.
5. Roberts MC, Brooks PH. Children's injuries: Issues in prevention and public policy. *Journal of Social Issues*. 1987;43:1-12.
6. Butler JA, Mitrovich KA. The Select Panel for the Promotion of Child Health: Injury recommendations in retrospect. *Journal of Social Issues*. 1987;43:119-132.
7. Kopjar B, Wickizer TM. Population-based study of unintentional injuries in the home. *American Journal of Epidemiology*. 1996;144(5):456-462.
8. Cataldo MF, Finney JW, Richman GS, et al. Behavior of injured and uninjured children and their parents in a simulated hazardous setting. *Journal of Pediatric Psychology*. 1992;17 (1):73-80.
9. Hartsough CA, Lambert NM. Medical factors in hyperactive and normal children: prenatal, developmental, and health history findings. *American Journal of Orthopsychiatry*. 1985;55:190-201.
10. Jaquess DL, Finney JW. Previous injuries and behavior problems predict children's injuries. *Journal of Pediatric Psychology*. 1994;19(1):79-89.
11. Canadian Institute of Child Health. The health of Canada's children: a statistical profile. Ottawa, Ont.; 1994.
12. Matheny AP. Accidental injuries. In: Routh D, ed. *Handbook of Pediatric Psychology*. NY: Guilford; 1988.
13. Rivara FR, Mueller BA. The epidemiology and causes of childhood injuries. *Journal of Social Issues*. 1987;43(2):13-31.
14. Baker SP. Motor vehicle occupant deaths in young children. *Pediatrics*. 1979;64:860-861.

-
15. Gallagher SS, Finison K, Guyer B, Goodenough S. The incidence of injuries among 87,000 Massachusetts children and adolescents: results of the 1980-81 Statewide Childhood Injury Prevention Program Surveillance System. *American Journal of Public Health*. 1984;10:1340-1347.
 16. Rivara FP. Developmental and behavioral issues in childhood injury prevention. *Developmental and behavioral pediatrics*. 1995;16(5):362-370.
 17. Rivara FP, Bergman AB, LoGerfo JP, Weiss NS. Epidemiology of childhood injuries. II. Sex differences in injury rates. *American Journal of Diseases in Children*. 1982;136:502-506.
 18. Dowswell T, Towner EML, Simpson G, Jarvis SN. Preventing childhood unintentional injuries-what works? A literature review. *Injury Prevention*. 1996;2:140-149.
 19. Nersesian WS, Petit MR, Shaper R, Lemieux D, Naor E. Childhood death and poverty: A study of all childhood deaths in Maine, 1976 to 1980. *Pediatrics*. 1985;75:41-50.
 20. Pless IB, Verreault R, Arsenault L, Frappier JY, Stulginskas J. The epidemiology of road accidents in childhood. *American Journal of Public Health*. 1987;77(3):358-60.
 21. Beautrais AL, Fergusson DM, Shannon DT. Childhood accidents in a New Zealand birth cohort. *Australian Paediatrics*. 1982;18:238-242.
 22. DiGuseppi CG, Rivara FP, Koepsell TD. Attitudes toward bicycle helmet ownership and use by school-age children. *American Journal of Diseases of Children*. 1990;144:83-86.
 23. Glik D, Kronenfeld J, Jackson K. Safety behaviors among parents of preschoolers. *Health Values*. 1993;17(1):18.
 24. Matheny APJ. Injuries among toddlers: Contributions from child, mother, and family. *Journal of Pediatric Psychology*. 1986;11(2):163-176.
 25. Matheny AP. Psychological characteristics of childhood accidents. *Journal of Social Issues*. 1987;43(2):45-60.
 26. Valsiner J, Lightfoot C. Process structure of parent-child-environment relations and the prevention of children's injuries. *Journal of Social Issues*. 1987;43:61-72.
 27. Choinière R, Robitaille Y. Chapter 1. Methodological considerations and overall profile of mortality, hospitalizations and emergency room visits. *For the safety of Canadian children and youth: from injury data to preventive measures*. Ottawa: Canada Communication Group-Publishing; 1997.
 28. Pickett W, Hartling L, Brison RJ. A population based study of hospitalized injuries in Kingston, Ontario, identified via the Canadian Hospitals Injury Reporting and Prevention Program. *Chronic Diseases in Canada*. 1997;18(2):61-69.
 29. Vital Statistics Agency. Selected vital statistics and health status indicators. Victoria, BC: BC Ministry of Health; 1996.
 30. Bijur PE, Stewart-Brown S, Butler N. Child behavior and accidental injury in 11,966 preschool children. *American Journal of Diseases of Children*. 1986;140:487-492.

-
31. Langley J, McGee R, Silva P, Williams S. Child behavior and accidents. *Journal of Pediatric Psychology*. 1983;8:181-189.
 32. Wazana A, Krueger P, Raina P, Chambers L. A review of risk factors for child pedestrian injuries: Are they modifiable? *Injury Prevention*. 1997;3:295-304.
 33. Coppens NM, Gentry LK. Video analysis of playground injury-risk situations. *Research in Nursing and Health*. 1991;14(2):129-136.
 34. Hillier LM, Morongiello BA. Age and gender differences in school-age children's appraisals of injury risk. *Journal of Pediatric Psychology*. 1998;23(4):229-238.
 35. Morongiello BA. Children's perspectives on injury and close-call experiences: Sex differences in injury-outcome processes. *Journal of Pediatric Psychology*. 1997;22(4):499-512.
 36. Soubhi H, Babul S, Chong M. Highlights of unintentional injuries in British Columbia: Trends and patterns among children and youth. Vancouver, BC: Centre for Community Child Health Research; 1998.
 37. Peterson L, Harbeck C, Moreno A. Measures of children's injuries: self-reported versus maternal-reported events with temporally proximal versus delayed reporting. *Journal of Pediatric Psychology*. 1993;18(1):133-147.