Child Pedestrian Injuries Report
2007-2008
Increased pedestrian numbers actually heighten driver awareness, which results in slower rates of speed and fewer child pedestrian injuries.
About Safe Kids Canada

Safe Kids Canada is the national injury prevention program of The Hospital for Sick Children. As a national leader, Safe Kids Canada promotes effective strategies to prevent unintentional injuries, the leading cause of death among children in Canada. By building partnerships and using a comprehensive approach, we advance safety and reduce the physical, financial and emotional burden of injuries on Canada’s children and their families. Our strength is that of knowledge broker, turning research into action, by providing credible programs and messages.

Safe Kids Canada works with more than 2,300 partners across the country to conduct research, raise awareness, educate families and advocate for safer environments to protect children from injury. Safe Kids Canada is also part of Safe Kids Worldwide, a global movement to prevent childhood injury.

180 Dundas Street West, Suite 2105
Toronto, Ontario M5G 1Z8
www.safekidscanada.ca
1-888-SAFE-TIP (1-888-723-3847)

Report methodology

This report is based on an extensive literature review of national and international academic sources, in addition to data from Transport Canada, Statistics Canada and the Canadian Institute for Health Information.

Why focus on child pedestrian injuries?

Walking is usually a child’s first means of independent transportation, which makes children particularly vulnerable to pedestrian injuries. The level of danger posed by traffic exceeds children’s overall cognitive, physical, sensory and auditory development. This danger is exacerbated by their small stature, lower eye level and the need to look up and over vehicles. Obstructions also limit children’s field of vision, decreasing their perception and ability to deal with oncoming traffic.

A neighbourhood’s environment and traffic flow contribute greatly to the frequency and severity of pedestrian-related crashes. Children are more likely to be struck by a car in areas with heavy traffic volumes, a high density of parked cars, higher speed limits, and limited choices for play, such as available green space.

Despite the fact that during the past decade the number of child pedestrian deaths and injuries has declined, international research indicates that a major factor for this reduction is that children are walking less. Children are still considered to be at greater risk of pedestrian injuries due to the increased speed and volume of traffic, coupled with their developing cognitive abilities.

Many Canadian communities are taking an interest in active living to promote good health, in addition to supporting the environment by leaving the car in the driveway more often. This may subsequently lead to a renewed family enthusiasm for walking to school. It is vital to encourage parents and caregivers to talk to children about pedestrian safety during these walks, and it is equally important to create more walkable communities that promote safe, pedestrian-friendly environments. Increased pedestrian numbers actually heighten driver awareness, which results in slower rates of speed and fewer child pedestrian injuries.
Key facts and statistics

- Child pedestrian injuries are a leading cause of injury-related death for Canadian children aged 14 years or younger.
- Pedestrian-related injuries contribute almost 15 per cent of all injury-related deaths of children younger than 14 years.²
- On average, 30 child pedestrians younger than 14 years are killed and 2,412 are injured every year.³,⁴
- Children aged 10 to 14 years have the highest risk of pedestrian injuries and deaths.⁵,⁶

Figure 1. Transport Canada: 2000-2004 Average annual pedestrian fatalities by age

Children are more likely to be struck by a car in areas with heavy traffic volumes, a high density of parked cars, higher speed limits, and limited choices for play, such as available green space.
When children are struck by vehicles, their injuries are often life threatening or cause permanent physical damage. Children of different ages are at risk for different types of injuries because of the child’s physical stature. In children between 10 to 14 years of age, serious injuries occur because the body’s center of gravity tends to be above the bumper of the vehicle. The collisions cause three distinct impacts: the first point of contact is with the leg on the bumper, the second point of contact is between the thigh on the edge of the hood and the third contact is with the head and shoulders on the hood and windshield. As the vehicle’s speed increases, so does the force of these impacts. At high speeds, the increased momentum forces the legs to rotate above the head before falling back onto the hood, and at even greater speeds, the child somersaults into the windshield or roof.

- A child pedestrian is most likely to suffer injuries to the lower extremities from hip to toe (34 per cent), a traumatic brain injury (25 per cent) and injuries to the torso (10 per cent).
- Fracture is the most common type of injury and the most common body area injured is from hip to toe.
- Internal damage (injury to lungs, liver and spleen) is the most common cause of death.
- Traumatic injury to the brain is the most common body region injured that caused death.
- Overall, lower extremity injuries occur more frequently than upper extremity injuries.
- More than half of all child pedestrian deaths and most injuries (95 per cent) happen in urban areas.

When children are struck by vehicles, their injuries are often life threatening or cause permanent physical damage. Children of different ages are at risk for different types of injuries because of the child’s physical stature. In children between 10 to 14 years of age, serious injuries occur because the body’s center of gravity tends to be above the bumper of the vehicle. The collisions cause three distinct impacts: the first point of contact is with the leg on the bumper, the second point of contact is between the thigh on the edge of the hood and the third contact is with the head and shoulders on the hood and windshield. As the vehicle’s speed increases, so does the force of these impacts. At high speeds, the increased momentum forces the legs to rotate above the head before falling back onto the hood, and at even greater speeds, the child somersaults into the windshield or roof.

* Note: Transport Canada defines urban as:
  (a) metropolitan roads and streets and other urban areas, or
  (b) a speed limit at the collision site of 60 km/hr or less
Rural includes:
  (a) primary or secondary highways, as well as local roads, or
  (b) a speed limit at the collision site exceeding 60 km/hr.
Note that in Alberta and Saskatchewan, urban includes any area within the corporate boundaries of a city, town, village or hamlet. Rural includes any area outside of what is defined as “urban”.
In children nine years of age and younger, the centre of gravity is often below the bumper, so that the child’s chest or head is the first point of contact with the bumper, rather than the legs. The child is then vaulted away from the vehicle, which results in a second impact as the child hits the ground. At slightly slower speeds, it is more likely that the child will not fall far from the vehicle, which increases the risk of the child being run over.11

Table 1. Transport Canada: 1995-2004 Pedestrian fatalities by pedestrian action

<table>
<thead>
<tr>
<th>Pedestrian action</th>
<th>Age 0-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersection</td>
<td>114</td>
</tr>
<tr>
<td>Walk with traffic</td>
<td>23</td>
</tr>
<tr>
<td>Running into road</td>
<td>59</td>
</tr>
<tr>
<td>Safety zone</td>
<td>8</td>
</tr>
<tr>
<td>Between intersections</td>
<td>6</td>
</tr>
<tr>
<td>Walk against traffic</td>
<td>7</td>
</tr>
<tr>
<td>Play/work on roadway</td>
<td>37</td>
</tr>
<tr>
<td>From behind parked cars</td>
<td>21</td>
</tr>
<tr>
<td>Other actions</td>
<td>71</td>
</tr>
<tr>
<td>Unknown</td>
<td>35</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>381</strong></td>
</tr>
</tbody>
</table>

Twenty-nine per cent of child pedestrians younger than 14 years of age were killed crossing at intersections with no traffic control, 15 per cent were running on to the road and 10 per cent were playing on the road.

The most frequently reported child pedestrian action that led to injury or death is crossing at an intersection followed by running onto the road.12

Table 2. Transport Canada: Percentage of pedestrian fatalities by striking vehicle

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Percentage of fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger cars</td>
<td>57</td>
</tr>
<tr>
<td>Light trucks &amp; vans</td>
<td>25</td>
</tr>
<tr>
<td>Heavy trucks</td>
<td>10</td>
</tr>
<tr>
<td>Bus</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
</tr>
</tbody>
</table>

Passenger vehicles are most often the type of vehicle that injures or kills child pedestrians, followed by light trucks (including SUVs) and vans.13 In addition, the highest number of child pedestrian injuries and deaths occur in areas where the posted speed limit is 50 km/hr.14

Table 3. Transport Canada: 2004 Pedestrian injury rate of children age 0-19 years by province

<table>
<thead>
<tr>
<th>Province</th>
<th>Injury rate (/100,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quebec</td>
<td>48.2</td>
</tr>
<tr>
<td>British Columbia</td>
<td>46.5</td>
</tr>
<tr>
<td>Yukon</td>
<td>44.9</td>
</tr>
<tr>
<td>Manitoba</td>
<td>39.1</td>
</tr>
<tr>
<td>Nunavut</td>
<td>37.2</td>
</tr>
<tr>
<td>Alberta</td>
<td>37.1</td>
</tr>
<tr>
<td>Ontario</td>
<td>36.4</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>28.9</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>28.3</td>
</tr>
<tr>
<td>NWT</td>
<td>25.7</td>
</tr>
<tr>
<td>Newfoundland</td>
<td>24.0</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>19.3</td>
</tr>
<tr>
<td>P.E.I.</td>
<td>17.4</td>
</tr>
</tbody>
</table>

In 2004, Quebec had the highest child pedestrian injury rate for children younger than 19 years of age, followed by British Columbia and the Yukon. In Canada the overall child pedestrian injury rate was 39.5/100,000.
Before 11 years of age, children also have a difficult time judging vehicle speed or even their own walking speed. Pre-school children may say, “I’m as fast as a jet” and really believe it. Children younger than eight years of age also tend to think that smaller cars travel faster than larger cars. To judge speed, children need to be able to classify and judge a vehicle’s size relative to other objects. Detecting traffic requires a search strategy and this is not a reliable skill until children reach approximately 11 years of age.

To compound this lack of judgement, both pre-school and school-aged children are egocentric and as a result, they find it hard to believe that a driver would not be aware of them.

In addition, young children can struggle with recognizing a safe gap in traffic in order to cross the street. Several studies have illustrated that children younger than six years of age make errors both in identifying too short a gap and in missing appropriate opportunities for crossing. One study demonstrated that five-year-olds missed more chances to cross than adults when they had a comparable number of short gaps. The ability to scan is poorly developed in children younger than six years of age, however, children between six and seven years of age can begin to learn planned systematic searches. Nevertheless, it is important to note that this function is not well developed until approximately 11 years of age.

As a result of all of these factors, a five-year-old child will take twice as long as an adult to make a crossing decision. And for any young child decisions are based on distorted perceptions, and incomplete cognitive tools as a result of the child’s developmental level.

Children aged 11 to 14 years

By the time children reach 11 years of age, they are beginning to utilize abstract thought, which means that they have the ability to combine a number of ideas to form a new concept. This ability is used when one set of rules is applied to multiple and varied situations. It is not obvious to children younger than 11 years of age that the pedestrian safety rules used on one street corner can be applied to all street corners, but older children are capable of understanding and applying this concept. However, it is not unusual for pre-teens and teens to harbour exaggerated beliefs about their abilities and embrace an attitude of invincibility, which can lead to increased risk-taking. For these children, an unhappy ending to their personal story is inconceivable.
In order to cross a street independently AND safely, children need three important skills that are typically NOT acquired until between 9 and 11 years of age:

1. The ability to determine and use a safe crossing pathway
2. The capability to realistically assess a vehicle’s speed
3. The cognitive means to judge safe gaps in traffic
Parents expressed a strong concern about the environment in which their children walk. They identified speeding, increased volume of traffic, drivers not being aware of children playing, children’s risk-taking behaviours, increased crime, and unpleasant walking environments as perceived risks in their neighbourhoods. Parents also believe that children resort to playing in the street due to the lack of accessible and affordable alternatives, and that existing public spaces are ill-equipped and poorly maintained.

Parents have expressed a willingness to participate in strategies to reduce the risk of child pedestrian injuries. If parents perceive a high risk of injury, they are more likely to spend time attending a meeting or to volunteer for a safety program. Neighbourhood solidarity or feeling a sense of connection to the neighbourhood was the best predictor of parents’ willingness to make changes to improve child pedestrian safety.

Environment
Traffic environments contribute greatly to the frequency and severity of pedestrian-related crashes. Children are more likely to be struck by a car in areas with heavy traffic volumes, a high density of parked cars, higher speed limits, and limited choices for play, such as a neighbourhood park. Lower income neighborhoods, particularly urban ones, have also been shown to present a higher risk for child pedestrian injuries.

Drivers
There is a direct correlation between an increase in vehicle speeds and the increase of the risk of injury. It is estimated that a pedestrian struck by a car travelling at 50 km/hr is eight times more likely to be killed than a pedestrian struck at 30 km/hr. Even small reductions in speed can be significant. For each 1.6 km reduction in average speed, collision frequency is reduced by five per cent. Reducing vehicle speed has been proven to be effective in preventing crashes and reducing the severity of injuries.

Speeding is common in Canada. According to the Traffic Injury Research Foundation, about 2.7 million Canadians admit to habitually driving well over the speed limit; 2 million admit to frequently accelerating to get through a traffic light; and about 670,000 say they take risks while driving, just for the fun of it.
In a Transport Canada study on driver behaviours and attitudes towards speeding, seven out of 10 drivers admit to exceeding the speed limit, at least occasionally. The average increase over the speed limit was 12 km on highways, 10 km on two lane highways and seven km on residential streets. Many people believe that they are not technically speeding at these rates and that they are not endangering themselves or others.\(^5\) It is significant that drivers are unable to accurately assess their own speed while they are driving and, as a consequence, make few adjustments in the presence of children. They continue to drive in excess of posted speed limits.\(^5\) Drivers who were involved in a crash with a child pedestrian were statistically more likely to be males between the ages of 17 to 20 or 31 to 40.\(^5\)

**What can be done to make Canada safer for child pedestrians?**

In order to create safer communities for child pedestrians, societal attitudes must be changed to embrace a perspective that acknowledges and respects the rights of pedestrians, strives to make environments safer, and increases the knowledge, skills and practices of children and their parents and caregivers.

1. **Reduce driver speed**

   Research on speed limit reductions in countries such as South Africa, Belgium, Finland, France, Germany, New Zealand, United Kingdom and the United States, have demonstrated that when a speed limit was reduced, road crashes decreased from eight to 40 per cent.\(^5\)

2. **Encourage guided practice to teach child pedestrian safety**

3. **Make communities more walkable**

**1 Reduce driver speed**

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**Reduce traffic speeds**

At speeds greater than 40 km/hr, both drivers and pedestrians have an increased potential for making mistakes in judging the time required to stop or cross the street safely, compounded by a drivers tendency to underestimate their speed. At a speed of 30 km/hr, vehicles and pedestrians are able to co-exist with relative safety which means that drivers have sufficient time to stop for pedestrians, and pedestrians can make better crossing decisions. Lower traffic volumes can also result in a reduction of pedestrian injuries.

**Remind drivers when they are speeding**

Mechanisms that alert drivers when they are speeding can be very useful. According to Transport Canada, 72 per cent of Canadian drivers supported the idea of roadside warning signs to tell drivers when they are speeding.\(^5\)

**Speed cameras**

Research has demonstrated that using a combination of speed cameras and fines can enforce speed limits in residential areas and school zones. One study illustrated that the proportion of vehicles travelling more than 10 km over the speed limit actually dropped by 70 per cent.\(^5\)

**2 Encourage guided practice to teach children pedestrian safety**

Parents and caregivers should use guided practice to instil safety awareness and safe pedestrian habits in young children. This can be accomplished by talking with children about pedestrian safety as soon as they start walking with them, and continuing to do so at least until the early teenage years. It is crucial that adults create opportunities for discussion by accompanying children on walks, especially since the simple presence of parents or caregivers may help reduce the risk of injury.\(^5\)

Discussions and demonstrations addressing safe crossing behaviours, in a variety of situations, will enable children to make more independent – and correct – decisions about road crossings and safe pedestrian travel in general.

Many opportunities can arise for discussing pedestrian safety with children. Here are just a few:

- When weather conditions change (e.g. snow, fog, sleet, rain)
- When taking, or deciding on, a new route to school or the playground
- When visiting a new place
- When moving to a new neighbourhood
- When it’s a child’s first time walking with friends
- When it’s a child’s first time walking alone
- When witnessing jaywalking or other unsafe pedestrian practices
Child pedestrian education needs to be based on children’s development in order to be useful. Because cognitive abilities and perceptions change dramatically from age seven to 14 years, educational and parental approaches must also evolve in order to reflect the child’s developmental growth.

3 Make communities more walkable

Studies have shown that when there are more people walking, pedestrian injuries are less likely to occur. It appears that motorists unconsciously adjust their driving behaviour in response to increased numbers of pedestrians. Walkable neighbourhoods also promote health benefits to the community’s residents, in addition to reducing environmental pollution from vehicles.

Since wider roads entice drivers to travel at greater speeds, changes in how streets are constructed, such as building narrower streets, can support speed reduction. Refuge islands and medians can assist pedestrians by allowing a staged crossing and simplifying decision-making. Curb extensions can also improve pedestrian safety by reducing the crossing distance, the area, and the time in which the pedestrian is at risk. This is helpful for children who often have difficulty choosing a safe gap in traffic at a conventional crossing point. Existing streets have the potential for modifications that reflect these traffic-calming elements.

It is crucial that adults create opportunities for discussion by accompanying children on walks, especially since the simple presence of parents or caregivers may help reduce the risk of injury.

Canadian communities can create more walkable, pedestrian-friendly neighbourhoods by working together to reduce vehicular speeds, while actively embracing opportunities for guided practice with children. Education, engineering and enforcement, in combination, are the key approaches to reducing child pedestrian injuries and deaths.

4, 5, 9, 12, 13, 14 Transport Canada Road Safety’s Traffic Accident Information Database (TRAIRD) 2007.
6, 7, 8 Canadian Institute of Health Information 2003. Note: This data excludes the provinces of Manitoba and Quebec.
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