TIRF

Young and New Driver RESOURCE CENTRE

Vulnerable Road User

What Are...

What are vulnerable road users?

Vulnerable road users are pedestrians, cyclists, and motorcyclists. They are considered vulnerable because they are not protected by an enclosed vehicle and its safety features such as seat belts or air bags. They are also smaller and less visible to other road users, which increases their vulnerability. As a result of these factors, vulnerable road users are more likely than other types of road users to be killed or severely injured in a collision, especially if the collision is with a vehicle[1]. For instance, a pedestrian is 284 times more likely to be injured or killed in a car-pedestrian collision than the motorist. A cyclist is 150 times more likely to be injured or killed in a car-bicycle collision than the motorist and a motorcycle driver is 50 times more likely to be injured or killed in a car-motorcycle collision than the driver of the car[2].

Behaviours

How common are collisions involving vulnerable road users?

According to Transport Canada, vulnerable road users accounted for 22% of all road fatalities from 2004-2006[3].

- Pedestrians struck by a motor vehicle accounted for 13% of fatalities, or 363 deaths annually;
- Motorcyclists struck by a motor vehicle accounted for 7% of fatalities, or 211 deaths annually; and,
- Cyclists struck by a motor vehicle made up 2% of fatalities, or 60 deaths annually.

Both pedestrian fatalities and cyclist fatalities have been declining recently but motorcycle fatalities have increased 41% since 2001[4].

Canadian drivers do not often report experiencing collisions that involve a vulnerable road user. The Traffic Injury Research Foundation's (TIRF) 2008 Road Safety Monitor (RSM) reported that 29% of Canadians came close to being involved in a collision with a pedestrian or cyclist. Only 1.5% reported actually experiencing a pedestrian or cyclist collision[5].

What are the characteristics of vulnerable road user collisions?

Pedestrian fatalities commonly occur on urban roads (70 km/h or less) and near intersections. Urban areas and intersections are dangerous because they are occupied by a high volume of vehicles and foot traffic which increases the chance of collision. Being close to a bus stop, a school zone, a road with multiple lanes or an area without raised medians also leads to a higher probability of experiencing a pedestrian collision. A majority of pedestrian fatalities result from pedestrians crossing a road (60% of fatalities). This is especially dangerous when it is a road without traffic controls (no walk signs or lights) or when a pedestrian ignores traffic controls and crosses without the right-of-way.

Urban areas and intersections are a common location for cyclist collisions as well. Of cyclists who were killed in 2001, 39% were killed at intersections, and of those who suffered serious injuries, 64% were at intersections. Over half of cyclist fatalities and 85% of injuries occurred in urban areas. The afternoon rush hour period was the most high risk time for cyclists: 17% were killed during this time[6].

Over half of motorcycle fatalities occur on rural roads (80 km/h or higher) and the rest at intersections. Most motorcycle collisions involve single vehicles that either run off the road or experience a head on collision[7]. These commonly occur in darkness or low light, especially between 6 pm and 9 pm, when people are still outside commuting but the sun is setting, or has set. Pedestrian collisions are more likely to occur at this time period as well.

Who are the victims of vulnerable road user collisions?

Seniors are overrepresented in pedestrian fatalities. To illustrate, one in three pedestrians killed between 2004 and 2006 were aged 65 and older. While this age group constituted 35% of pedestrian fatalities, seniors represent just 13% of the Canadian population. A majority of pedestrians killed are males – 62% of fatalities between 2004 and 2006 were men[8].

1 Transport Canada 2009
2 Wegman and Aarts 2006
3 Transport Canada 2009
4 Transport Canada 2009
5 Vanlaar et al. 2009b
6 Transport Canada 2004
7 Transport Canada 2009
8 Transport Canada 2009

Cyclists who die in collisions are also often male (81%). Those under 16 accounted for the largest portion of fatally injured cyclists (18%) between 2004 and 2006, and 35-44 year olds and 45-54 year olds each accounted for 12% of cyclist fatalities at that time[9].

The age group that had the highest fatality rate for motorcyclists was those aged 25 to 34 years, accounting for 23% of victims between 2004 and 2006. The death rate of motorcycle users aged 45-54 is increasing at an alarming rate. They accounted for 21% of victims which is a 109% increase since 2001. Almost all motorcyclists killed in this time period were men (90%)[10].

How often are young drivers responsible for vulnerable road user collisions?

Between 2004 and 2006, 18% of drivers who struck and killed a pedestrian were between the ages of 16 and 24. The same age group was also more likely to be speeding when they hit a pedestrian. Of the drivers who killed a pedestrian while drinking, 70% were under the age of 34. Young drivers did not have any significant involvement in the fatalities of motorcyclists or cyclists[11].

Young drivers have unique weaknesses that increase their chances of involvement in pedestrian collisions. Although young drivers may have basic car handling skills, they have yet to develop the intuition and road scanning skills needed to react quickly to hazards, such as other vehicles, animals or people entering into the road. Young drivers detect fewer hazards and take longer to respond to hazards than more experienced drivers. They also do not have the experience base needed to quickly decide on how to respond to a hazard[12]. This means that if a pedestrian were to step out into the road unexpectedly or cross an intersection without the right of way young drivers are less likely to notice them and brake in time to prevent a collision.

(More information about the hazard perception skills of young drivers will be available soon in the Brain Development Fact Sheet)

What behaviours lead to vulnerable road user collisions?

Pedestrians using new technologies, such as smart phones, computer tablets and MP3 players, are dangerously distracted as they travel to their destination. Between 2004 and 2011, injuries and deaths to pedestrians wearing headphones more than tripled, and more than two-thirds of the victims were young males.

These devices cause sensory deprivation such as hearing loss from headphones/ear buds or loss of sight if a pedestrian is focused on a screen or image. They also cause 'inattentional blindness', which decreases a pedestrian's awareness of his or her surroundings. These distractions prevent pedestrians from paying attention to the environment, such as traffic signals telling a pedestrian to stop walking, or from hearing important safety cues, such as approaching vehicles (the most dangerous being a train)[13].

Young cyclists are less likely to wear helmets compared to older cyclists, especially if there are no jurisdictional helmet laws. A study conducted across Canada found that young adults were less likely to wear helmets if they were cycling with an adult who also was not wearing a helmet. Helmets have been found to reduce head and brain injury by 63%-88% and are an important safety tool to protect young cyclists. Thus, positive role modeling from adults is needed to encourage helmet use among youth[14].

Attitudes, Concerns and Perceptions

Are Canadians concerned about the safety of vulnerable road users?

In the 2008 RSM survey, respondents were asked to rank road safety issues based on how concerning they were. Cyclists behaving unsafely and pedestrians behaving unsafely ranked the 3rd and 2nd lowest of concern, respectively[15]. In another 2008 RSM report, driving a motorcycle was ranked as the least risky of all dangerous driving behaviours (drunk driving was ranked the most dangerous)[16]. From these results, it can be concluded that the behaviours and activities of vulnerable road users are not very concerning to Canadians. This finding is problematic because it is much more difficult to increase the safety of vulnerable road users if the general population is not greatly concerned about the issue.

Are Canadians concerned with dangerous behaviours of vulnerable road users?

Overall, Canadians do not show much concern for vulnerable road user behaviours. That being said, 55% of respondents considered stunt driving on public roads by motorcyclists as a very or extremely serious road safety problem and 73% felt there should be stricter penalties for this behaviour, such as impounding the driver's motorcycle[17]. Jay-walking, defined as pedestrians walking into a road or traffic without the right-of-way, concerned 37% of Canadians, and 67% reported often seeing this behaviour while on the road[18].

What pedestrian issues should concern Canadians?

> Elderly and disabled pedestrians have special needs compared to other pedestrians. The elderly and disabled are at a high risk for pedestrian fatalities because of their fragility, decreased mobility (coordination and manoeuvrability) and decreased perceptual skills (sight, hearing, alertness). They may require use of a wheelchair, cane, or walker which can make their movement slower than other pedestrians. Elderly and disabled

9 Transport Canada 2009
10 Transport Canada 2009
11 Transport Canada 2009
12 Isler et al. 2009
13 Robinson 2012
14 Dennis et al. 2010
15 Vanlaar 2008b
16 Vanlaar 2008a
17 Vanlaar 2009a
18 Vanlaar 2009b

pedestrians might experience difficulty perceiving the visual and auditory cues of traffic signals and may not have enough time to get across crosswalks. Elderly and disabled pedestrians need extra patience and time from drivers. Lengthening crossing times at intersections and ensuring concrete islands are available in between lanes if pedestrians do not make it all the way across[19] would greatly benefit this type of vulnerable road user.

- Intoxicated pedestrians are at a much higher risk of being struck by a vehicle. Drinking pedestrians, not just drinking drivers, contribute to the overall magnitude of the alcohol-fatal crash problem each year in Canada. This occurs because walking on or beside a road after drinking is extremely risky. Intoxicated pedestrians may not notice important traffic cues or may unsafely enter into traffic due to their impairment (stumbling in front of a moving vehicle or crossing without looking for vehicles). Of the fatally injured pedestrians tested for alcohol in 2006, 42% had been drinking, most of which had a BAC over .08[20], which is the legal limit for drivers in Canada.

What motorcycle issues should concern Canadians?

Motorcycles are becoming increasingly popular, especially with those aged 45-56. In 2007, 82,482 motorcycles were sold in Canada, which is a significant increase from the 52,313 motorcycles sold in 2000. This means drivers are more likely to encounter a motorcycle on the road today compared to ten or twelve years ago.

Motorcyclists have unique needs compared to other vehicles. The high performance capabilities of motorcycles allow maximum speeds to be reached in a short amount of time and these speeds are often much higher that the maximum speeds of larger vehicles (more than 250 km/h).

Motorcycles are less stable when braking and less visible by other drivers due to their smaller size. This has implications for the ability of other drivers to estimate the spacing of motorcycles. Drivers judge motorcycles to be further away[21], usually resulting in unsafe distances being left between vehicles and motorcycles. It is also difficult for other motorists to estimate the approaching speed and distance of a motorcycle. This causes collisions to occur at intersections[22]. For instance, at an intersection, it would be harder for other motorists to judge how far away an approaching right-of-way motorcycle is and how fast it is going compared to an approaching car or truck. Drivers may underestimate these factors and make a left turn under the impression there is plenty of time, coming into contact with the motorcycle and causing a collision.

19 Vanlaar 2009b
20 Mayhew et al. 2009
21 Evans 2004
22 Vanlaar 2009a

Legislation

What laws exist to protect vulnerable road users?

Provincial helmet laws exist for both cyclists and motorcyclists. All Canadian provinces have mandatory helmet laws for motorcyclists and six have mandatory laws for cyclists.

- New Brunswick, Nova Scotia, and Prince Edward Island have an all-ages cyclist helmet law;
- Ontario and Alberta have helmet laws for cyclists under 18;
- British Columbian law is for those under 16; and,
- Saskatchewan, Manitoba, Quebec, Newfoundland, Yukon, North West Territories and Nunavut have not yet implemented cyclist helmet legislation.

Studies show that provinces with helmet legislation have higher rates of helmet use and helmet legislation does not necessarily decrease rates of cycling[23].

Most provincial Highway Traffic Acts stress that the vehicle-vulnerable road user relationship needs to be one of respect. Vehicles must respect the space of cyclists and yield to pedestrians at all times. Pedestrians must also follow traffic rules, such as obeying traffic signals and crossing roads in the designated areas.

Are there Graduated Driver Licensing programs for motorcyclists?

Yes. All provinces and territories (except New Brunswick and Nunavut) have graduated driver licencing (GDL) programs for those who wish to obtain a motorcycle licence. Each program has its own processes and qualifications but they generally require the driver to pass certain tests (mental, physical and skill-based) in order to advance to the next stage and receive their full licence. Some programs also include mandatory periods where the driver must be accompanied by an experienced motorcyclist at all times. These programs ensure all licenced motorcyclists are fully prepared to be safe road users.

Solutions

What can vulnerable road users do to ensure their safety?

Pedestrians should:

- Cross at marked crosswalks or traffic lights and obey traffic signals;
- Be alert to traffic from all sides;
- Watch for turning vehicles;
- Avoid dashing into the street or stopping in the middle;
- Wear clothing that enhances visibility, especially at night;
- Be aware of the dangers of traveling while intoxicated;
- Stay clear of hedges, parked cars, and other obstacles to remain visible to drivers[24]; and,
- Refrain from crossing the crosswalk if not enough time is left on the countdown.

23 Dennis et al. 2010
24 Transport Canada 2009

Cyclists should:

- Wear a helmet and protective gear;
- Obey rules of the road;
- Never drink and ride;
- Be visible to motorists; and,
- Allow motorists enough time and space to react.

Motorcyclists should:

- Wear a helmet and protective riding gear;
- Obey the rules of the road;
- Take beginner and advanced ride training courses to sharpen riding skills;
- Ride within the limits of driver skill and ability; and,
- Never drink and ride.

What can vehicle drivers do to ensure the safety of vulnerable road users?

Motorists should:

- Always look for pedestrians and be prepared to stop, especially on residential streets and near schools;
- Double check when making turns to ensure a pedestrian has not stepped into the road;
- Be patient if a pedestrian needs extra time to cross a road;
- Keep a close watch for smaller vehicles such as motorcycles or bicycles;
- Be aware that motorcycles may be going faster than they appear and may be closer than they appear;
- Come to complete stops at stop signs; and,
- Do not speed. The speed of a vehicle at the time of a collision affects the fatality rate of the pedestrian involved. For instance, if a pedestrian is hit by a vehicle traveling 65 km/h there is an 85% chance he or she will die. If they are hit by a vehicle traveling 50 km/h there is a 45% chance he or she will die[25].

What can the government do to ensure the safety of vulnerable road users?

- Consider raising penalties for vulnerable road user infractions;
- Develop education and awareness programs about safe road use that are tailored to specific audiences;
- Use engineering solutions to improve pedestrian safety at intersections by installing more traffic controls, setting longer light cycles, and adding median islands to intersections and between traffic lanes; and,
- Increase enforcement of traffic laws related to pedestrians, bicyclists and motorcyclists[26].

References

Dennis, J., Potter, B., Ramsay, T., Zarychanski, R. (2010). The Effects of provincial bicycle helmet legislation on helmet use and bicycle ridership in Canada. *Injury Prevention.* 16(4): 219-244.

Evans, L. (2004). *Traffic Safety.* Bloomfield Hills, Michigan: Science Serving Society.

Isler, R.B., Starkey, N.J., Williamson, A.R. (2009). Video-based road commentary training improves hazard perception of young drivers in a dual task. *Accident Analysis and Prevention.* 41: 445-452.

Mayhew, D.R., Brown, S.W., Simpson, H.M. (2009). The Alcohol-Crash Problem in Canada: 2006. Traffic Injury Research Foundation. Ottawa, Canada.

Robinson, K. (2012). Distracted Walking? Crashes Involving Headphones Skyrocket. NBC Washington. Retrieved from: http://www.nbcwashington.com/news/health/Distr acted-Walking-Crashes-Involving-Headphones-Skyrocket-137449788.html.

Transport Canada. (2009). Fatally Injured Vulnerable Road Users in Canada, 2004-2006. Road Safety Directorate. Retrieved from: http://www.ccmta.ca/english/pdf/tc_vru_report_april_09.pdf.

Transport Canada. (2004). Vulnerable Road User Safety: A Global Concern. Road Safety Fact Sheet. Road Safety and Motor Vehicle Regulation. TP2436E.

Vanlaar, W., Marcoux, K., Robertson, R. (2009a). The Road Safety Monitor 2008: Motorcyclists. Traffic Injury Research Foundation. Ottawa, Canada.

Vanlaar, W., Marcoux, K., Robertson, R. (2009b). The Road Safety Monitor 2008: Pedestrians and Bicyclists. Traffic Injury Research Foundation. Ottawa, Canada.

Wegman. F., Aarts, L. (2006). Advancing Sustainable Safety. National Road Safety Outlook for 2005-2010. SWOV Institute for Road Safety Research. Leidschendam, Netherlands.

Zegeer, C.V., Bushell, M. (2012). Pedestrian crash trends and potential countermeasures from around the world. *Accident Analysis and Prevention.* 44(1): 3-11.

25 Zegeer and Bushell 2012
26 Transport Canada 2009