TRAFFIC INJURY RESEARCH FOUNDATION

THE ROAD SAFETY MONITOR 2008
MOTORCYCLISTS

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THE TRAFFIC INJURY RESEARCH FOUNDATION

The mission of the Traffic Injury Research Foundation (TIRF) is to reduce traffic-related deaths and injuries. TIRF is a national, independent, charitable road safety institute. Since its inception in 1964, TIRF has become internationally recognized for its accomplishments in a wide range of subject areas related to identifying the causes of road crashes and developing programs and policies to address them effectively.

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THE ROAD SAFETY MONITOR 2008: MOTORCYCLISTS

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EXECUTIVE SUMMARY

> The *Road Safety Monitor* (RSM) is an annual public opinion survey conducted by the Traffic Injury Research Foundation (TIRF) and sponsored by Transport Canada, the Brewers Association of Canada, the Canadian Motorcycle Association (CMA), the Motorcycle & Moped Industry Council (MMIC), and the Canada Safety Council (CSC). The survey takes the pulse of the nation on key road safety issues by means of a telephone survey of a random, representative sample of Canadian drivers.

> The annual results of the RSM are released in a series of reports (available at: www.tirf.ca) – the present one focuses on motorcyclists.

> The number of new motorcycle sales has been increasing in Canada with 52,313 units sold in 2000 to 82,482 units sold in 2007. There has been a notable increase in motorcycle ownership for those aged 40 and older.

> Motorcycle riders are more vulnerable because they lack the protection of an enclosed vehicle. Motorcycles also lack many safety features of passenger cars.

> The motorcyclist fatality rate in Canada increased every year from 2002 to 2005. There was a modest decrease in 2006 of 0.3%.

> 80.4% of Canadian motorcycle riders are male. The majority of these riders are aged 40-49 (24.6%), followed by those aged 50-59 (21.2%), and those aged 30-39 (20.9%).

> While the overall picture regarding unsafe riding behaviours suggests that riders are not necessarily behaving more or less risky than drivers, there is room for improvement. For example, 25.5% of Canadian motorcyclists ride well above the speed limit (compared to 24.3% of drivers); 10.5% weave in and out of traffic; 9% pass other vehicles when it is not safe to do so; 8.5% perform stunts on public roads; and 3.1% ride a motorcycle without wearing a helmet.

> 41.4% of respondents often see motorcycles passing other vehicles when it is not safe to do so; 39.1% see motorcycles weaving in and out of traffic;16.4% see motorcyclists performing stunts on public roads; and 8.9% of respondents see motorcyclists riding without a helmet.

> Those who frequently ride a motorcycle without wearing a helmet were more likely to be older. They were more likely to be from a rural area, less likely to be married, and more likely to have driven more kilometres in a typical month than those who do frequently wear a helmet.

> Riding a motorcycle was perceived as being the least risky of all road behaviours; 16.6% perceived riding a motorcycle to be very or extremely risky.

> The survey revealed the public is not overly concerned about unsafe motorcycle riders. Motorcyclists performing stunts on public roads only received the seventh highest rating of concern of all road safety issues with 55.3% of respondents being highly concerned about it.

> 72.9% agreed that motorcycles should be impounded for performing stunts on public roads; 68.2% agreed that there should be increased fines for the non-use of helmets for motorcyclists; and 51.8% agreed that there should be an engine size limitation for new motorcycle riders. Motorcycle riders were just as likely to agree with increased fines for the non-use of helmets as drivers of other motor vehicles and motorcycle riders were actually more supportive than other road users for restricting engine size for new riders.

INTRODUCTION

The *Road Safety Monitor* (*RSM*) is an annual public opinion survey developed and conducted by the Traffic Injury Research Foundation (TIRF) to take the pulse of the nation on key road safety issues. The survey examines:

- what Canadians see as priority road safety issues and how concerned they are about them;
- their views about how to deal with these problems;
- what they know and do not know about safe driving practices; and
- how they behave on the highways.

The *RSM* includes a core set of questions that are asked each year to provide information on trends in attitudes, opinions and behaviours. This is supplemented each year by a set of questions that probe more deeply into special, topical, and emerging issues. This report describes the findings from the 2008 *RSM* regarding the issue of motorcyclists.

METHOD

The eighth edition of the *RSM* contained 98 items designed to probe the knowledge, attitudes, and concerns of Canadians with respect to a range of road safety issues, and to obtain information on their driving practices. The survey required an average of approximately 15 minutes to complete.

The survey was administered by telephone to a random sample of Canadian drivers who have driven in the past 30 days and have a valid driver's licence. The sample was stratified by province and weighted according to gender and age to avoid bias. Opinion Search Inc. fielded this survey in September, 2008. Among the 7,563 households contacted in which a person was asked to participate, 5,874 (78%) refused and 488 (6.5%) were not qualified.

A total of 1,201 drivers completed the interview. The data were analyzed taking account of the stratified and weighted sampling design (see StataCorp. 2007 for information about the modeling procedures), using both univariate and multivariate approaches. Based on a sample of this size, on average, the results can be considered accurate within 2.9%, 19 times out of 20.

BACKGROUND

Riding a motorcycle has become more popular in Canada, and is a growing phenomenon. The number of new motorcycle sales has been increasing from year to year in Canada from 52,313 units sold in 2000 to 82,482 units sold in 2007. Motorcycle sales were highest in the province of Ontario (20,536 or 24.9%), followed by Alberta (18,883 or 22.89%), Quebec (17,646 or 21.39%) and BC (13,446 or 16.3%). All other provinces remained under 5% of the total number of motorcycles sold (MMIC & COHV, 2007).

Riding a motorcycle is more risky than driving a passenger car for a variety of reasons (MPI, 2004). Motorcycles are vehicles that lack the protection of an enclosed vehicle, with no doors, windows or roof. They also lack many passenger car safety features such as seatbelts and airbags, so motorcyclists are more likely to be injured or killed in the event of a collision (IIHS, 2008). Also, many motorcycles have high performance capabilities such as the ability to reach high maximum speeds and accelerate quickly. And, during emergency braking situations motorcycles are less stable than cars (IIHS, 2008; MPI, 2004).

Motorcycles are not as often seen on the roads, compared to other types of vehicles, so they are also less likely to be expected in moving traffic. Motorcycles are also less visible due to their smaller size than passenger cars or trucks. As a result, they are more difficult for other drivers to detect in traffic, and their approaching speed is more difficult to determine (Huang and Preston, 2004). Research has shown that approaching motorcycles appear further away than larger vehicles because of their smaller size (Evans, 2004).

Information about motorcycling in Canada, however, is hard to come by. Most of the literature on the topic is based on U.S. data. Given the vulnerability of motorcycle riders and the increasing number of motorcycle sales in Canada, concern is warranted. The purpose of this report is to provide information that can help improve safety of motorcycle riders in particular and other road users in general in Canada.

Magnitude and trends of the problem

Available data reveals that although the overall number of motor vehicle crashes is decreasing, the number of motorcycle crashes is growing. To illustrate, the number of people killed in motor vehicle traffic crashes in Canada decreased steadily between 2002 (2,932) and 2004 (2,772) with an increase in 2005 (2,905) and another decrease in 2006 (2,892). From 2002 to 2005 the motorcyclist fatality rate increased every year from 172 (5.9%) in 2002, 177 (6.4%) in 2003, 198 (7.3%) in 2004, and to 229 (7.9%) in 2005. In 2006, motorcyclist fatalities represented 7.6% of all traffic fatalities corresponding to 218 people killed. This represents a modest decrease from 7.9% (229) in 2005 (Transport Canada, 2006a).

Among motor vehicle fatalities and motorcyclist fatalities in the U.S, a similar pattern has been noted. For example, the number of people killed in motor vehicle traffic crashes in the U.S. reached its lowest level

in five years in 2006. Fatalities dropped from 43,510 in 2005 to 42,642 in 2006, the largest decline since 1992. This decline in fatalities occurred for occupants of passenger cars, light trucks, pedestrians and bicyclists, whereas motorcyclist fatalities continued to increase (NHTSA, 2007a). Conversely, in the U.S., motorcyclist fatality rates declined steadily in the late 1980s and early 1990s, levelled off in the mid-1990s, and have been increasing since 1997. Fatality Analysis Reporting System (FARS) data from 1990 to 1999 show that motorcyclist fatalities decreased every year from 1993 to 1997, reaching a historic low of 2,116 in 1997. Since then however, motorcyclist fatalities have been increasing with a 127% increase from 1997 to 2006 (NHTSA, 2008b; Shankar, 2001). In fact, motorcyclist fatalities in 2006 more than doubled since 1997 (IIHS, 2008). It is interesting to note that the yearly number of motorcycle deaths in the U.S. is more than double the annual total number of people killed in all aviation, rail, marine and pipeline accidents combined (NTSB, 2007).

The growing number of fatalities and injuries can also be illustrated by the increasing number of motorcycle claims from 1996 to 2003 in Manitoba. The number of crashes per 1,000 insured motorcycles has increased and motorcyclists have become more likely to be injured. Consequently, claims costs for motorcycles are much higher than for passenger vehicles (for both injury costs and physical damage costs); and since 2000, the frequency of motorcycle collision claims has grown faster than that of passenger cars (MPI, 2004).

Insight into the magnitude of the problem is further revealed by vehicle ownership statistics and an examination of fatalities per vehicle miles travelled. In Canada, motorcycles represent only 2% of all registered vehicles (Statistics Canada, 2008). When taking account of motorcycle exposure (vehicle miles travelled, and number of registered motorcycles) motorcycle fatalities in the U.S. have increased disproportionately (NHTSA, 2008b). In the U.S. in 2007, motorcycles represented less than 3% of all registered vehicles and accounted for only 0.4% of all vehicle miles traveled (NHTSA, 2007b). The fatal crash rate for motorcycles is 35 per 100 million miles of travel compared to 1.7 per 100 million miles of travel for passenger vehicles (Paulozzi and Patel, 2004). Such data were not available for Canada.

Types of crashes

Motorcycles are more likely to be involved in single-vehicle crashes compared to passenger vehicles. In other words, motorcycles involved in crashes are more likely to collide with a fixed object. To illustrate, in Manitoba the percentage of single vehicle claims for motorcycles has increased from 28.3% in 1996 to 51.1% in 2003 (MPI, 2004). In the U.S. in 2007, 25% of motorcycles involved in a crash collided with a fixed object compared to 18% for passenger cars, 13% for light trucks, and 3% for large trucks (NHTSA, 2007b). Similarly, 28% of motorcycle fatalities in Britain involve no other vehicle (EuroRAP, 2004).

In addition, motorcyclists are also often involved in multiple-vehicle crashes. In Canada 60.8% of fatal motorcycle crashes involved another motor vehicle (TIRF, 2006). In multiple vehicle crashes in Canada,

7.5% were rear end collisions, and 17.7% were head-on collisions (Transport Canada, 2006b). Similarly, in the U.S., in 2007, 50% (2,641) of motorcyclist fatalities involved another type of motor vehicle. In two-vehicle crashes, 78% were hit in the front, and 5% in the rear (NHTSA, 2007b). Likewise, in Britain, 53% of motorcycle fatalities involved a car (EuroRAP, 2004).

Motorcycles are also frequently involved in intersection crashes. Motorcycles are less visible due to their smaller size. As a result, they are more difficult for other drivers to detect in traffic, and their approaching speed is more difficult to determine which explains why these crashes are so prevalent (Huang and Preston, 2004). Motorcyclists are predisposed to more severe injuries in cases where a vehicle and a motorcycle are approaching each other from opposite directions and one vehicle attempts to turn right or left across the path of the other (Pai and Saleh, 2008; Huang and Preston, 2004). In Canada, over 40% of fatal motorcycle crashes, and over 45% of serious injury crashes occurred at intersections (Transport Canada, 2004). Furthermore, the number of motorcyclists being killed at intersections is rising (Transport Canada, 2008a). In Canada, 18.3% of fatal motorcycle crashes occurred while the other vehicle was turning left and the motorcyclist was going straight, and 3.1% occurred while the motorcycle was passing or overtaking the vehicle (Transport Canada, 2006b). In the U.S., of the 2,332 two-vehicle fatal crashes involving a motorcycle in 2007, 40% (939) occurred while the other vehicle was turning left and the motorcyclist was going straight, passing, or overtaking the vehicle; and in 27% (632) of these crashes both vehicles were going straight (NHTSA, 2007b). In Britain 44% of motorcycle fatalities occurred at junctions (EuroRAP, 2004).

The limited visibility of motorcycles also contributes to the crash risk of motorcyclists and the types of crashes. For example, compared to passenger vehicles, motorcycles are more likely to be involved in night time collisions (MPI, 2004). Interestingly, one study found that motorcycle crashes were less severe under wet pavement conditions, near intersections, and when passengers were on the motorcycle. This may be an indication that riders drive more cautiously under these circumstances (Savolainen and Mannering, 2007).

Profile of riders and victims

The Motorcycle & Moped Industry Council (MMIC) data show an increase in the number of new motorcycle sales in Canada, with a noted increase in ownership of those aged 40 and above. In particular, the number of licensed drivers aged 55-64 is growing (Transport Canada, 2008a). The growing motorcycle ownership among older riders may also be a reflection of increases in this age group among the general population (Shankar and Varghese, 2006). Similarly, according to the U.S. Federal Highway Administration (FHWA), data show a growing number of registered motorcycles in recent years.

It is possible that these older riders are returning to riding after a long time, which may result in a decline in safety-related motorcycle skills. As the average age of motorcyclists has increased, reflex and skill degradation due to age become more of a concern (Savolainen and Mannering, 2007).

In Canada, 92.8% of fatally injured motorcyclists are motorcycle operators (TIRF, 2006). Motorcycle collisions are mainly a male rider problem (Evans, 2004). In Canada, 90.9% of fatally injured motorcycles are male. This is not surprising given that males accounted for 64.2% of all traffic fatalities, 57.6% of all pedestrian fatalities, and 82.4% of all bicyclist fatalities (TIRF, 2006). In the U.S., 90% are motorcycle operators (Shankar, 2001). From 1995 through 2004, between 89% and 91% of motorcycle rider fatalities in the U.S. were males (Shankar and Varghese, 2006). Similarly in the U.S. males accounted for 70% of all traffic fatalities, 69% of all pedestrian fatalities, and 88% of all bicyclist fatalities (NHTSA, 2006b).

In particular, a high crash risk was noted for riders in their forties and fifties. In Canada, from 1986 to 2001 the number of motorcycle fatalities has increased notably for those aged 45 to 64. A smaller increase was seen for those aged 25 to 44 and a notable decline was seen for those aged 16 to 24 (Transport Canada, 2004). The largest number of motorcycle fatalities in the U.S. occurs in the 20-29 age group; however, fatalities in the 40-49 age group are fast approaching this rate (Shankar and Varghese, 2006). In Britain, fatalities were the highest among the 30-34 age group; however the greatest increase in fatalities from 1997-1999 to 2000-2002 was for the 30-49 age group (EuroRAP, 2004). As older riders may have more disposable income, this increase in older rider fatalities could be due to riding larger motorcycles with high performance capabilities (Harrison and Christie, 2005) in combination with a decline in safety-related motorcycle skills.

Even after controlling for other variables (crash type, motorcycle type), older motorcyclists were found to be more likely than younger riders to be involved in serious injury crashes (Savolainen and Mannering, 2007). Interestingly, crash risk declines as current riding exposure increases. This may indicate that riders learn with experience, so being an older rider does not necessarily suggest being a more experienced rider (Harrison and Christie, 2005).

Risk factors associated with fatality and injury

There are a number of common risk factors associated with motorcyclist fatalities and injuries including the non-use of helmets, alcohol consumption, aggressive driving behaviours such as speeding and having an invalid licence.

Helmet use

All Canadian provinces have universal helmet laws requiring all riders to wear a helmet (Canada Safety Council). A survey of motorcyclists in Manitoba found that 91% of motorcyclists wear a helmet at all times. Helmet use was highest among riders aged 18-29 (96%), followed by riders aged 30-39 (92%), 50 or older

(89%), and 40-49 (80%) (MPI, 2004). In the U.S., however, this is not the case, and several states have moved to repeal their mandatory helmet laws. States that have repealed their universal helmet laws have seen lower helmet usage and higher death and injury rates (NTSB, 2007). In Kentucky and Louisiana, repeal of universal helmets laws resulted in an increase in both fatalities and injuries per registered motorcycle (NHTSA, 2008a). In the U.S. in both 2007 and 2008, 26% of riders were not wearing a helmet (NHTSA, 2008c).

In motorcycle crashes, head injury is a leading cause of death (NHTSA, 2008a; NTSB, 2007). When involved in a crash, a motorcyclist without a helmet is 40% more likely to suffer a fatal head injury, and 15% more likely to suffer a non-fatal injury (NHTSA, 2008a). As a comparison, Evans (2004: p. 285) reported that "a motorcyclist not wearing a helmet is 31 times as likely to be killed as a car occupant for the same distance of travel". Moreover, in a crash, an unhelmeted motorcyclist is three times more likely to suffer brain injuries. Of all fatally injured motorcyclists in the U.S. in 2006, 41% of motorcycle operators and 55% of motorcycle passengers were not wearing a helmet (NHTSA, 2006b).

Helmets are estimated to be 37% effective in preventing fatal injuries among riders. As a comparison, Evans (2004) found that motorcycle helmets reduce passenger fatality risk by about 28%. The U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) estimated that helmets saved the lives of 1,658 motorcyclists in 2006, and another 1,784 motorcyclists in 2007. An additional 752 lives in 2006, and another 800 lives in 2007, could have been saved if all motorcyclists wore helmets (NHTSA, 2007b; 2006a). Furthermore, from 1984 through 2006, helmets saved the lives of an estimated 19,230 motorcyclists in the U.S., and an additional 12,320 would have been saved if all motorcyclists were wearing a helmet (NHTSA, 2008a).

Opponents of universal helmet laws argue that helmets may increase the risk of a crash by interfering with the rider's ability to see and hear surrounding traffic. However, studies have shown that helmets have no negative effect on the ability of riders to hear or see. Helmets did not restrict the ability of riders to hear horn signals, or detect vehicles in the adjacent lane prior to lane change. In terms of vision, partial compensation was noted with some riders turning their heads a little farther before changing lanes, but they did not require significantly more time to turn their heads to check for traffic (NHTSA, 1996; McKnight and McKnight, 1995). In addition, wearing a helmet does not increase the risk of other types of injury (NTSB, 2007).

Alcohol

Alcohol consumption is dangerous when operating any type of vehicle. This is particularly true in relation to riding a motorcycle for the following reasons. The operation of a motorcycle is more difficult than the operation of a four-wheeled passenger car, even under normal environmental conditions. Operating a motorcycle is very different from driving a passenger vehicle as it requires balance and coordination. Riders must maintain balance while at the same time use their hands and feet to manipulate the controls

in a manner quite different from driving a car. As expected, the use of alcohol makes this task even more difficult (Sun et al., 1998). A study comparing the differences between BAC levels of motorcyclists to those of automobile drivers found that motorcyclists are involved in crashes at lower BACs than drivers. Thus, it appears that decrements in performance at lower BACs are more significant for motorcycle riders than for drivers of passenger vehicles (Sun et al., 1998).

In Canada, the number of drinking riders involved in fatal crashes declined by almost 9% between 1996-2001 and 2003-2005 (Transport Canada, 2008c). Of all fatally injured drivers in Canada with blood alcohol concentration (BAC) levels of .08 grams per decilitre (g/dL) or higher (.08%), 5.5% (49) were motorcycle riders, 53.6% were automobile drivers, 35% were light truck drivers, 5.2% were van drivers, and 0.5% were heavy truck drivers (Mayhew et al., 2009). When comparing such percentages between different road users, lower exposure of motorcycle riders has to be borne in mind. This means that there is a smaller number of motorcycle riders relative to other road users and they do not ride year round. In the U.S. a different pattern emerges. Of all fatal crashes in the U.S. in 2007, 27% of motorcyclists had BAC levels of .08% or higher, compared to 23% for passenger cars, 23% for light trucks and 1% for large trucks (NHTSA, 2007b).

Riders who drink and drive are more likely to crash at night (Peek-Asa and Kraus, 1996). For motorcycle operators killed in traffic crashes in the U.S., the likelihood of having a BAC level of .08% was almost four times greater at night (44%) than during the day (12%).

According to Shankar and Varghese (2006), alcohol involvement is highest among those who ride larger motorcycles with engines sized 1,001-1,500 cubic centimetres (cc). Drinking riders are also less likely to be wearing a helmet. In the U.S. in both 2006 and 2007, reported helmet use in fatal collisions was lower for motorcycle operators with BAC levels of .08% (45%), compared to those with no alcohol (66%) (NHTSA, 2007b). In addition, drinking riders are more likely to be operating without a license and are more likely to speed. Of concern, drinking riders who were injured in crashes were more likely to have passengers on their motorcycle than non-drinking riders (Peek-Asa and Kraus, 1996).

Speeding

According to Transport Canada (2008b), from 2002 to 2004 motorcyclists accounted for only 9% of speeding-related fatalities — similarly to alcohol-related numbers, it should be noted that motorcyclists only account for a smaller proportion of traffic. However, the percentage of motorcyclists involved in speeding-related crashes between 1996 and 2004 has grown faster than that of other road users. Although one might expect this increase to be attributed to younger riders, this growth has been attributed to a greater number of older riders involved in speeding-related crashes. To illustrate, the number of motorcyclists aged 45-54 killed in speeding-related crashes more than doubled between 1996-2001 and 2002-2004. The fact that older riders are dying more often could perhaps also be explained by increases in motorcycle ownership for those aged 40 and above (Transport Canada, 2008b).

In 2007, 36% of all motorcyclists involved in fatal crashes in the U.S. were speeding. By comparison, the rate was 24% for passenger car drivers, 19% for light truck drivers and 8% for large truck drivers (NHTSA, 2007b). In a U.S. study, speeding on a motorcycle was shown to be most prevalent among 21-30 year olds (Shankar and Varghese, 2006).

Unlicensed riders

The percentage of fatally injured motorcyclists with a valid licence in the U.S. has increased from 1995 to 2004, although still about one-fourth are improperly licensed (Shankar and Varghese, 2006). In 2007, 26% of motorcycle riders involved in fatal crashes had an invalid licence at the time of the crash compared to 13% for passenger vehicles (NHTSA, 2007b). No such data were available for Canada.

Engine size

Motorcycles with larger engine capacity are larger in size, heavier in weight, have greater power, and can travel at greater speeds (Quddus et al, 2002). Riding a larger motorcycle has typically been viewed as an activity that increases the likelihood of crash involvement. Some studies have found that injury and damage severity have been shown to increase with increased motorcycle engine capacity (Quddus et al, 2002; Yannis et al, 2005). However, there is no strong evidence to support the theory that increased engine size is associated with an increase in crash risk (Mayhew and Simpson, 1989; Langley et al., 2000; Mayhew and Simpson, 2001).

According to Manitoba Public Insurance (2004), there has been a move towards higher value and higher powered motorcycles. In 1996, only 15% of all motorcycles had engines 1250 cc or larger. By 2004, 30% had engines 1250 cc or larger (MPI, 2004). For Canada as a whole, in 2007, 47.5% of (street legal) motorcycles sold had engines 951 cc and up, followed by 18.1% under 250 cc, 14.6% 601-750 cc, 10.5% 251-600 cc, and 9.3% 751-950 cc (MMIC & COHV, 2007).

Solutions/Countermeasures

There are a variety of strategies that have been proposed to increase safety of motorcycle riders. Safety features such as antilock brake systems on motorcycles can help reduce stopping distance and improve stability in hard braking situations. Also, airbags are optional on some new models, but this is not common (IIHS, 2008).

Other ways to reduce motorcyclist casualties include:

- The use of helmets and protective clothing (Huang and Preston, 2004; MPI, 2004; Morris, 2006);
- Graduated licensing for motorcyclists (Mayhew and Simpson, 2001);
- Visibility improvement, for example, brighter colours on both the motorcycle and the rider, as well as the use of daytime running lights (Yuan, 2000; Ulleberg, 2003; MPI, 2004; Pai and Saleh, 2008);

- Rider education and training, for example, enhancing hazard perception skills (Simpson and Mayhew, 1990); and,
- The enforcement of violations (Huang and Preston, 2004).

Conclusion

The number of new motorcycle sales has been increasing from year to year in Canada since 2000 with 52,313 units sold, to 82,482 units sold in 2007. Riding a motorcycle is more risky than driving a passenger car, as motorcyclists are more likely to be killed or injured due to their vulnerability. Given the dangers associated with riding a motorcycle and the increasing number of motorcycle sales in Canada, attention to this issue is warranted.

To illustrate, the motorcyclist fatality rate in Canada has steadily increased between 2002 and 2005, with only a modest decline in 2006. It remains to be seen if this decline will continue. In Manitoba, claims costs for motorcycles are much higher than for passenger vehicles; and since 2000, the frequency of motorcycle collision claims has grown faster than that of passenger cars.

There is a need to monitor the changing demographics of motorcycle riders. In Canada, from 1986 to 2001 the number of motorcycle fatalities has increased notably for those aged 45 to 64. It is possible that these older riders are returning to riding after a long time, which may result in a decline in safety-related motorcycle skills. As the average age of motorcyclists has increased, reflex and skill degradation due to age are of concern.

There are a number of common risk factors associated with motorcyclist fatalities and injuries including the non-use of helmets, alcohol consumption, aggressive driving behaviours such as speeding and having an invalid licence.

The purpose of this report is to provide information about the attitudes, opinions and behaviours of Canadians that can help improve the safety of motorcycle riders in particular and other road users in general in Canada.

PROFILE OF RIDERS

Of the 1,201 survey respondents, 107 or 8.9% reported that they ride a motorcycle. The majority of those who ride a motorcycle were male (80.4%), whereas, only 19.6% of respondents who ride a motorcycle were female. This difference (80.4% vs. 19.6%) was significant. For comparison, 47.5% of all survey respondents were male and 52.5% were female.

With regard to the age of Canadian motorcyclists, the three largest age categories were as follows: 24.6% for those aged 40-49, followed by 21.2% for those aged 50-59, and 20.9% for those aged 30-39. This is consistent with research that shows increases in motorcycle ownership for those aged 40 and above. As for the rest of the respondents who ride a motorcycle, 15.2% were between the ages of 21 and 29, 9.4% were under 21 years of age, and the remaining 8.7% were 60 years of age and above.

Canadians were also asked who they most often see riding motorcycles, young riders, older riders, or both. According to the results, both young riders *and* older riders are most often seen riding motorcycles, with 65% of the sample choosing both. A slight difference was found between those who most often see young riders (18.4%) and those who most often see older riders (16.6%), but it was not significant. In other words, respondents were equally likely to identify both younger riders and older riders as often riding without wearing a helmet. The true difference in age categories may not be pronounced enough for the public to perceive it accurately. In addition, full face helmets make it difficult to determine age. This may explain why the public does not think there are more older motorcycle riders.

PREVALENCE OF RISKY RIDING BEHAVIOUR

How often do Canadians engage in risky riding behaviour?

Respondents who ride a motorcycle were asked how often they ride well above the posted speed limit (see Figure 1), on a scale from 1 (never) to 6 (very often). Slightly less than three quarters of respondents (74.5%) provided a score of one, two, or three, indicating that they do not frequently ride well above the speed limit. Nevertheless, over one quarter (25.5%) of Canadian motorcyclists admitted to doing this. This corresponds to an estimated 374,000[1] to 516,000[2] motorcyclists. Note that the difference between motorcyclists who do not frequently ride above the posted speed limit and those who do was significant. This figure is comparable to an earlier *RSM* on speeding in which 24.3% of drivers – an estimated 5.4 million drivers (rather than riders) – admitted to driving well above the posted speed limit (Vanlaar et al., 2007).

In response to how often Canadian motorcyclists weave in and out of traffic while riding their motorcycle, 89.5% of respondents who ride a motorcycle provided a score of one, two or three, indicating that they do not frequently engage in this behaviour. Only 10.5% of Canadians – or an estimated 154,000 to 212,000 motorcyclists in Canada – admitted to doing this. This difference (89.5% vs. 10.5%) was significant.

Canadian motorcyclists were also asked how often they pass other vehicles when it is not safe to do so. The majority of respondents (91%) indicated that they did not frequently engage in this behaviour (selecting a score of one, two or three). The remaining 9% – or an estimated 132,000 to 182,000 Canadian motorcyclists – provided a score of four to six indicating that they frequently pass other vehicles when it is not safe to do so. This difference (91% vs. 9%) was significant.

When asked how often Canadian motorcyclists perform stunts on public roads, 91.5% of those who ride a motorcycle indicated that they do not frequently engage in this type of behaviour. Few Canadian motorcyclists (8.5% or an estimated 125,000 to 172,000 motorcyclists) admitted to performing stunts on public roads. The difference between motorcyclists who perform stunts on public roads and those who do not was significant.

Canadians were also asked how often they ride their motorcycle without wearing a helmet. The majority of respondents who ride a motorcycle (96.9%) indicated that they do not frequently ride without wearing a helmet. The remaining 3.1% of respondents – or an estimated 45,000 to 63,000 motorcyclists – provided a score of four, five or six, indicating that they do frequently ride a motorcycle without wearing a helmet. The difference between those that do wear a helmet and those who do not was significant.

[1] This number is based on a CCMTA survey of jurisdictions of the number of licensed motorcyclists in each province. Note that no data was available for Nova Scotia, or the Yukon, so this number is likely underestimating the total.
[2] This number is based on an estimated total of 2.023 million licensed motorcyclists. This estimate was calculated using results from this RSM which found that 8.9% of the total sample of drivers also ride a motorcycle and an estimated 22.726 million licensed drivers in 2008. This estimate of 22.726 million was obtained by increasing the 2006 number of 22.278 million licensed drivers (source: Transport Canada 2007) with an anticipated growth of 1% per year.

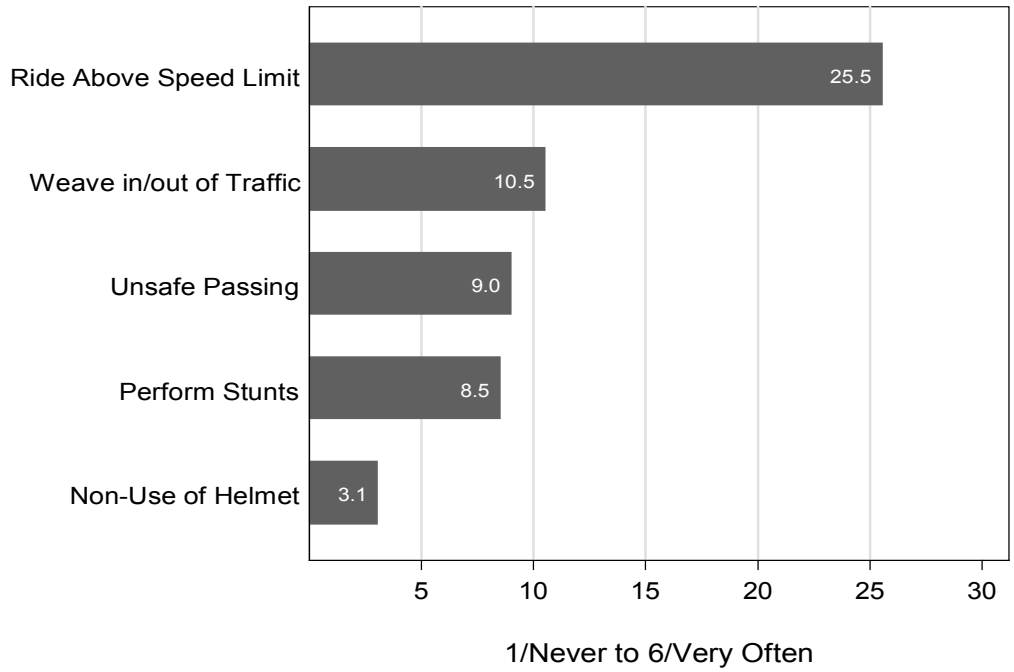

Figure 1. Self-Reported Risky Riding Behaviour

Finally, respondents were asked to estimate how many minutes they used their cell phone while riding their motorcycle within the last seven days. The vast majority of respondents who ride a motorcycle reported that they do not use their cell phone while riding their motorcycle, with 91.1% reporting that they did not spend any time talking, and 93.5% reporting that they did not spend any time texting on their cell phone within the last seven days. In terms of talking on their cell phone, 8.9% of motorcyclists admitted to talking on their cell phone for one or more minutes within the last week, with one respondent admitting to talking for 25 minutes.

As a comparison, previous *RSM*s found that 20.5% of survey respondents in 2001, 23% in 2002, and 37% in 2006 reported that they had used a cell phone while driving in the last seven days (Beirness et al., 2001; 2002; Vanlaar et al., 2006b). Furthermore, among those who had used a cell phone in the last seven days in 2006, the average length of time it was used while driving was 35 minutes; the maximum was 800 minutes (Vanlaar et al., 2006b). With regards to texting, only 6.5% of motorcyclists admitted to spending one to five minutes texting within the last week. No similar question about texting was asked in previous *RSM*s.

How often do Canadians see motorcyclists engaging in risky riding behaviour?

Respondents were asked how often they see motorcycles passing other vehicles when it is not safe to do so, using a scale from 1 (never) to 6 (very often). Answers were recoded into two categories: not likely (1 – 3), and likely (4 – 6). As can be seen in Figure 2, 41.4% of respondents selected a score of four to six,

indicating that they often to very often see motorcycles passing other vehicles when it is not safe to do so, while 58.6% did not frequently see this behaviour. This difference (41.4% vs. 58.6%) was significant.

Survey participants were also asked how often they see motorcycles weaving in and out of traffic. It was found that 39.1% of participants indicated that they frequently see motorcycles weaving in and out of traffic. On the other hand, 60.9% reported that they do not frequently see motorcycles weaving in and out of traffic. The difference between those who see motorcycles weaving in and out of traffic and those that do not was significant.

In response to how often respondents see motorcyclists performing stunts on public roads, 16.4% indicated that they often to very often see this happening. Conversely, 83.6% of respondents reported that they do not often see motorcyclists performing stunts on public roads. This difference was significant.

Respondents were also asked how often they see motorcyclists riding without wearing a helmet. Only 8.9% reported that they often to very often see motorcyclists riding without a helmet. In contrast, 91.1% of respondents indicated that they do not frequently see motorcyclists riding without wearing a helmet. The difference between those who see this and those who do not was significant.

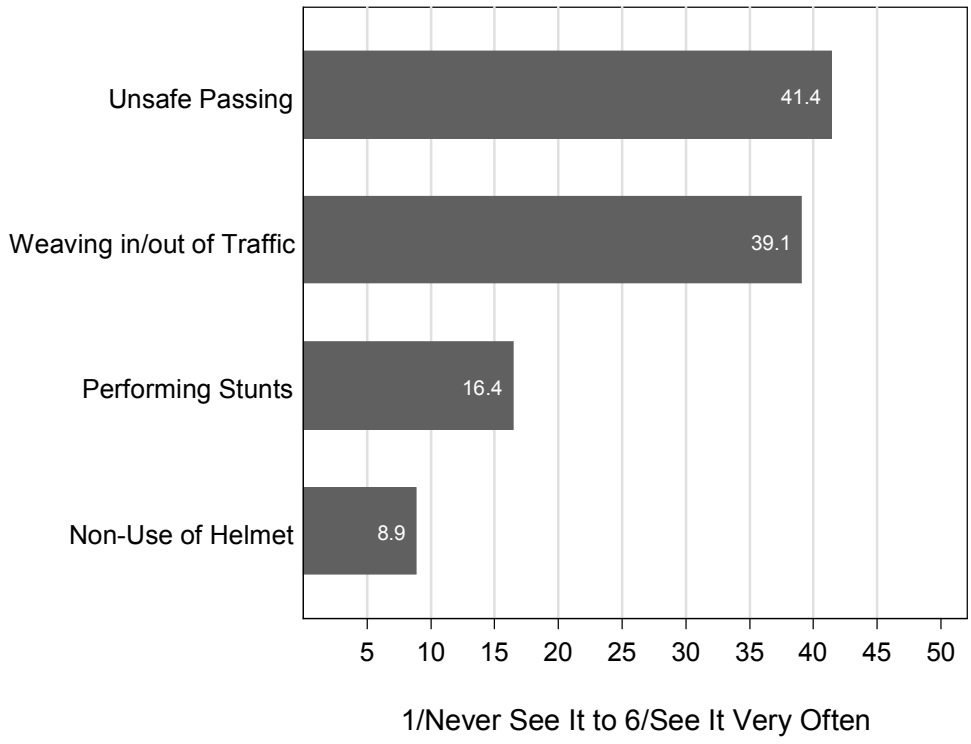

Figure 2. Perceptions of Risky Riding Behaviour

Who do Canadians most often see riding motorcycles without wearing a helmet?

In addition, respondents were asked who they most often see riding motorcycles without wearing a helmet; young riders, older riders, both, or none of the above. Riders are most often seen wearing a helmet, with 68.6% of respondents indicating that they do not see any riders (young or old) riding without wearing a helmet. However, among those who are seen riding without wearing a helmet, young riders (16.5%) are seen more often than older riders (6.7%). Furthermore, the difference between those who most often see young riders riding without a helmet (16.5%) and those who most often see older riders riding without a helmet (6.7%) was significant. The remaining 8.2% reported that they often see *both* young riders and older riders riding without a helmet.

Profile of Canadian riders who do not frequently wear a helmet

Logistic regression was used to investigate the difference between riders who wear a helmet and those that do not based on self-reported data rather than based on what people see riders do. It was found that those who frequently ride a motorcycle without wearing a helmet were significantly more likely to be older than those who do frequently wear a helmet. Those who do not frequently wear a helmet were also more likely to be from a rural area. To illustrate, 7.4% of riders who were from a rural area admitted that they do not frequently wear a helmet while riding a motorcycle, compared to 1.3% of riders from an urban area admitting to this. In addition, riders who do not frequently wear a helmet are less likely to be married. Specifically, 7.3% of riders who were not married admitted that they frequently ride a motorcycle without wearing a helmet, whereas only less than 1% of those who were married admitted to this. Finally, those who frequently ride a motorcycle without wearing a helmet were significantly more likely to have driven more kilometres in a typical month. More precisely, with every extra 1,000 kilometres driven per month, the chances of admitting to riding a motorcycle without wearing a helmet increases by 22.9%.

PERCEPTIONS OF MOTORCYCLISTS

How risky is riding a motorcycle to Canadians?

To gauge Canadians' general attitudes towards motorcycling, the *RSM* polled Canadians on the perceived risk associated with a variety of road safety issues. Figure 3 shows the percentage of respondents who felt that various road safety issues were risky, rated on a scale from 1 (not at all risky) to 6 (extremely risky); for scoring purposes, respondents were coded as feeling a behaviour was very or extremely risky if he or she chose a five or six.

Riding a motorcycle was perceived as being the least risky of all road behaviours. As can be seen in Figure 3, the vast majority of Canadians perceived drinking and driving to be a very or extremely risky behaviour (94.6%) followed by running red lights (83.9%), excessive speeding (75.1%), fatigued or drowsy driving (67%), the non-use of seat belts (66.1%), jaywalking (37.4%) and riding a motorcycle (16.6%). The difference between the perceived risk of riding a motorcycle and all other behaviours presented in the table were significant. This finding is positive in that it clearly illustrates that Canadians do not perceive riding a motorcycle per se to be a very or extremely risky behaviour when compared to a variety of road safety issues. However, it also begs the question if they fully understand the risks related to motorcycle riding due to their vulnerability.

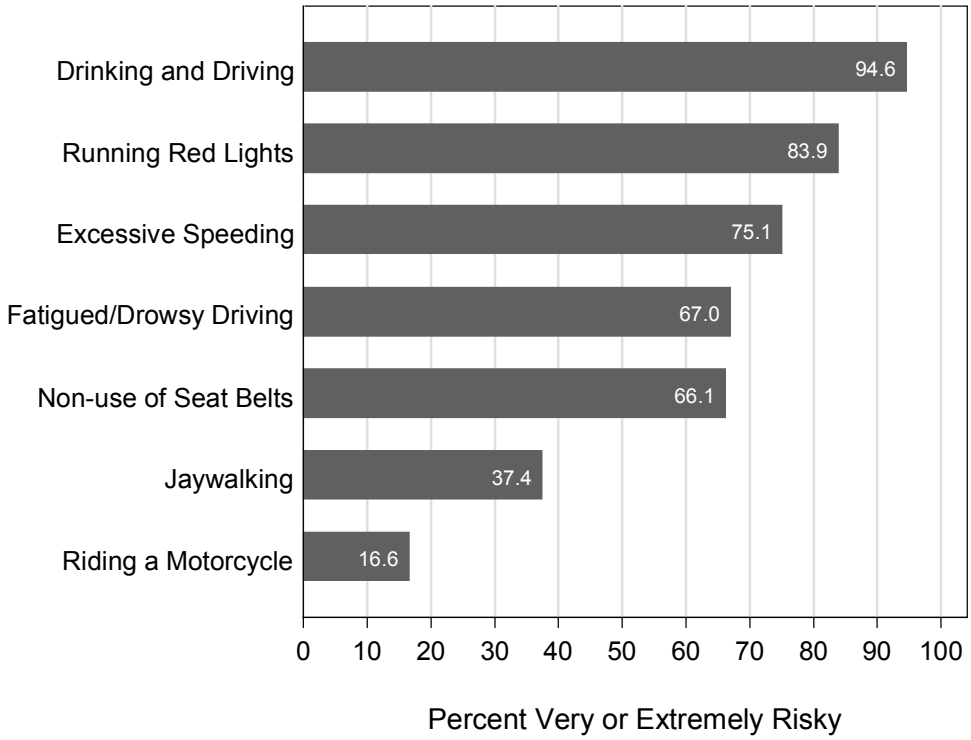

Figure 3. Percentage Very or Extremely Risky

Are motorcyclists who perform stunts on public roads a major road safety concern for Canadians?

Canadians were asked about a series of specific road safety concerns and how serious they perceive those problems to be. Figure 4 shows the percentage of respondents who said they were concerned about these various issues, rated on a scale from 1 (not at all concerned) to 6 (extremely concerned); for scoring purposes, respondents were coded as being concerned about an issue if he or she chose a five or six.

As can be seen in Figure 4, 55.3% of respondents are very or extremely concerned about motorcyclists performing stunts on public roads. This issue only received the seventh highest rating of concern, after drinking drivers (84.1%), drugged drivers (75.8%), running red lights (67.7%), excessive speeding (66.2%), distracted drivers (61.7%), and the use of (hand-held or hands-free) cellular telephones while driving (60.1%). The remaining road safety issues rated as very or extremely serious problems were as follows: drowsy drivers (54.1%), bicyclists behaving unsafely on the roads (47%), pedestrians behaving unsafely on the roads (42.6%), and young drivers (26.4%). Note that only the difference between motorcyclists performing stunts on public roads and drowsy drivers was *not* found to be significant. The difference between motorcyclists performing stunts on public roads and all other road safety issues was significant.

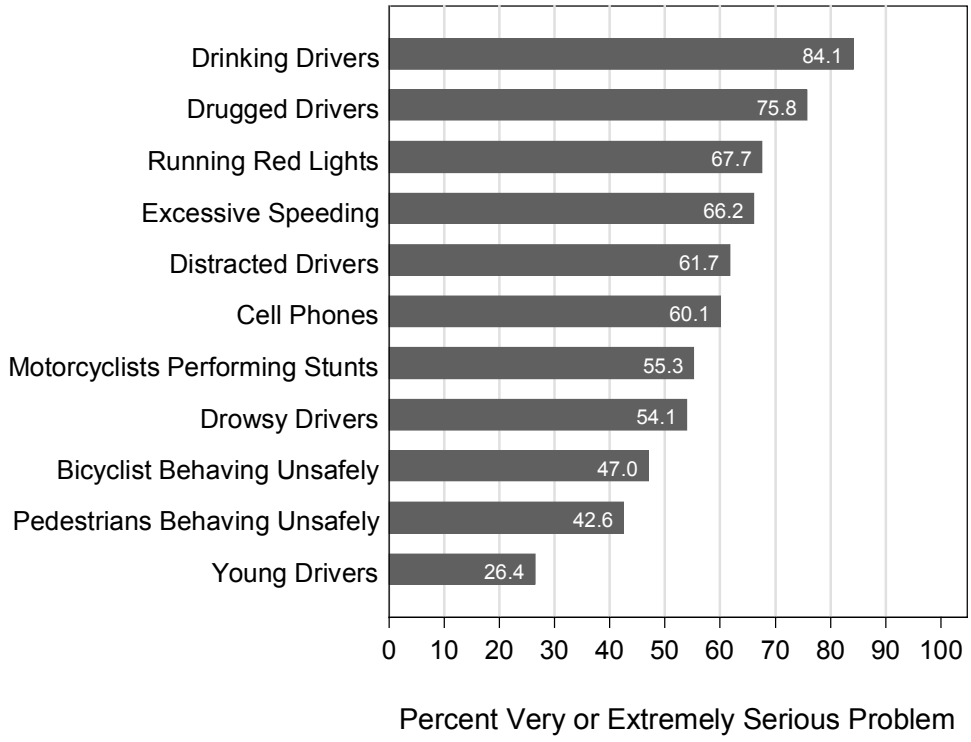

Figure 4. Percentage Very or Extremely Concerned About Various Road Safety Issues

PUBLIC SUPPORT FOR MEASURES TO INCREASE MOTORCYCLE SAFETY

Canadians (all respondents, including riders and drivers) were asked about the extent to which they agree with the use of various measures for dealing with motorcycling related issues, on a scale from 1 (strongly disagree) to 6 (strongly agree). Responses from 1 to 4 were recoded as not supportive, while responses from 5 to 6 were recoded as supportive of the measure in question[3].

As evident in Figure 5, the survey results indicate that:

- 72.9% agreed that motorcycles should be impounded for performing stunts on public roads;
- 68.2% agreed that there should be increased fines for the non-use of helmets for motorcyclists; and
- 51.8% agreed that there should be an engine size limitation for new motorcycle riders.

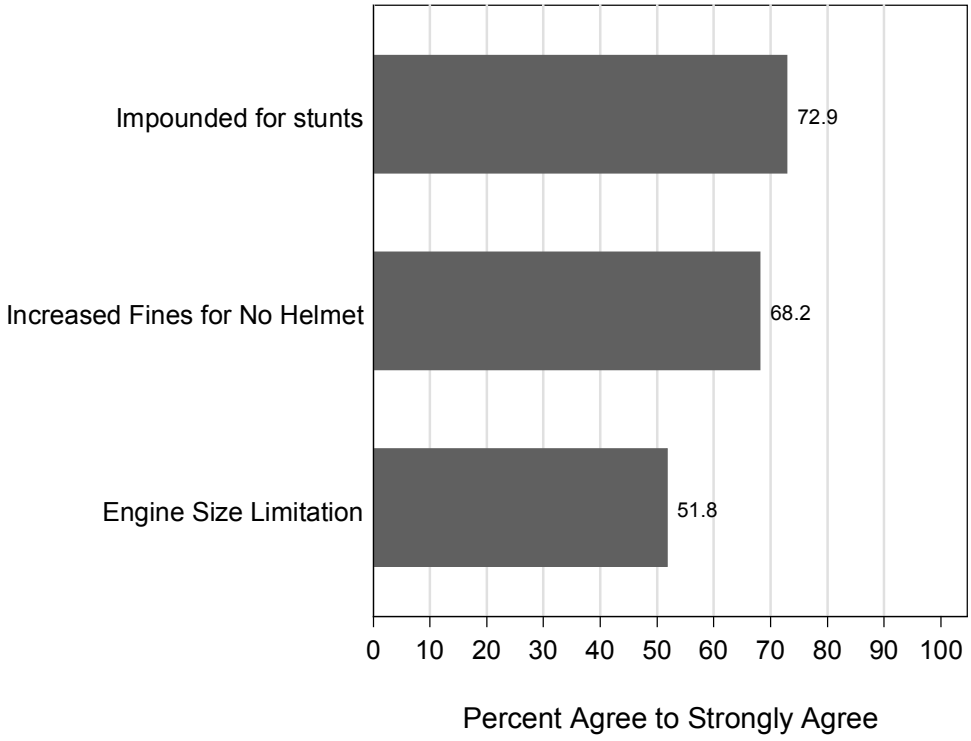

Figure 5. Percentage Who Agree With Various Methods for Dealing with Risky Riding Behaviour

Logistic regression was used to further investigate the profile of those who agree with various measures to deal with risky riding behaviour. Respondents who agreed with increasing fines for the non-use of helmets and engine size limitations for new motorcycle riders were significantly more likely to be female.

[3] Note that such a coding scheme measures support in a conservative fashion.

Respondents who agreed that motorcycles should be impounded for performing stunts on public roads as well as those who agreed that there should be engine size limitations for new motorcycle riders were significantly more likely to be older than those who did not show strong support for these two measures.

Respondents who agreed that there should be increased fines for the non-use of helmets were significantly more likely to have driven more kilometres in a typical month than those who did not agree with this measure.

The difference between respondents who ride a motorcycle and those who do not with regards to their levels of support for the above measures was also investigated. Respondents who agreed that motorcycles should be impounded for performing stunts on public roads were significantly less likely to ride a motorcycle themselves. To illustrate, 50.1% of those who ride a motorcycle agreed with this measure, whereas 75.1% of those who do not ride a motorcycle were in agreement with this measure.

With regards to support for engine size limitations for new motorcycle riders, those who are in agreement with this measure are significantly more likely to ride a motorcycle. More precisely, 61.8% of respondents who ride a motorcycle agreed with engine size limitations for new motorcycle riders. In comparison, only 50.7% of respondents who do not ride a motorcycle agreed with this measure.

No significant difference was found between respondents who ride a motorcycle and those who do not ride a motorcycle in terms of agreement with increased fines for not wearing a helmet. In other words, motorcycle riders are just as likely to agree with this measure (65.3%) as drivers who do not ride a motorcycle (68.5%).

SUMMARY AND CONCLUSIONS

Recent information about motorcycling in Canada is limited. Most of the literature on the topic is based on U.S. data. Given the vulnerability of motorcycle riders and the increasing number of motorcycle sales in Canada, concern is warranted. The purpose of this report is to provide information that can help improve safety of motorcycle riders in particular and other road users in general in Canada.

The majority of survey respondents who ride a motorcycle are male. The majority are also aged 40-49, followed by those aged 50-59, and those aged 30-39. This is consistent with research that shows increases in motorcycle ownership for those aged 40 and above.

The majority of respondents who ride motorcycles indicated that they do not engage in risky riding behaviour, as over 90% report that they do not frequently pass other vehicles when it is not safe to do so, they do not perform stunts on public roads, ride without wearing a helmet, or use their cell phones (either talking or texting) while riding their motorcycle. The most frequently reported risky riding behaviour was speeding, with 25.5% of motorcyclists admitted to doing this. Similarly, the *RSM* previously found that 24.3% of drivers admit to driving well over the posted speed limit (Vanlaar et al. 2007). Based on these data, there does not seem to be a difference in terms of speeding behaviour between riders and drivers.

In terms of the public's attitudes toward riding a motorcycle in general, only 16.6% of Canadians indicated that riding a motorcycle is risky. This finding is positive as it clearly illustrates that Canadians do not perceive riding a motorcycle per se to be highly risky when compared to other risky driving behaviours. However, it also begs the question if they fully understand the risks related to motorcycle riding. Over half the respondents (55.3%) reported high levels of concern about motorcyclists performing stunts on public roads. Compared to other road safety issues, this is relatively low and can probably be explained by the fact that few motorcyclists actually perform stunts on public roads.

Canadians were also asked how often they see motorcyclists engaging in risky riding behaviour. The majority of respondents indicated that they do not frequently see motorcycles passing other vehicles when it is not safe to do so (58.6%), whereas 41.4% reported that they frequently see this. In comparison, the 2001 and 2006 *RSM*s found that 68.3% and 65% respectively see other drivers passing vehicles when it is not safe to do so (Beirness et al., 2001; Vanlaar et al., 2006a). This lower perceived frequency for riders can possibly be explained by the lower number of riders compared to the number of drivers or by the more defensive driving practices of riders.

Likewise, the majority of respondents reported that they do not frequently see motorcycles weaving in and out of traffic (60.9%), whereas, 39.1% reported frequently seeing this. For comparison, in the 2001 and 2006 *RSM*s, the majority of respondents (68.3% and 65% respectively) reported frequently seeing other drivers weaving in and out of traffic (Beirness et al., 2001; Vanlaar et al., 2006a). As for the remaining

risky riding behaviours, the majority of Canadians indicated that they do not see motorcyclists performing stunts on public roads (83.6%), or see motorcyclists riding without wearing a helmet (91.1%). No similar questions were asked in previous *RSM* surveys.

While the overall picture regarding unsafe riding behaviours suggests that riders are not necessarily behaving more or less risky than drivers, there is room for improvement. For example, 9% still admit to passing other vehicles when it is not safe to do so, 8.5% admit to performing stunts on public roads, and 3.1% admit to riding without wearing a helmet.

As noted above, the majority of respondents do not frequently see motorcyclists riding without wearing a helmet. Among those who were seen riding without wearing a helmet, young riders were seen more often than older riders. However, in contrast, those who admit to frequently riding a motorcycle without wearing a helmet were significantly more likely to be older than those who do frequently wear a helmet. Given that the number of riders admitting to not wearing a helmet is likely more accurate and is also consistent with other research, the perception of the majority of Canadians with regards to the age of riders who do not wear a helmet may not be representative of what is truly happening on the roads. Risk-taking behaviour is more common among young drivers which may explain why respondents were more likely to expect young riders to be engaging in this behaviour (Beirness et al., 2002; Vanlaar et al., 2006a; 2007).

Finally, Canadians were asked to what extent they agree with various road safety measures to deal with risky riding behaviour. Results indicated that 72.9% agreed that motorcycles should be impounded for performing stunts on public roads; 68.2% agreed that there should be increased fines for the non-use of helmets for motorcyclists; and 51.8% agreed that there should be an engine size limitation for new motorcycle riders. Interestingly, both riders and other road users were equally supportive of increasing fines for not wearing a helmet and motorcycle riders were actually more supportive than other road users for restricting engine size for new riders.

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