



# The Road Safety Monitor

Aggressive Driving ●



**TRAFFIC  
INJURY  
RESEARCH  
FOUNDATION**

**A DRIVING FORCE FOR SAFETY**

## **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 effectively address them.

**Traffic Injury Research Foundation**  
**171 Nepean Street, Suite 200**  
**Ottawa, Ontario K2P 0B4**  
**Ph: (613) 238-5235**  
**Fax: (613) 238-5292**  
**Email: [tirf@trafficinjuryresearch.com](mailto:tirf@trafficinjuryresearch.com)**  
**Website: [www.trafficinjuryresearch.com](http://www.trafficinjuryresearch.com)**

**October 2001**

Traffic Injury Research Foundation  
Copyright © 2001  
ISBN: 0-920071-16-3

# **The Road Safety Monitor**

## **Aggressive Driving**

Douglas J. Beirness

Herb M. Simpson

Daniel R. Mayhew

Anita Pak

Financial support provided by:

---

Primary sponsors:

**Transport Canada**

**Brewers Association of Canada**



Transport  
Canada

Transports  
Canada



---

Secondary sponsors:

**Royal & SunAlliance**

**Young Drivers of Canada**

---

Additional support provided by:

**Canada Safety Council**

**Lockheed Martin IMS**

**Printing and distribution made possible by a grant from  
the Insurance Corporation of British Columbia**

# Table of Contents —●

<b>Executive Summary</b> .....	<b>ii</b>
<b>The Road Safety Monitor</b> .....	<b>1</b>
Rationale	1
Structure	1
<b>Method</b> .....	<b>3</b>
<b>Aggressive Driving</b> .....	<b>4</b>
Background	4
What is Aggressive Driving?	4
Who is the Aggressive Driver?	5
Speeding and its Consequences	6
Running Red Lights and Its Consequences	6
Monitoring Canadians' Concerns	7
<b>Survey Results</b> .....	<b>9</b>
Is the Public Concerned about Aggressive Driving?	9
Demographic differences	10
Regional differences	10
How Often Does Aggressive Driving Occur?	11
Demographic differences	12
Regional differences	12
Running Red Lights and Speeding	13
Demographic differences	13
Regional differences	14
Taking Action Against Running Red Lights and Speeding	15
Demographic differences	16
Regional differences	16
<b>Bibliography</b> .....	<b>17</b>



# Executive Summary —●

- ◆ The Road Safety Monitor is an annual public opinion survey by the Traffic Injury Research Foundation (TIRF) that takes the pulse of the nation on key road safety issues by means of a comprehensive telephone survey of a random, representative sample of Canadian drivers.
- ◆ The results from the inaugural edition of the Road Safety Monitor are being released in a series of reports that cover several key issues – the present report focuses on aggressive driving.
- ◆ Results show that aggressive driving is an important issue for Canadians – 65% believe it is a serious problem.
- ◆ Aggressive driving is regarded as more serious than the problems of sleepy drivers, the condition of the roads, or vehicle defects, but not as serious a problem as driving after drinking.
- ◆ Drivers in the Atlantic and Prairie provinces see aggressive driving as a less serious problem than do drivers in other regions of the country.
- ◆ Canadians report seeing acts of aggressive driving (e.g., speeding, tailgating, unsafe passing and running red lights) very often – speeding is seen most often. By contrast, they report seeing acts of courteous driving rather infrequently.
- ◆ Ontario drivers say they see most types of aggressive driving more often than do drivers in the rest of the country. British Columbia drivers see speeding and tailgating most often; drivers in the Prairies report the highest frequency of seeing drivers fail to stop at a stop sign; and running a red light is seen least often by drivers in the Atlantic provinces.
- ◆ British Columbia drivers report seeing acts of courtesy (letting pedestrians cross at intersections; allowing other drivers into a line of traffic) more often than do drivers in the rest of the country.
- ◆ Among the acts of aggressive driving seen across the country, 74% of Canadians view running red lights as a serious problem and 2/3 regard speeding as a serious problem.
- ◆ Drivers in Atlantic Canada judge running red lights as somewhat less serious a problem than do drivers in the rest of Canada; speeding is rated less serious by drivers in the Prairies than by drivers in the rest of Canada.
- ◆ Canadians strongly support greater police enforcement to reduce aggressive driving.
- ◆ Support for automated enforcement techniques such as photo radar and red light cameras is generally strong, but there is some opposition to these measures.
- ◆ Drivers in Quebec are most supportive of greater police enforcement of the traffic laws; drivers in British Columbia and the Prairies are least supportive of photo radar whereas drivers in Atlantic Canada are most supportive of it; Ontario drivers are the most supportive of red-light cameras.



# The Road Safety Monitor —●

The Road Safety Monitor is an annual public opinion survey developed 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;
- ◆ how they behave on the highways; and
- ◆ what they know and don't know about safe driving practices.

## Rationale

Information on public knowledge about road safety issues is valuable for determining the specific areas where awareness needs to be heightened and knowledge needs to be improved. Information on public attitudes toward road safety and information about driving habits and safety practices is valuable for guiding program development and policy decisions.

Annual monitoring in these areas permits an assessment of changes in knowledge and awareness as well as changes in safety practices and in the level of concern about persisting problems; it also helps identify new and emerging issues.

## Structure

The TIRF Road Safety Monitor is designed to assess public opinion, awareness, knowledge and practices on a broad range of important traffic safety issues. It includes a core set of questions that will be asked each year to provide information on trends in



attitudes, opinions and behaviours. This will be supplemented by a set of questions that probe more deeply into special, topical and emerging issues.

The results from this inaugural edition of the TIRF Road Safety Monitor are being released in a series of reports that covers various topics – aggressive driving, driving after drinking, driver distraction, general perceptions of road safety, and commercial vehicle operators. The present report focuses on *aggressive driving*.



# Method —●

The TIRF Road Safety Monitor contains 99 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 use of a branching format and the procedure of randomly asking a selected number of alternatives in some items allowed the entire survey to be completed in approximately 20 minutes.

The survey was administered by telephone to a randomly selected sample of Canadian drivers. Opinion Search Inc. conducted the interviews in late March and early April, 2001. The final sample consisted of 1,207 completed interviews.

The data were weighted to ensure the results were representative of the national population. Based on a sample of this size, the results can be considered accurate within 2.8%, 19 times out of 20 (most conservative estimate).



# Aggressive Driving —●

## Background

Aggressive driving is nearly as old as the automobile itself. As early as 1915, Engleman's Autocraft noted that "*some automobilists abuse their rights and needlessly run over the rights of others*" (IIHS 1998). Such concern has been voiced periodically over the ensuing 85 years but public outcry has never reached the level where it precipitated a demand for action -- until recently.

In the past few years, increased attention by the media has focussed public and political attention on aggressive driving. To a large extent this has been fuelled by reports of exceptionally violent and extreme cases of aggressive driving -- often referred to as "road rage". Fortunately, such incidents are relatively rare. However, other behaviours such as speeding, running red lights, tailgating, and abusive gestures, that are often considered "aggressive" and that can increase the risk of collision, are more widespread.

## What is Aggressive Driving?

Most researchers (e.g., Grey et al. 1989; Hennessy 1999; Mizell 1997) agree that aggressive driving encompasses a continuum of behaviours that range from extreme acts (e.g., shootings or malicious assaults) to less severe manifestations (e.g., roadside arguments, confrontations, and gestures). In general, aggressive driving is seen as any behaviour that endangers, or is likely to endanger, people or property – e.g., risky driving, duelling, and violence on the road (Martinez 1997). It represents *the operation of a motor vehicle without regard for other motorists' safety* and is often the result of anger or frustration (AAA 1998).

The common types of driving behaviours often considered to be aggressive include: excessive speeding, tailgating, running red lights, unsafe passing, weaving in traffic, and failing to stop at stop signs. Such behaviours are not uncommon. For example, a recent



survey by Transport Canada revealed that 29% of Canadian drivers admitted that they “often pass other cars on the highway even if I’m not in a hurry” and 25% indicated that they “sometimes enter intersections as the light is about to turn red” (Kiar 1998). Similarly, in a recent survey in the United States, 25% of respondents admitted to driving aggressively at some time in the past year; 50% said they had seen others engage in aggressive driving in the past couple of days (AAA 1998).

## Who is the Aggressive Driver?

Research (e.g., Beirness and Simpson 1997; Chen et al. 1994; Galdabini 1988; Mercer 1989; Retting and Williams 1996; Tasca 2000) suggests that the following profile describes the aggressive driver:

- young (i.e., under 30);
- male;
- high school education;
- enjoys the thrill and excitement of taking risks;
- engages in other types of behaviours that compromise health and safety;
- exhibits general aggressive and hostile tendencies; and
- has a record of previous driving violations and crashes.

In addition, research (e.g., Beirness and Simpson 1997) has shown that drivers who engage in one type of aggressive behaviour (e.g., excessive speeding) are also likely to engage in other types of aggressive driving behaviour (e.g., running red lights).

Two of the most common types of aggressive driving – speeding and running red lights – have been studied quite extensively, so they are discussed in more detail below. Moreover, the Road Safety Monitor focussed on these two types of aggressive driving.



## Speeding and Its Consequences

A commonly observed behaviour, often considered to be aggressive, is excessive speeding. And, such behaviour is not uncommon. For example, prior to the introduction of photo radar in Ontario, the Ministry of Transportation collected information on the speed of vehicles on three different types of highways -- a 2-lane road with an 80 km/hr limit; a four-lane divided highway with a 100 km/hr limit; and a 6-lane highway with a 100 km/hr limit. Speed was monitored electronically for 24 hours a day for approximately two weeks.

Driving in excess of the posted limit was, not surprisingly, quite common – over 60% of all vehicles, regardless of the type of highway, were travelling at least 5 km/hr over the speed limit. Of greater concern was the finding that 7.8% of the vehicles were travelling more than 25 km/hr over the speed limit on the 2-lane highway – that is, *one out of every 12 vehicles was travelling in excess of 105 km/hr in an 80 km/hr zone*. On the divided highways with a 100 km/hr limit, at least 9% of the vehicles were exceeding the speed limit by 25 km/hr or more (Ministry of Transportation Ontario 1995).

Excessive speed is of concern because it contributes to serious road crashes. In the United States, speed is reported to be a factor in 30% of all fatal motor vehicle crashes accounting for the loss of over 13,000 lives each year (NHTSA 1998). A very recent and detailed review of the frequency of unsafe driving acts found that approximately 19% of serious injury crashes were attributable to speed (Hendricks et al. 2001).

In Canada, speed has been identified as a contributing factor in up to 18% of fatal and personal injury crashes (Beirness and Simpson 1997). This means that as many as 4,000 deaths and injuries could be attributed to speed each year.

## Running Red Lights and Its Consequences

Another commonly observed behaviour, often considered to be aggressive, is running a red light. Observational studies of traffic have demonstrated that the prevalence of this behaviour varies according to the type of intersection, the time of day, and the traffic



volume. For example, one study in England (Lawson 1991) found that at particularly busy intersections 6% of vehicles were reported to violate the red light and, at certain times of day, this increased to 10%.

Using automated cameras at two large urban intersections in Virginia, researchers observed an average of three red-light violations per hour (Retting et al. 1998). A subsequent study in California reported an average of 13 red-light violations for every 10,000 vehicles entering the intersection. At some intersections, the number of drivers running red lights was as high as 26 per 10,000 vehicles (Retting et al. 1999).

The risks associated with running a red light are obvious and significant. In a study conducted in four U.S. cities, disobeying the traffic signal accounted for 27% of all crashes involving personal injury (Retting et al. 1995). A subsequent study revealed that drivers running a red light were responsible for 3% of all fatal crashes in the United States (Retting et al. 1999). Most of these crashes occurred on urban roads (86%) and during daylight hours (57%). In addition, it was evident that the number of fatal crashes caused by running a red light was increasing.

In Ontario, 18% of fatal crashes and 30% of personal injury crashes occur in an intersection (Ministry of Transportation Ontario 1998). Disobeying the traffic signal is involved in 42% of fatal crashes at intersections and 29% of injury crashes. In Ontario alone this means that approximately 61 fatal crashes and 4,800 injury crashes occur each year as a result of drivers running red lights. Extrapolated to the whole of Canada, *running red lights could account for as many as 200 fatal crashes and 13,000 injury crashes each year.*

## Monitoring Canadians' Concerns

The prevalence of aggressive driving behaviours, particularly speeding and running red lights, and the high risk of crash involvement associated with such behaviours, leave little doubt about the importance of aggressive driving to overall road safety. The emergence of aggressive driving as an issue on the road safety agenda prompted the inclusion of questions in the Road Safety Monitor to gauge public opinion on this topic.



The purposes were to:

- assess how concerned the public is about aggressive driving;
- determine how often they witness aggressive driving behaviours; and,
- gauge their support for measures to deal with aggressive driving.

# Survey Results

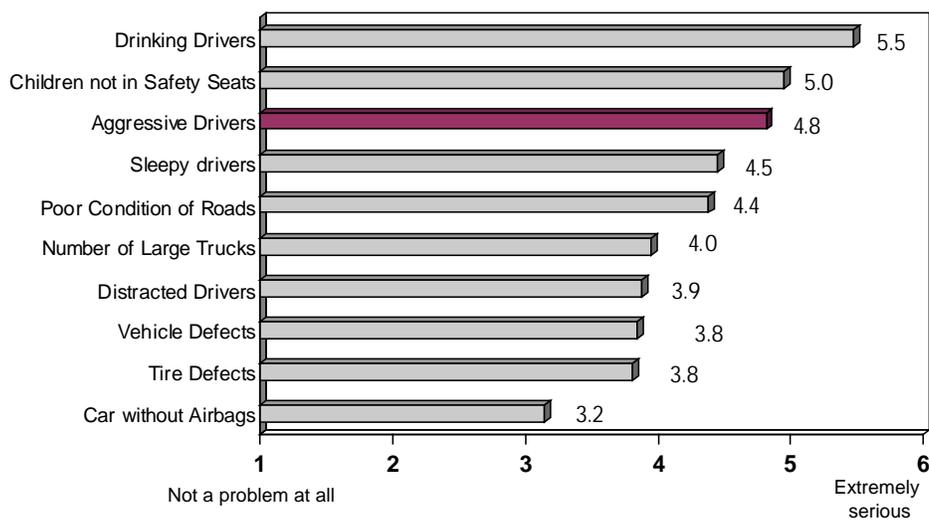
## Is the Public Concerned About Aggressive Driving?

Canadians are deeply concerned about aggressive driving! When asked to rate the seriousness of aggressive driving on a scale from 1 (not a problem at all) to 6 (an extremely serious problem), 65% of Canadians think aggressive driving is a serious or extremely serious problem.

*65% of Canadians think aggressive driving is a serious or extremely serious problem.*

Indeed, Canadians see aggressive driving as one of the most serious road safety issues facing us today. Figure 1 shows the average ratings of the perceived seriousness of a number of road safety issues – 1 represents “not a problem at all” and 6 represents “an extremely serious problem”. As can be seen, Canadians feel that aggressive driving is a more serious problem than many other road safety issues, such as the poor condition of roads, the number of large trucks, or tire defects. On the other hand, aggressive driving is not perceived to be as serious a problem as drinking drivers (the issue that received the highest rating and the topic of a forthcoming report from the Road Safety Monitor).

**Figure 1: Perceived Seriousness of Traffic Safety Issues**

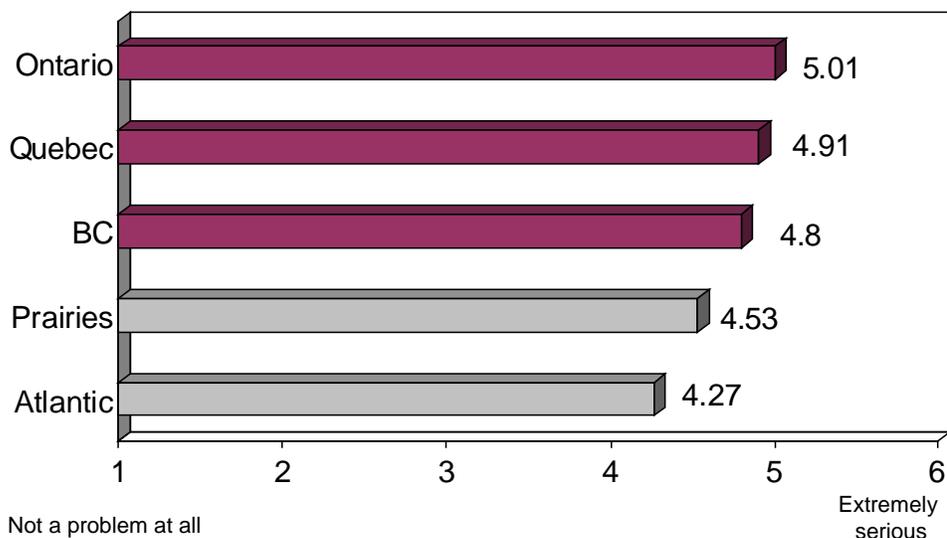


**Demographic differences.** Women are more inclined to see aggressive driving as a serious problem -- 68% of women, compared to 61% of men, rate aggressive driving as a serious or extremely serious problem<sup>1</sup>. At the other end of the scale, men are more likely than women to believe that aggressive driving is not a problem at all (10% and 3%, respectively). Despite these differences, the vast majority of both men and women perceive aggressive driving as a serious problem.

Older drivers (those aged 55 and above), and those living in urban areas, are more likely than younger drivers and rural residents to see aggressive driving as a problem. The age differences are not unexpected, given that the profile of the aggressive driver shows they are more likely to be young.

**Regional differences.** Although there is a general consensus across Canada that aggressive driving is a serious problem, perceptions differ somewhat according to region. Figure 2 shows the average ratings of the perceived seriousness of aggressive driving in five major regions of Canada. As can be seen, on average, drivers in Ontario, Quebec and British Columbia see aggressive driving as significantly more serious a problem than drivers in the Atlantic or Prairie regions.

**Figure 2: Perceived Seriousness of Aggressive Driving According to Region**



<sup>1</sup>In reporting the findings of the survey, only those differences that were found to be statistically significant ( $p < .05$ ) are presented.



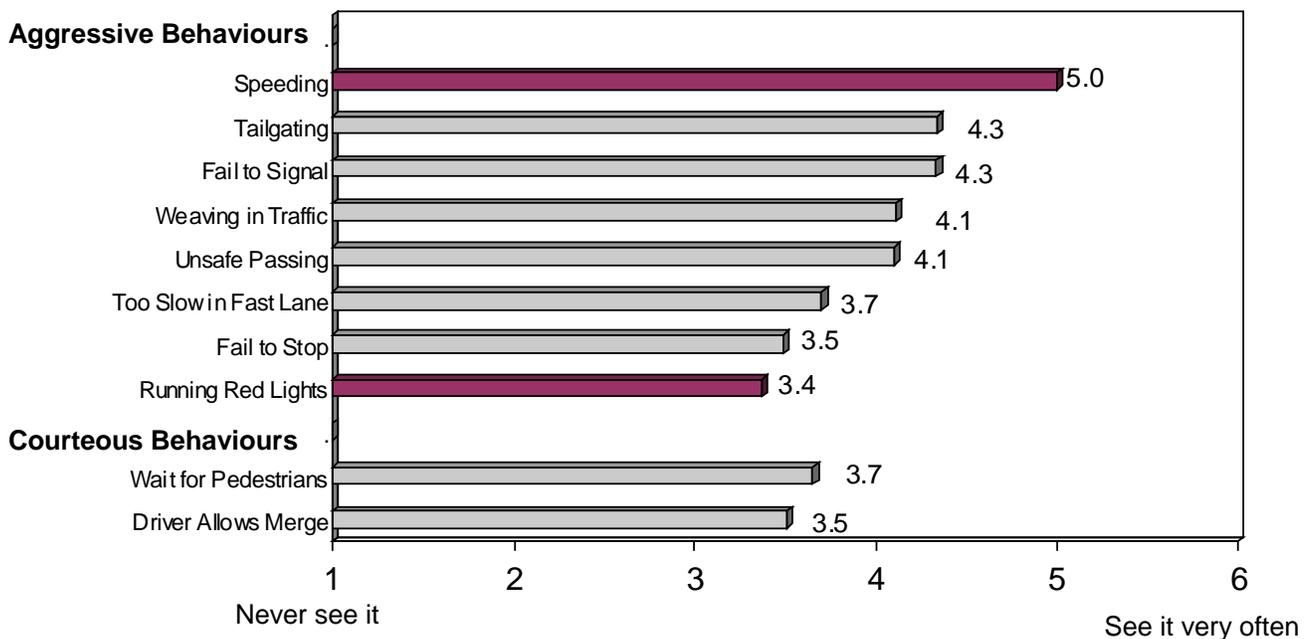
## How Often Does Aggressive Driving Occur?

Aggressive driving manifests itself in a variety of ways – e.g., excessive speeding, tailgating, weaving in traffic, unsafe passing, running red lights. *One of the reasons Canadians view aggressive driving as a serious road safety problem is that they see these driving behaviours very often.* Survey respondents were asked to indicate how often they see each of ten driving behaviours when they are on the road, using a scale of 1 (never see it) to 6 (see it very often).

Results show that Canadians see many of these aggressive driving behaviours quite often. Figure 3 shows, on average, how often Canadians see each of eight aggressive driving behaviours and, for comparison, two courteous driving behaviours. Among the aggressive driving behaviours, speeding is seen most frequently, followed by tailgating, and failure to signal lane changes. Failing to stop at a stop sign and running a red light are the least frequently observed aggressive driving behaviours.

*Canadians witness acts of aggressive driving quite often; by contrast, they see courteous driving less often.*

### Figure 3: Perceived Frequency of Ten Driving Behaviours



Canadians see courteous behaviours infrequently. Survey respondents were asked how often they see drivers waiting for pedestrians to cross, and how often they are let into a line of traffic. As shown in the figure, these courteous behaviours are not witnessed very often. Indeed, only two aggressive driving behaviours – failure to stop at a stop sign and running a red light – are seen less frequently than the two courteous driving behaviours.

Interestingly, although running a red light is seen less often than speeding, as will be described in more detail below, it is regarded as a more serious problem. Apparently, in rating the seriousness of a problem, Canadian drivers include an assessment of the risk of crash involvement associated with it – i.e., although they do not witness drivers running red lights as often as they witness such things as unsafe passing, they regard the potential consequences of the former as more serious.

**Demographic differences.** In general, women report seeing aggressive driving more often than men; young drivers (aged 16-24) report seeing courteous driving more often than do their older counterparts. Canadians living in urban areas report seeing both aggressive and courteous driving more frequently than drivers who live in rural areas.

**Regional differences.** In general, Ontario drivers say that they see most types of aggressive driving behaviour more often than do drivers in other regions of Canada. British Columbia drivers also report seeing speeding and tailgating often, whereas those in the Prairies report the highest frequency of seeing drivers fail to stop at a stop sign. Running a red light is least frequently reported by drivers in the Atlantic provinces.

Courteous driving behaviour also varies according to region of the country. In general, British Columbia drivers report the highest frequency of seeing a driver wait for a pedestrian to cross and having another driver let them into a line of traffic. Drivers in Quebec are less likely than drivers in the rest of the country to report seeing other drivers waiting for pedestrians to cross.



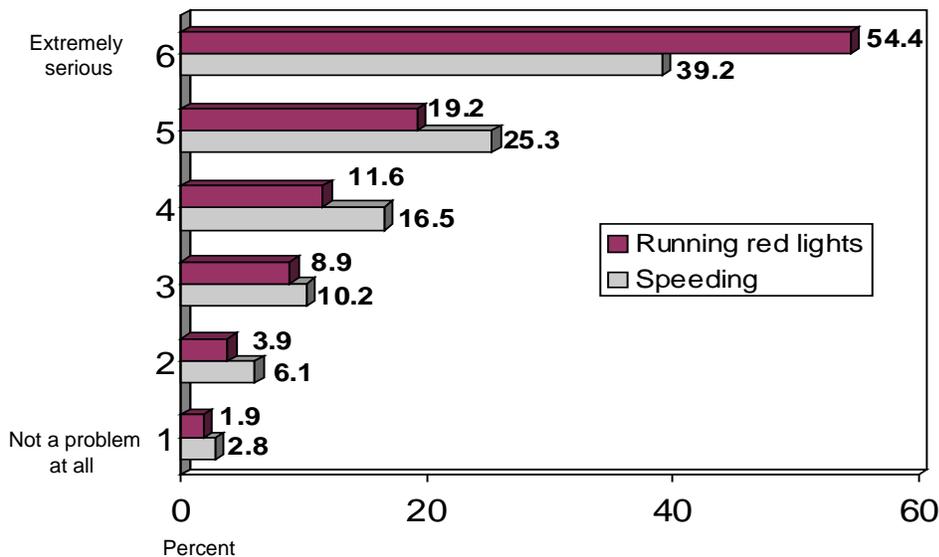
## Running Red Lights and Speeding

In addition to general perceptions of aggressive driving, respondents were asked to rate the perceived seriousness of two specific aggressive driving behaviours – i.e., speeding and running a red light – on a scale from 1 (not a problem at all) to 6 (an extremely serious problem). The results are presented in Figure 4, which shows how Canadians judged the problems of running red lights and speeding. Each bar represents the percent of respondents who rated the problem at that level of seriousness (from 1 to 6).

As can be seen, 74% of Canadians view running red lights as a serious problem. About 2/3 see speeding as a serious problem. Very few Canadians consider running red lights or speeding as not being a problem (5.8% and 8.9%, respectively gave them a rating of 1 or 2).

*74% of Canadians view red light running as a serious problem*

**Figure 4: Perceived Seriousness of Running Red Lights and Speeding**



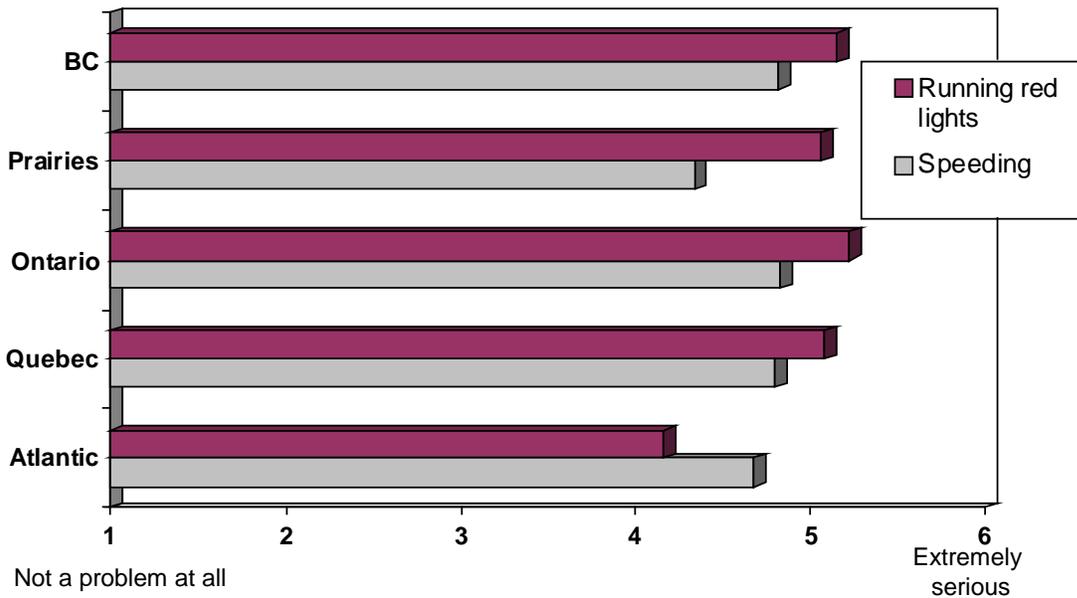
**Demographic differences.** Not all drivers see these behaviours as being equally serious. Women, drivers aged 55 and older, and those living in urban areas, see running red lights and speeding as more serious problems than do corresponding groups of men, younger drivers, and those living in rural areas.



In what might be an apparent attempt to rationalize their own behaviour, drivers who received a traffic ticket in the past 12 months were *less* likely than drivers who had not been issued a traffic ticket to judge running red lights and speeding as serious problems.

**Regional differences.** Perceptions of the seriousness of running red lights and speeding vary according to the region of Canada as well. Figure 5 shows the average perceived seriousness of running red lights and speeding in each of five regions of Canada. It can be seen that running red lights is generally perceived as a serious problem throughout Canada but drivers in Atlantic Canada view it as being somewhat less serious a problem than drivers in the rest of the country. Speeding is also perceived as a serious problem in all regions of Canada but drivers from the Prairies view speeding as a less serious problem than drivers in other parts of the country.

**Figure 5: Perceived Seriousness of Running Red Lights and Speeding by Region**



Of some interest, running red lights is perceived as a more serious problem than speeding in all regions of the country, except Atlantic Canada. As shown in Figure 5, drivers in Atlantic Canada view speeding as a more serious problem than running red lights.



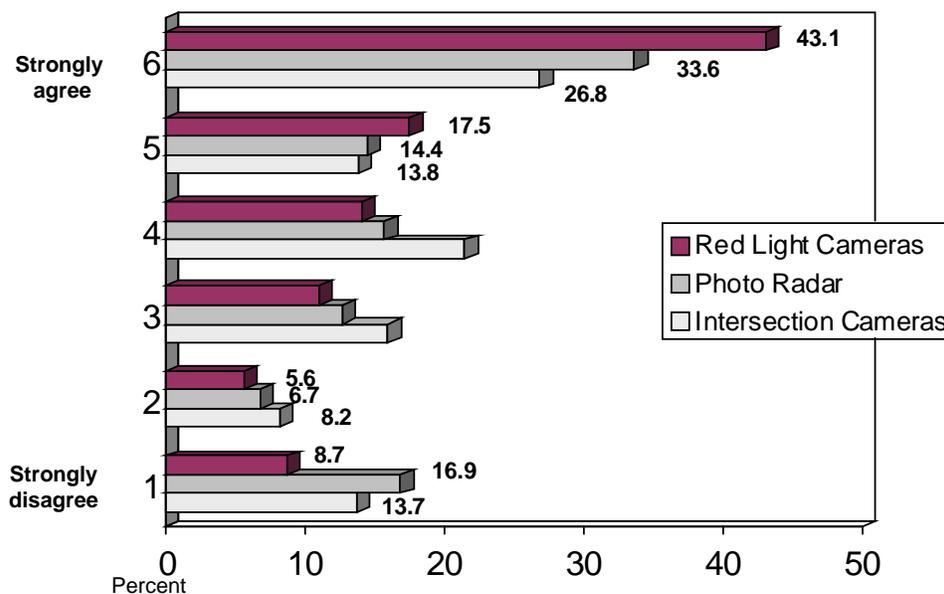
# Taking Action Against Running Red Lights and Speeding

Canadians think aggressive driving is a serious problem, and one that they frequently observe on the road, so it is informative to determine what actions they support to control the problem. Survey respondents were asked to indicate, on a scale of 1 (strongly disagree) to 6 (strongly agree), the extent to which they support a number of enforcement approaches to deal with aggressive driving.

They were initially asked if they supported greater enforcement of traffic laws by the police. Overall, 60% of Canadians agreed or strongly agreed there should be greater enforcement of traffic laws.

They were also asked to indicate their level of support for three different technological approaches for controlling speeding and running red lights – cameras to catch drivers who run red lights, photo radar to catch speeders, and cameras to identify and charge drivers who speed through intersections, even when the light is green or amber. The results are shown in Figure 6.

**Figure 6: Agreement with Enforcement Techniques**



Red-light cameras received the strongest endorsement, with 61% of Canadians strongly agreeing (a rating of 5 or 6) with the use of this technology. Nearly half (48%) of respondents strongly agreed with the use of photo radar, and 41% strongly supported the use of cameras to catch drivers speeding through intersections, even when the light is amber or green. This latter approach is relatively new and most drivers are not likely familiar with it.

Despite strong overall support for greater enforcement of traffic laws, there is some disagreement as well. For example, about 24% of Canadians disagreed (rating of 1 or 2) with the use of photo radar; 14% disagreed with red-light cameras; and 22% opposed the use of cameras to catch drivers speeding through intersections.

**Demographic differences.** Support for greater enforcement differs according to the characteristics of drivers. In particular, support for the use of all forms of traffic enforcement is strongest among women and drivers 55 years of age and over. Canadians who drive less and those who have not received any traffic tickets in the past twelve months are also more supportive of the various enforcement techniques. Not surprisingly, drivers who had been issued a traffic ticket are somewhat less supportive of greater enforcement, including the use of automatic cameras.

**Regional differences.** Canadians from different regions of the country support different forms of traffic enforcement. Drivers in Quebec are most strongly supportive of greater enforcement of traffic laws; drivers in British Columbia and the Prairies are least likely to support enhanced enforcement. These latter groups are also least supportive of photo radar and cameras at intersections to catch speeders. In contrast, drivers in Atlantic Canada are more favourably disposed to photo radar enforcement for speeders. Ontario drivers are the most supportive of red-light cameras.



# Bibliography —●

- American Automobile Association Foundation for Traffic Safety. (1998). *Opinion Research on Aggressive Driving*. Washington, D.C.: AAA Foundation for Traffic Safety.
- Beirness, D.J., and Simpson, H.M. (1997). *Study of the Profile of High-Risk Drivers*. TP-13108. Ottawa, Ontario: Transport Canada, Road Safety and Motor Vehicle Regulation.
- Chen, W., Cooper, P., and Pinili, M. (1994). Driver accident risk in relation to the penalty point system in British Columbia. *Journal of Safety Research* 26: 9-18.
- Galdabini, T.V. (1988). *Identification of High Risk Traffic Accident Populations in Washington*. Olympia, Washington: Washington Traffic Safety Commission.
- Grey, E.M., Triggs, T.J., and Haworth, N.L. (1989). *Driver Aggression: The Role of Personality, Social Characteristics, Risk and Motivation*. CR 81. Canberra, Australia: Federal Office of Road Safety.
- Hendricks, D.L., Fell, J.C., and Freedman, M. (2001). *The Relative Frequency of Unsafe Driving Acts in Serious Traffic Crashes*. Washington D.C.: National Highway Traffic Safety Administration.
- Hennessy, D. (1999). The influence of driving vengeance on aggression. In: *Proceedings of the Canadian Multidisciplinary Road Safety Conference XI, Paper 28*. Halifax, Nova Scotia: Canadian Association for Road Safety Professionals and Dalhousie University.
- IIHS Status Report. (1998). Road Rage. *IIHS Status Report*. 33 (10).
- Kiar, S. (1998). *Public Perceptions of Road Safety in Canada*. Ottawa, Ontario: Road Safety and Motor Vehicle Regulation, Transport Canada.
- Lawson, S. (1991). *Red-Light Running: Accidents and Surveillance Cameras*. Basingstoke, Hampshire: AA Foundation for Road Safety Research.
- Martinez, R. (1997). Speech Before Congress, July 1997. Washington, D.C.: National Highway Traffic Safety Administration.
- Mercer, G.W. (1989). Traffic accidents and convictions: Group totals versus rate per kilometre driven. *Risk Analysis* 9(1): 47-53.
- Ministry of Transportation of Ontario. (1995). *Photo Radar Safety Evaluation: Preliminary 4-Month Speed Results*. Ministry of Transportation, Ontario.



- Ministry of Transportation Ontario. (1998). *Ontario Road Safety Annual Report 1997*. Toronto: Ministry of Transportation Ontario.
- Mizell, L. (1997). Aggressive driving. In: *Aggressive Driving: Three Studies*. Washington D.C.: AAA Foundation for Traffic Safety.
- NHTSA. (1998). *Speeding. Traffic Safety Facts 1997*. Washington, D.C.: National Highway Traffic Safety Administration.
- NHTSA. (1998). *Strategies for Aggressive Driver Enforcement*. Washington, D.C.: National Highway Traffic Safety Administration. DOT HS 808 744.
- Retting, R.A., and Williams, A.F. (1996). Characteristics of red light violators: Results of a field investigation. *Journal of Safety Research* 27(1): 9-15.
- Retting, R.A., Ulmer, R.G., and Williams, A.F. (1999). Prevalence and characteristics of red light running crashes in the United States. *Accident Analysis and Prevention* 31(6): 687-694
- Retting, R.A., Williams, A.F., Farmer, C.M., and Feldman, A.F. (1999). Evaluation of red light camera enforcement in Oxnard, California. *Accident Analysis and Prevention* 31(3): 169-174.
- Retting R.A., Williams, A.F., and Greene, M.A. (1998). Red light running and sensible countermeasures: Summary of research findings. *Transportation Research Record* 1640, 23-26. Washington D.C.: Transportation Research Board.
- Retting, R.A., Williams, A.F., Preusser, D.F., Weinstein H.B. (1995). Classifying urban crashes for countermeasure development. *Accident Analysis and Prevention* 27: 169-174.
- Tasca, L. (2000). A review of the literature on aggressive driving research. Paper presented at the Global Web Conference on Aggressive Driving Issues, October 16 to November 30, 2000. Toronto, Ontario: Ontario Ministry of Transportation and Transportation Research Board.

