



VEHICLE SAFETY FEATURES:
KNOWLEDGE, PERCEPTIONS, AND
DRIVING HABITS



The knowledge source for safe driving

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 research 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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EXECUTIVE SUMMARY

- > This report contains the results of the Traffic Injury Research Foundation's (TIRF) investigation into Canadian drivers' perceptions of, attitudes towards, and familiarity with ten modern vehicle safety features: anti-lock braking systems (ABS), traction control, brake assist, electronic stability control (ESC), electronic brake-force distribution, adaptive headlights, collision warning systems, lane departure warning systems, brake override, and driver monitoring systems.
- > TIRF also investigated the effect of vehicle safety features on driving. Specifically, whether and to what extent different beliefs about safety features may influence some drivers to drive less carefully by engaging in one or more of six dangerous driving behaviours, including driving well over the speed limit, driving while distracted, driving while tired or fatigued, falling asleep at the wheel, drinking and driving, and failing to wear a seat belt.
- > A public opinion poll was developed and conducted by TIRF containing 120 items designed to explore a range of issues relating to vehicle safety features and driving habits. The majority of questions used a scale from one to six where six indicated high agreement, concern, or support and one indicated low agreement, concern, or support. A total of 2,506 Canadians completed the poll; 832 over the phone and 1,674 online.
- > Safety is a high priority for drivers making vehicle purchasing decisions. Consistent with results from other studies, drivers continue to cite safety as an important consideration when buying a new vehicle, along with price, reliability, and fuel efficiency.
- > With the exception of ABS and traction control, less than one-third of Canadian drivers reported being familiar with various modern safety features such as ESC, brake assist, adaptive headlights, and collision warning systems. In addition, it was found that male drivers tend to be more familiar with safety features than female drivers.
- > Despite the fact that many Canadians lack familiarity with several safety features, the majority of drivers nevertheless report that they believe safety features would be easy to use. Again, male drivers were found to be more likely to agree that safety features are easy to use than female drivers.
- > As drivers age, they are more likely to think that safety features will make them better drivers. In addition, drivers who agree that safety features will make them better drivers are also many times more likely to say that they would use a particular safety feature if their vehicle had it.
- > When asked whether they would drink and drive if their vehicle was equipped with modern safety features, 7.5% of Canadian drivers said that they would be likely or very likely to do so, compared to 3.2% who reported that they currently often drink and drive. These results suggest that some drivers are more willing to engage in what many consider to be the most serious road safety issue (i.e., drinking and driving) when they know that they have modern safety features on their vehicle.
- > Further examples of behavioural adaptation suggest that some drivers are more willing to engage in dangerous behaviours when they have safety features on their vehicle. More precisely, 13.1% of drivers said that they would be likely to tailgate others if their vehicle had safety features, while 20% said that they would be likely to drive while tired or fatigued if their vehicle had safety features. These self-reported frequency ratings represent telling increases from the number of drivers who currently admit to tailgating or driving while fatigued: 8.6% and 16.0% respectively.
- > In order to gauge whether Canadian drivers considered the possible negative effects of aftermarket accessories on the performance of their safety features, survey participants were asked a series of questions concerning their beliefs about aftermarket accessories. Over a third (33.8%) of Canadian drivers agreed that they assume aftermarket accessories like remote starters and floor mats are safe

because they are sold in-store. Also, nearly one-third (30.5%) of drivers said that they would buy an aftermarket accessory that was not designed for their vehicle.

- > When asked whether other drivers rely too much on vehicle safety features, 64.8% of Canadians agreed that other drivers rely too much on their safety features and do not pay enough attention to driving. This suspicion is supported by the number of drivers who revealed that they would engage in dangerous driving behaviours if their vehicle was equipped with modern safety technology.
- > When asked to rate their own driving in terms of safety, the most common self-rating was an eight out of ten (44.6%), three units higher than the most common rating Canadians gave to their fellow motorists (27.7% rated others a '5'). Thus, the majority of Canadian drivers feel that they are much safer than the average driver.
- > Less than half (40.3%) of Canadians agreed that safety features help protect drivers in the event of a collision, while only 46.4% agreed that safety features can help protect passengers in the event of a collision. Men and drivers who reported familiarity with safety features were more likely to correctly report that safety features offer more protection to vehicle occupants in the event of a crash.
- > A strong correlation was found between perceptions of the usefulness of safety features and the intention to use safety features if they are already on vehicles. Specifically, drivers who perceive safety features as useful are much more likely to report that they would use safety features if their vehicle already had them.
- > The foundation has been laid for several key areas where education is lacking and for further projects aimed at improving road safety. Significant knowledge gaps have been identified, specifically for the eight newer safety features included in the survey. Canadian drivers continue to form opinions concerning the ease of use and usefulness of safety features despite lacking important details concerning the purposes and limits of safety features. In addition, a very strong link was revealed between perceiving a safety feature as useful and being willing to use it. Thus, a large part of motivating drivers to use safety features includes helping them to understand when these safety features are useful and what they are designed to do.
- > Finally, the results of the survey expose the need for information regarding the safety of aftermarket accessories to be more widely disseminated and made more easily available to those who would buy aftermarket accessories. Specifically, drivers must be encouraged to purchase aftermarket accessories that are designed for their vehicles, and not to trust that these accessories are safe simply because they are sold in-store.

1.0 INTRODUCTION

Over the past few decades, advances in vehicle technology have painted an encouraging picture of safer roads in the future. Safety features are now available that address a wide variety of potentially threatening situations including low-visibility conditions, slippery road surfaces, accidental lane departure, and dangerous lateral swerving. Furthermore, safety system developers continue to work at reducing injuries to vehicle occupants in the event of a crash by enhancing current airbag and seat belt systems and by incorporating new whiplash prevention and head protection designs. In addition, since many safety features complement each other directly, they are often packaged and sold together in carefully planned combinations. The result is that each safety feature is able to offer more than its individual contribution to overall vehicle safety. For example, adaptive headlights can help drivers identify potential road hazards earlier than they would without this feature. If adaptive headlights are then combined with brake assist, drivers are not only able to see obstacles sooner, but are also more likely to be able to stop in time, avoiding a collision. Anti-lock braking systems (ABS) and electronic stability control (ESC) also complement each other in similar ways.

Many features have become more widely available as a result of research showing a range of positive benefits related to increases in driver safety. For instance, ESC has proven to be so beneficial since its introduction in 1995 that as of September 2011, all new passenger vehicles available for sale in Canada are equipped with ESC¹. As safety features become standard or optional on a wider range of vehicles, more data will become available on just how effective these technologies are at mitigating and preventing crashes. Nevertheless, estimates about the potential reduction in the number of crashes that are relevant to modern safety features are already very promising. The Insurance Institute for Highway Safety (IIHS) in the United States estimates that if all vehicles were equipped with side-view assist, adaptive headlights, forward collision warning, and lane departure warning, about one in three fatal and one in five injury crashes could be mitigated or avoided altogether (IIHS 2010). It has likewise been found that, in addition to reducing fatal single-vehicle crash risk by up to 49% and fatal multi-vehicle crash risk by 20% for cars and sport utility vehicles (SUV)s, ESC can reduce rollover risk by 75% for SUVs and 72% for cars (IIHS 2010). Thus, equipping as many vehicles as possible with modern safety features should translate to huge improvements in road safety generally.

However, despite these technological advances and promising test results, knowledge gaps still exist between those who design safety features and consumers who purchase and use new vehicles. Many Canadians do not fully understand what these new safety systems are designed to do and how they are designed to do it. Explanations in owner's manuals may sometimes be unclear, and car buyers do not always seek or receive an adequate explanation of how their safety features work upon buying a new vehicle (Page, Foret-Bruno, and Cuny 2005).

¹ www.tc.gc.ca/eng/acts-regulations/regulations-crc-c1038-sch-iv-126.htm

This general lack of information has consequences downstream for driver behaviour that can undermine the performance of safety features. Drivers may lack a clear vision of how their driving habits relate to the functioning of their safety features. This presents a significant problem, since driving habits directly affect how much benefit a driver can expect to accrue from having safety features. If people are willing to speed, drive when distracted, or drive when fatigued because of a sense of comfort instilled by the fact that their vehicle is equipped with up-to-date safety technology, they may inadvertently limit the potential benefits of those very features. The projected advantages for road safety will not be realized if drivers do not understand how the safety systems on their vehicles operate and how their driving habits affect the efficacy of those systems.

1.1 Purpose and objectives

Research in recent years has suggested that Canadians are, to some extent, unfamiliar with many modern vehicle safety features. In addition, studies and public opinion polls suggest that many Canadians are equally unfamiliar with how the effectiveness of modern safety features relates to driver behaviour and the road environment (Rudin-Brown et al. 2011; Rudin-Brown & Noy 2002). In light of the evidence demonstrating the benefits of these features, it is essential that drivers are well informed about the performance and limitations of safety features in order to achieve maximum benefits associated with them. It cannot be underscored enough that drivers will only accrue these benefits if the features are operating within proper parameters and drivers do not incorrectly over-estimate the effects of these features, or become over-reliant on them to mitigate poor driving behaviours. Thus, it is crucial that drivers are familiar with and understand the design, function, and typical responses of their safety features in different driving environments.

To fill this gap and increase knowledge and awareness among road users about vehicle safety features, the Traffic Injury Research Foundation (TIRF) has partnered with the Toyota Canada Foundation to develop a national education program to benefit all Canadians. This research-based program is being developed with input from road users and highlights important vehicle safety features, their respective benefits, and ways in which these features can be properly used in conjunction with safe driving practices in the variable road conditions that drivers experience throughout the year.

As a first step in this process, TIRF conducted an opinion poll to explore knowledge, opinions, and perceptions of Canadians in relation to the use of key safety features. Conducted online and over the phone, the results from the survey support preliminary concerns that a general lack of knowledge about safety features may contribute to a decline in driver performance, and thus negatively affect the potential benefits of those safety features.

The present report summarizes the findings from the opinion poll conducted between November 2011 and January 2012. The purpose of the report is to expose key knowledge gaps among Canadian drivers; to measure perceptions of the usefulness and ease of use of modern safety features; to estimate the extent

to which drivers modify their behaviour in response to safety features; and to measure driver awareness of some factors that may negatively effect safety feature performance.

The objective of this project is to present a thorough assessment of Canadian drivers' attitudes towards safety features and corresponding adaptive behaviours so that a foundation may be set for further research to close the knowledge gap between those people who design and engineer safety features on the one hand, and the drivers who purchase and use those safety features on the other. It is anticipated that road safety can be greatly improved by focusing on the often-overlooked intersection between driver behaviour and the performance of vehicle safety features.

1.2 Background

In order to gain a clear picture of the extent to which driver behaviour may work against the presumed goal of safety on the road, it is important to have a sense of the level of importance drivers place on vehicle safety. If safety is a high priority for drivers and it is found that they are acting in ways that undermine this priority, then there is a need for safety researchers to expose this gap and why it occurs in order to better align driver priorities and behaviours. With safety as a motivating concern, information disseminated on how to properly utilize safety features should receive substantial uptake, and given sufficient time, it can be expected that drivers will modify their behaviour to the extent that they value their own safety and the safety of roadways generally.

With some notable exceptions (DesRosiers 2002), results of research on the influence of safety considerations on vehicle purchases have shown that car buyers place a high priority on safety when purchasing a new vehicle (Rudin-Brown et al. 2011; Anaby and Vrkljan 2011; Koppel et al. 2008; MORI 2005). However, some studies have found that drivers adapt their behaviour in ways that have negative effects on the performance of safety features (DesRossier 2002). At first, this result may appear problematic because it seems inconsistent to claim that drivers both value and work against vehicle safety features. However, studies have suggested that underlying psychological factors and processes – such as trust in automation, background assumptions, and risk modification – can influence drivers to act in ways that run contrary to their expressed interests in safety and collision avoidance. It is therefore not inconsistent to say that drivers prioritize safety while at the same time their actions undermine it.

1.2.1 Safety as a priority of car-buyers

Several studies have examined the considerations that influence vehicle purchasing decisions. Factors like price, safety, reliability, performance, and fuel consumption have all been shown to sway car-buying towards some vehicles and away from others (Rudin-Brown et al. 2011; Vrkljan and Anaby 2011; MORI 2005; Koppel et al. 2008). Many of these studies also set out to gauge how consumers conceptualize safety (Koppel et al. 2008), where they go to find safety information (Vrkljan and Anaby 2011; Koppel et al. 2008, MORI 2005), and whether factors like age and gender influence how drivers prioritize safety (Vrkljan and Anaby 2011; Koppel et al. 2008; MORI 2005).

Safety has not always come out near the top of car-buyer concern. In the past, safety seems to have been trumped by price, appearance, and reliability (Koppel et al. 2008; DesRosier 2002). One study in particular found that when asked what three vehicle-related factors most affect their choice of a particular model of vehicle, safety ranked ninth on average, behind reliability, performance, price, fuel economy, comfort, interior space, cost of maintenance, and resale value (DesRosiers 2002). The author of the study suggested that the steady number of road crashes, despite technological advances in the realm of vehicle safety, pointed to driver behaviour as the biggest road safety problem. The study claims that safety features are taken for granted in vehicles, and tend to form the foundation of a “false sense of security” that prompts drivers to flout road rules and drive less cautiously (DesRosiers 2002). However, while driver behaviour is undoubtedly a significant and ongoing factor in road safety or the lack of it, the results of this study may not accurately reflect consumer and driver views about vehicle purchasing decisions. It is not clear how participants were recruited in the study, nor how many participated. Since so little is known about how the information was gathered, the extent to which the findings are representative is unclear.

Other more recent studies have found that safety is a very important consideration in vehicle purchasing decisions (Rudin-Brown et al. 2011; Vrkljan and Anaby 2011; Koppel et al, 2008; MORI 2005). Research has suggested that safety, reliability, and price often compete for the top spot on a car buyer’s list of concerns. Vrkljan and Anaby found that safety had the highest importance rating among Canadian drivers with the exception of reliability (Vrkljan and Anaby 2011). Another 2008 study of Swedish and Spanish drivers who had recently purchased a new car found that vehicle safety is the most important consideration in the process of purchasing decisions (Koppel et al. 2008). The report associated with a recent Transport Canada opinion poll also showed that safety is one of the top priorities of car-buyers, coming in second place behind fuel consumption (Rudin-Brown et al. 2011). Finally, as will be shown later, TIRF’s most recent findings also reveal that safety continues to be a high priority for Canadians purchasing a new vehicle. Overall, safety has been shown to be of high importance in vehicle purchasing decisions.

Many of these studies also looked at key demographic parameters such as age and gender typically associated with ranking vehicle safety as a high or low priority (Rudin-Brown et al. 2011; Vrkljan and Anaby 2011; Koppel et al. 2008). Findings in this area also converged between the studies. With age, the importance attributed to safety when purchasing a vehicle tends to increase, with the exception of male drivers aged 55-64 where a slight decrease in the reported importance of safety is noted (Vrkljan and Anaby 2011). Across all age groups, women rate safety as more important than men (Vrkljan and Anaby 2011; Koppel et al. 2008). Women also tended to rate safety similarly across their driving lifespan, whereas men showed a more or less steady increase in their appreciation of vehicle safety (Vrkljan and Anaby 2011). Young male drivers tended to rate other factors like performance above safety, and viewed safety as less important than all other age and gender groupings.

Vehicle purchasers must navigate a series of difficult trade-offs between many different aspects of a vehicle, and there is limited information on how consumers balance safety against these other considerations (Koppel et al. 2008). In addition, there are certain aspects of vehicle purchase where consumer choice is

ruled out. For example, financial and functional constraints may limit the scope of an individual consumer's choice of vehicle (Koppel et al. 2008; MORI 2005). Fortunately, as modern safety features become more prevalent and as more of these features are made standard on vehicles, the cost of these features and their reparations is likely to decrease. This should make the trade-off with price less demanding.

While the need for trade-offs between competing values is unlikely to disappear, coming to an informed decisions vis-à-vis purchasing a vehicle can be made easier if the decision-maker is well-informed. Studies agree that more effective ways of disseminating safety information are needed in order to help drivers make more informed choices about how to balance trade-offs between competing values (Vrkljan and Anaby 2011; Koppel et al. 2008). It may also be necessary to target specific groups like young male drivers and older female drivers in order to help make the link between vehicle safety and crash prevention clearer (Vrkljan and Anaby 2011; Koppel et al. 2008).

1.2.2. Behavioural adaptation and risk homeostasis

While drivers seem to value vehicle and road safety, a concerning trend seems to be emerging that shows drivers modify their driving habits in response to the knowledge that their vehicles are equipped with safety features. Studies have explored this phenomenon (Rudin-Brown et al. 2011; DesRosiers 2002; Rudin-Brown and Noy 2002), and offered theoretical explanations as to why drivers who value safety may be inadvertently undermining it (Rudin-Brown et al. 2011). Two theories in particular – behavioural adaptation and risk homeostasis – have received significant uptake in the road safety community, and it is worth reviewing those two theories briefly in order to provide further context for the overall purpose and objectives of this project.

Behavioural adaptation

Behavioural adaptation is often cited as the reason for the differences between engineer estimates about the benefits of vehicle safety features and the actual, real-world benefits that are accrued (Rudin-Brown and Noy 2002). Behavioural adaptation is variously defined, but in the context of road safety research, it is "mainly associated with unexpected or unanticipated behavioural changes that may appear in response to the introduction of a change in the traffic system and which may (more or less) jeopardise its expected safety benefits" (Cacciabue and Saad 2008). In other words, behavioural adaptation refers to ways that a driver may modify his or her driving habits in response to new information about traffic and vehicle safety measures that he or she thinks influence crash risk. The problematic end-result is that some drivers may drive less carefully because they believe themselves to be safer. For example, knowing that she has ABS on her vehicle, a driver may adapt her behaviour in response to the decreased crash-risk she assumes comes with having ABS. This behavioural adaptation may include such behaviours as driving faster than she would have driven without ABS, following other cars more closely, or driving in inclement conditions that normally would have prompted her to stay home.

Theories of behavioural modification emphasize that engineering measures alone may not be enough to guarantee safety increases, and that human responses to safety measures may have the greatest influence

on whether technological advances translate to improvements in road safety. Of primary concern for road safety researchers is the extent to which drivers may modify their behaviour in ways that negate the benefits of technological advances in vehicle safety. To illustrate, Underwood et al. cite a study from 1980 where the effects of helmet-use on motorcycle safety in Nigeria was investigated (Underwood et al. 1993). The study found that despite a helmet wearing rate of 96%, a 171% increase in fatalities and a 55% increase in injuries occurred over a two-year period after the implementation of a law mandating the use of helmets (Underwood et al. 1993). Underwood et al. concluded that the reason for the substantial increase in crash-related injuries and fatalities among motorcycle drivers was that the drivers overestimated the protective effects of helmets, and increased their risk-taking as a result (Underwood et al. 1993).

The factors influencing behavioural modification are hard to pin down, and are often directly associated with individual driving habits. Many of the factors are deeply subjective and rooted in psychological aspects of the driver that will be beyond the influencing reach of road safety professionals. For example, subjective and vague factors like “driving style”, examples of which include a driver’s tendency to change lanes more or less frequently, follow other cars more or less closely, and travel faster than or with surrounding traffic, tend to play a significant role in the overall level of behavioural modification observed (Cacciabue and Saaf 2008).

Attempts have been made to construct models of behavioural adaptation that limit the influence of factors that are vague or difficult to measure. Rudin-Brown and Noy (2002) have advanced a qualitative model of behavioural adaptation suggesting that the extent to which drivers modify their behaviour is dependent on psychological characteristics including their tendency to trust automation, their sense of “locus of control”, and their propensity towards sensation-seeking (Rudin-Brown and Noy 2002).

Drivers are not discouraged from trusting automation; however this trust is not always realistic. The type of trust in automation that is of particular interest to road safety researchers is false trust: where drivers rely too much on a safety feature and as a result decrease their overall alertness and situational awareness. Rudin-Brown and Noy claim that false trust is one of three psychological factors that contribute to making negative behavioural adaptation more likely (Rudin-Brown and Noy 2002). In addition to false trust, Rudin-Brown and Noy suggest that a driver’s “locus of control” also influences his or her disposition towards negative behavioural adaptation (Rudin-Brown and Noy 2002). Loci of control are defined as being either internal or external. An internal locus of control describes a driver who feels like his behaviour is the major decider of future outcomes, whereas someone whose locus of control is rooted externally is more likely to attribute events to fate or luck. Drivers with an external locus of control may become less involved with the driving task, and more likely to rely on their safety measure to keep them safe (Rudin-Brown and Noy 2002). Finally, sensation-seeking is defined as the disposition towards experiencing new and different sensations, resulting in the willingness to take more risks.

Rudin-Brown et al. tested the model that false trust in automation, external loci of control, and sensation-seeking are all correlated to some extent with behavioural adaptations that have a negative overall

influence on road safety. The researchers used lane-departure warning technology to test the model, and found that at least some drivers altered their behaviour depending on their self-reported level of trust in automation, locus of control, and disposition towards sensation-seeking (Rudin-Brown and Noy 2002).

Risk homeostasis

Developed by Gerald Wilde in 1982, the theory of risk homeostasis refers to a specific type of behavioural adaptation, and attempts to account for a driver's changes in driving behaviour in terms of a trade-off between risks and rewards (Wilde 1982). Broadly, risk homeostasis is the theory that drivers will respond to measures that reduce their risk of collision by modifying their driving habits in ways that bring that level of risk back up to what it was before the initial risk-reducing measure. So, when drivers take fewer risks in one way (e.g., by driving with safety features), they will take more risks in another way (e.g., by driving less safely). As a result, according to the model, risk level tends to stay the same no matter what safety features are put in place to try to reduce it.

Risk homeostasis has been the topic of some debate, and has attracted controversy for a variety of reasons (Underwood et al. 1993). First of all, the theory predicts that there will be no change overall in the number of crashes, since the level of crash-risk remains in steady equilibrium. This prediction has proven to be false, since the development of safety systems and various other safety-awareness campaigns have helped to reduce the number of crashes. Second, some explications of risk homeostasis seem to suffer from the need for drivers to be able to quickly and accurately assess the level of risk they face at a given time. Calculating risk-level like this is a demanding process, and likely not something that drivers would be capable of doing continuously. The empirical and conceptual claims put forth by the theory of risk homeostasis have been questioned, and those who wish to retain the theory of risk homeostasis have been urged to develop a more nuanced version of the theory that responds to some of its traditional problems.

More refined models of the theory of risk homeostasis have been presented since its development three decades ago. Underwood et al.'s model of risk compensation is careful to emphasize that in order to rationalize an increase in risk, drivers must feel like they are benefiting in some other way. To illustrate, safety technologies like brake assist make it easier for drivers to stop during episodes of emergency braking. Therefore, having brake assist lowers the risk of being involved in a head-on collision. In response to this lowered risk, the behavioural theory of risk compensation claim that drivers may respond by engaging in other behaviours (e.g., speeding) that increase risk of being involved in a collision to approximately the same level of risk they were at before the addition of brake assist. Again, Underwood et al. mention that risk compensation occurs when a driver feels that they can increase the amount of net gain (e.g., getting to their destination sooner, experiencing the thrilling sensation of high-speed), yet maintain an acceptable level of risk. As can be seen, the net effect of risk compensation is that overall road safety is not increased but instead remains relatively stable or even decreases.

The effects of risk compensation have been illustrated by reviewing case studies. In addition to the aforementioned case of helmet use among motorcyclists in Nigeria, the theory of risk compensation

has received support from research on the overall effect of seat belt use on road safety. Underwood et al. cite a study conducted in 1982 that compared the road crash fatality rates in thirteen countries that legislated the use of seat belts and four countries that did not. No significant difference in fatalities was noted (Underwood et al. 1993). The theory of risk compensation can help explain this lack of road safety improvement. Drivers were made aware of the promised benefits of seat belt use and, as a result, may have raised their risk-taking in hopes of achieving a greater gain at a risk that is perceived to be lower than it would be to achieve that same gain without the use of seat belts (Underwood et al. 1993).

Manipulating driver psychology and reducing instances of negative behavioural adaptation is no doubt outside the scope of road safety engineers' focus. The most prudent way to respond to behavioural adaptation may be to account for it in the conceptual, pre-development stages of road safety technology design (Cacciabue and Saad 2008). It may also be necessary to advertise safety features differently to reduce instances of false trust in automation (Underwood et al. 1993). The foundation for any effective strategy for dealing with behavioural adaptation is a more thorough understanding of the individual, psychological, and cultural factors associated with behavioural adaptation.

By exposing and investigating cases of detrimental behavioural modification, the present report represents an important step towards the overall goal of understanding how driver psychology interacts with advances in vehicle safety technology.

1.3 Overview

The report has been structured according to the following layout: in Section Two, a description of the methods used to collect information and calculate trends is presented. This section includes information about the survey administered to Canadian drivers, information about the response-rate, and details regarding the statistical accuracy of the findings contained in the rest of the report.

Section Three focuses on drivers' current and past perceptions of road safety. More precisely, survey participants were asked to rate the severity of twelve road safety issues (including speeding, drinking drivers, and distracted drivers) on a scale of one (not serious at all) to six (very serious). The results of this assessment of current perceptions of road safety are also compared to how Canadians rated those same issues in the past. The report has been structured so that information about the perceptions of road safety is presented before findings concerning familiarity with safety features and driving behaviour. This has been done in order to provide the reader with more context on the topic of perceptions of road safety generally. For example, if drivers turn out to be unconcerned about many road safety issues, then this will colour how later findings about driver behaviour and perceptions of safety features are understood. If few drivers are concerned about road safety and road safety issues, it may not be surprising if they do not know very much about safety features, and/or report an increased willingness to drive less safely with safety features on their vehicle. In addition, when determining whether behavioural adaptation is present, it is important to first understand how drivers perceive their crash-risk and their overall sense of security on the road. Once

the level of concern over road safety is clear, a more nuanced investigation of driver familiarity, perceptions, and behaviours in relation to vehicle safety features can be conducted.

The fourth section of the report contains data pertaining to the level of familiarity with safety features among Canadian drivers, their perceptions on how easy safety features are to use, their beliefs about whether or not safety features will make them better drivers, and whether they report a willingness to use safety features if their vehicles were already equipped with them. The objective of this section is to thoroughly examine the current state of familiarity with ten common safety features and to gauge driver attitudes towards safety features more generally. Logistic regression and other data analysis techniques were used to identify any relationships that exist between, for example, familiarity with safety features and perceived ease of use. In addition, data were further analyzed to check for any demographic patterns amid familiarity with, perceptions of, and attitudes towards vehicle safety features.

The fifth section of the report outlines findings concerning driver behaviour in response to the knowledge that drivers have of vehicle safety features. Specifically, section five seeks to estimate the level of behavioural adaptation that may be occurring among Canadian drivers in light of advances in vehicle safety technology. Contrasts with perceptions of road safety (section three) are made, and relationships between behavioural adaptation and perceptions of safety features are explored.

Finally, Section Six contains data collected about how Canadian drivers perceive and act towards two factors that can potentially undermine the proper functioning of vehicle safety features: warning lights on the dashboard of their vehicle, and the purchasing of aftermarket accessories. The goal of investigating these two factors is to measure how much Canadian drivers rely on their safety features to work, irrespective of any confounding variables that may indicate (in the case of warning lights) or cause (in the case of aftermarket accessories) decreases in the overall effectiveness of their safety technology. Again, demographic trends and other relationships were sought and measured.

2.0 METHODS

A public opinion poll was developed and conducted by TIRF to probe familiarity, attitudes, and concerns of Canadians in relation to the use of key safety features in Canada and safe driving practices. The survey contained 120 items designed to explore a range of issues including familiarity with different features, perceptions about their use, and the effects of these features on driving.

The majority of the questions were answered using a scale from one to six where six indicated high agreement, concern, or support and one indicated low agreement, concern or support. The survey required an average of approximately 25 minutes to complete.

A portion of all respondents were contacted by telephone and the other portion on-line. Opinion Search Inc. fielded this survey between November 2011 and January of 2012 to a random sample of Canadian motor vehicle drivers who have driven in the past 30 days and have a valid driver's licence. To ensure bias due to refusal to participate was kept to a minimum when the survey was introduced, it was explained that personal information would be kept confidential and the answers would be treated anonymously. Sponsorship was revealed such that participants knew that the nature of the survey was non-commercial.

A portion of the survey was administered on-line. Among the 5,516 invitations to participate, 3,842 (69.7%) did not complete the survey. The other portion of the survey was administered by telephone. Among the 4,608 households contacted by phone in which a person was asked to participate, 3,445 (74.8%) refused or terminated the interview and 331 (7.2%) were not qualified. Note that those who refused include respondent and household refusals as well as company refusals. Also, it warrants mentioning that general population survey response rate results according to the Marketing Research & Intelligence Association (MRIA) definition show a general downward trend. Average response rates for 2005/2006 were estimated to be between 10% and 12% (MRIA 2006), so the response rate for this survey was above this range.

A total of 2,506 Canadians completed the poll. Some respondents were contacted by phone (832) and some on-line (1,674). The national sample was stratified by province and weighted according to gender and age to avoid bias. The data were analyzed taking account of the stratified and weighted sampling design to ensure the results were representative of the national population (see StataCorp. 2010 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 2.0%, 19 times out of 20.

3.0 PERCEPTIONS OF ROAD SAFETY

In order to gauge how concerned Canadian drivers are about road safety issues and road safety more generally, TIRF inquired about attitudes towards particular road safety issues, and asked drivers to rate themselves and others in terms of safety. Attitudes towards current road safety issues are compared to previous years in order to assess any trends in the levels of concern expressed over particular issues. This comparison is based on data retrieved from TIRF's *Road Safety Monitor*, an annual public opinion survey designed to take the pulse of the nation on key traffic safety issues and track changes in the opinion and concerns of Canadians.

In this report, results concerning the perceptions of road safety are presented first in order to supply the reader with more context on overall public concern for road safety. Furthermore, many of the findings presented later in this report are bolstered in light of current perceptions of road safety. For example, conclusions concerning the level of behavioural adaptation that occurs in response to developments in safety technology must be based on an evaluation of the level of risk perceived by Canadian drivers. If Canadians are concerned about a particular road safety issue, e.g., excessive speeding, and yet demonstrate an increased willingness to speed if they have safety features on their vehicles, then the conclusion that behavioural adaptation is responsible for an increase in instances of speeding will be stronger. Without the antecedent information about how concerned Canadians are about speeding, other factors besides behavioural adaptation could also explain a reported increased willingness to speed (e.g., drivers do not think speeding is inherently dangerous).

3.1 Is safety a priority for car-buyers?

In order to gauge whether safety is a priority for car-buyers, survey participants were asked to list the top three things they consider when purchasing a vehicle. Answers from the respondents were condensed into 25 categories. The most frequently reported answer that was listed first was the price of the vehicle (29%) followed by safety (15.6%), and fuel consumption (13.2%). These top three answers are consistent with findings from other studies on what drivers cite are the most important considerations in vehicle purchasing decisions (Vrkljan and Anaby 2011; Koppel et al. 2008; MORI 2005). Other answers given were all under 10% and included such things as reliability (6.1%), the vehicle type or size (4.4%), its appearance (3.9%), and the reputation/rating of the vehicle (2.1%).

Logistic regression was used to investigate any patterns that may exist between various demographic variables and what drivers first report as their top consideration when buying a vehicle.

With respect to price, logistic regression revealed that driving more kilometres in a typical month significantly decreases the likelihood of listing price as a top priority when purchasing a vehicle. More precisely, with every extra 500 kilometres driven per month, the chances of drivers listing price as a top priority when purchasing a vehicle decrease by 13.1%. It was also found that as age increases, the

likelihood of listing price as a top priority when purchasing a vehicle decreases. It was found that with every ten year increase in age, the chances of listing price as a top priority when purchasing a vehicle decrease by 11.5%.

With respect to safety, it was found that with every ten year increase in age, the chances of listing safety as a top priority increase by 13.9%. Logistic regression also revealed that being male significantly decreases the likelihood of listing safety as a top priority when purchasing a vehicle. To illustrate, among females, 19.4% listed safety as a top priority when purchasing a vehicle, while among males, only 11.4% listed safety first (see Table 3.1.1).

Safety as top priority			
Gender	No	Yes	Total
Female	80.6%	19.4%	100.0%
Male	88.6%	11.4%	100.0%
Total	84.4%	15.6%	100.0%

Table 3.1.1: Safety as a top priority by gender

No significant effects with demographic variables were found when analyzing data regarding fuel consumption as a top priority.

With regards to reliability, logistic regression revealed that driving more kilometres in a typical month significantly increases the likelihood of listing reliability as a top priority when purchasing a vehicle. More specifically, with every extra 500 kilometres driven per month, the chances of listing reliability as a top priority when purchasing a vehicle increase by 10.9%. It was also found that with every ten year increase in age, the chances of listing reliability as the top priority when purchasing a vehicle increase by 50.9%.

When looking at vehicle type or size, it was found that as age increases, the chances of listing vehicle type or size as a top priority also increase. More precisely, with every ten year increase in age, the likelihood of listing vehicle type or size as the priority when purchasing a vehicle increases by 22.5%.

Finally, regarding the power or performance of the vehicle, logistic regression revealed that being male significantly increases the likelihood of listing this as a top priority. To illustrate, among males, 3.7% listed the power or performance of the vehicle as the top priority when purchasing a vehicle, while among females, this percentage was nearly half the size at 1.7% (see Table 3.1.2).

Power/performance as top priority			
Gender	No	Yes	Total
Female	98.3%	1.7%	100.0%
Male	96.3%	3.7%	100.0%
Total	97.4%	2.6%	100.0%

Table 3.1.2: Power or performance as a top priority by gender

3.2 How concerned are Canadian drivers about road safety issues?

To investigate more closely the specific issues that Canadians viewed as a serious problem, twelve traffic safety issues were rated on a scale from one (not a problem at all) to six (extremely serious problem). Respondent were described as being concerned about an issue if he or she rated each issue as a five or a six.

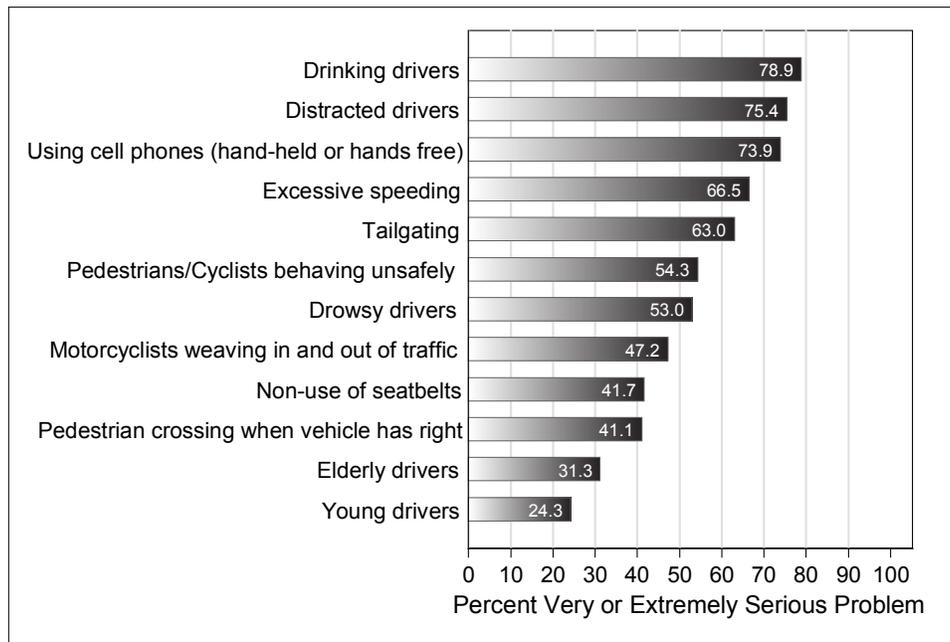


Figure 3.1: Current perceptions of the severity of road safety issues

As can be seen in Figure 3.1, the issue that Canadians consider to be the most serious traffic safety issue is drinking drivers, with 78.9% rating this as a very or extremely serious problem. The second highest rating of concern was for distracted drivers, with 75.4% of respondents citing this as a very or extremely serious problem. The third most concerning road safety issues for Canadian drivers is cell phone use, either hand-held or hands-free, with 73.9% of survey respondents claiming it was a very or extremely serious road safety issue. In fourth place is excessive speeding (66.5%), fifth is tailgating (63%), sixth is pedestrians or cyclists behaving unsafely (54.3%), and seventh is drowsy drivers (53%). The remaining road safety issues each had less than the majority of respondents citing it as a very or extremely serious problem, and were ranked in the following order: motorcyclists weaving in and out of traffic (47.2%), non-use of seat belts (41.7%), pedestrians crossing when the vehicle has the right of way (41.1%), elderly drivers (31.3%), and young drivers (24.3%).

3.3 How do drivers rate their fellow motorists in terms of safety?

Perceptions of road safety can also be gauged by asking drivers to rate the safety level of their fellow motorists. Canadians were asked to rate how safe the average driver is on a scale of zero (not safe at all) to ten (very safe). The mean rating for the average driver was found to be 6.1. The three most common

ratings were five (27.7%), six (20.4%), and seven (25.7%). Thus, most Canadians believe that the average driver on the road is moderately safe.

Logistic regression was performed to investigate the profiles associated with high or low safety ratings of other motorists, however no significant results were found.

3.4 How do drivers rate themselves in terms of safety?

Canadians were also asked to rate how safe of a driver they are on a scale of 0 (not safe at all) to ten (very safe). The average rating in this case was 7.6, with the most common rating being an eight (44.6%), followed by seven (27.7%). Canadian drivers rate themselves as much safer than the average driver, with most placing themselves in the highly safe range. This suggests that many drivers either rate the safety level of others too low, or rate their own level of overall safety too high.

Logistic regression was performed to investigate the profiles associated with drivers who rated themselves high or low in terms of safety. When examining age and gender differences in self-ratings of driver safety, no significant difference in means was found.

3.5 Do drivers think that others rely too much on their safety features?

Survey participants were asked whether they agreed that other drivers rely too much on their safety features and do not pay adequate attention to their driving. Nearly two-thirds (64.8%) agreed or strongly agreed with this, suggesting that Canadians are aware of the limitations of safety features and realize that having safety features does not make up for unsafe driving. That the majority of drivers feel that others are relying too heavily on their safety features also supports the observed tendency to rate other drivers lower in terms of safety.

Logistic regression was performed to investigate the profile of those who agreed or strongly agreed that some drivers rely on the safety features in their vehicles too much and do not pay enough attention to their driving. The analysis revealed that driving more kilometres in a typical month significantly increases the likelihood of reporting that some drivers rely too much on the safety features in their vehicles, with an odds ratio slightly greater than one. More precisely, with every extra 500 kilometres driven per month, the chances of reporting that other drivers rely too heavily on their safety features increase by 6.6%.

3.6 How have perceptions of road safety issues changed over time?

Every year since 2001, TIRF has published the *Road Safety Monitor* (RSM), an annual public opinion survey designed to take the pulse of the nation on key traffic safety issues and track changes in the opinions and concerns of Canadians. Survey participants are routinely asked to gauge the seriousness of particular driver behaviours and road safety issues. The results of the survey allow researchers to gain a better understanding of public concern, and shed light on what particular issues are viewed by drivers as posing the greatest threat to driver safety.

Drinking drivers

In TIRF's most recent poll, 78.9% of Canadians said that drinking drivers were a very or extremely serious road safety issue. While this statistic is consistent with previous findings that Canadians generally take drinking and driving very seriously, the number of people citing drinking drivers as a significant road safety issue has decreased slightly since previous years. The high point for concern over drinking drivers was in 2007, with 87.1% of Canadians viewing it as a very or extremely serious problem. This was a slight increase since 2006, when the number was 85%. Throughout 2008, 2009, and 2010 a steady level of concern amid Canadian drivers about drinking drivers was seen, with 84.1%, 84.4%, and 84.5% respectively viewing it as a very or extremely serious road safety issue. In 2005, the average rating from one (not a problem at all) to six (a very seriously problem) for drinking drivers was 5.5.

Distracted drivers and cell phone use

Distracted driving came a close second on the list of the most concerning road safety issues in 2012, right behind drinking drivers, with 75.4% of respondents saying distracted driving was a very or extremely serious road safety concern. The concern over distracted driving has increased steadily over the years, likely due in part to the growing media attention on the dangers of distracted driving. In the RSM published in 2010, distracted driving was ranked as the sixth most concerning road safety issue, with 76.6% of respondents viewing it as a very or extremely serious problem. Over the years, TIRF has reported growing public concern over distracted driving, with the level of concern increasing from 41% in 2006, to 61.7% in 2008.

Like distracted driving, the issue of cell phone use has received unprecedented media attention over the past few years. TIRF's most recent findings suggest that cell phone use is still a significant road safety issue, coming in third place with 73.9% of respondents considering it a very or extremely serious problem. This marks another step in a steady increase of concern over this road safety issue. In 2010, 72% of Canadians surveyed were similarly concerned. In 2006, 61% of Canadians perceived cell phone use as a very or extremely serious road safety issue, with this number climbing to 66.4% in 2007 and then falling back to 60.1% in 2008.

Excessive speed

The issue of excessive speed has consistently ranked as a moderately high road safety concern on the radar of Canadian drivers and attitudes towards it have remained relatively constant. Most recently, 66.5% of Canadian drivers surveyed categorized excessive speed as a very or extremely serious road safety concern. This is down slightly from 71.8% in 2010, but is consistent with findings from 2008 (66.2%), 2007 (67.9%), and 2006 (63%). Overall, concern over excessive speeding on roadways has not changed very much over the years, and has remained high on the list of drivers' safety concerns.

Tailgating

TIRF asked Canadian drivers where they thought tailgating ranked in terms of road safety issues. This was the first time that tailgating was presented in this fashion, so there are no data from other years available

to show a pattern of concern on this topic. However, in 2012 a strong majority (63%) did cite tailgating as a very or extremely serious road safety concern.

Cyclists and pedestrians behaving unsafely

Driver attitudes towards cyclists and pedestrians behaving unsafely have been the subject of few TIRF surveys. Results from the 2011 survey found that 54.3% of respondents said that cyclists and/or pedestrians behaving unsafely are very or extremely serious road safety concerns. In 2008, drivers were asked how they felt about pedestrians and cyclists behaving dangerously, but pedestrians and cyclists were considered separately. The results were fairly consistent with, but slightly lower than TIRF's current findings, with 47% and 42.6% of respondents respectively citing cyclists and pedestrians behaving badly as a very or extremely serious road safety issue.

In TIRF's most recent survey, participants were asked specifically to rank the seriousness of pedestrians crossing the street when the vehicle has the right of way as a road safety issue. A significant 41.1% of drivers saw this as a very or extremely serious road safety concern. This figure is consistent with the findings from the 2008 survey – the only other time drivers were asked specifically about pedestrians behaving unsafely. Then, 42.6% saw this as a very or extremely serious issue.

Drowsy drivers

Public concern over drowsy driving has slightly decreased from past years. TIRF's most recent survey found that 53% of Canadian drivers responded that drowsy driving was a very or extremely serious road safety issue. In 2008, when asked the same question 54.1% of respondents were concerned about drowsy driving, which is down from 56.1% in 2007, and down further from 58% in 2006. In 2005, the average rating out of six for the severity of drowsy driving as a road safety concern was 4.7.

Motorcyclists behaving unsafely

Canadian drivers were asked in TIRF's more recent poll and in 2008 to rank where motorcyclists behaving unsafely falls on the spectrum of road safety concerns. Although not many data are available on this issue, concern over motorcyclists behaving dangerously seems to have decreased since 2008, from 55.3% citing it as a very or extremely serious problem to 47.2% currently citing the same thing.

The non-use of seat belts

The most recent year marked the first time that survey participants were asked to rank the seriousness of the non-use of seat belts as a road safety issue. Nonetheless, it proved to hold a significant place in the opinion of many Canadian drivers, with 41.7% citing the non-use of seat belts as a very or extremely serious road safety concern. However, this concern may turn out to be unfounded. In the same survey, drivers were asked about their own seat belt use. A very promising 95.5% of respondents indicated that they often or very often wear their seat belts as both drivers and passengers. This finding is consistent with other research concerning seat belt use in Canada. In particular, Transport Canada's recent assessment of seat belt use among drivers revealed that 93% of Canadians use their seat belts (Transport Canada 2007).

Elderly drivers and young drivers

TIRF asked how Canadians ranked elderly drivers in the context of road safety issues in 2007 and then again most recently in 2011. The results show that concern over elderly drivers has remained relatively constant over time, with 32.7% expressing concern in 2007 and 31.3% expressing concern in 2011.

TIRF has also monitored Canadian drivers' perception towards young drivers over the years. However, survey questions have not always differentiated between young drivers generally, and young drinking drivers. Unsurprisingly, Canadians maintain a high level of concern about young drinking drivers, with 84.5% in 2010 and 86% in 2006 citing young drinking drivers as a very or extremely serious road safety concern. Canadians seem to be less concerned about young drivers generally, with levels of concern remaining fairly stable between 2011 (24.3%), 2010 (23.2%), 2008 (26.4%), and 2007 (25.7%).

3.7 Results summary

In summary, most Canadian drivers believe themselves to be significantly safer than the average driver, with the most common self-rating being an eight on a scale from zero to ten and the most common rating of others being a five on that same scale. In addition to feeling like other drivers are less safe than themselves, many Canadians also agreed that other drivers rely too much on their safety feature and as a result pay insufficient attention to their own driving.

To provide further context for the objectives of this report, overall trends in the level of concern for a variety of road safety issues were investigated. The results show that Canadians are very concerned about a number of road safety issues. Drinking drivers continue to be the issue of paramount concern. Distracted driving and cell phone use have become more concerning for drivers over the years, while concern about excessive speeding, drowsy driving, and young drivers has remained relatively constant.

The next section of this report examines current familiarity with and perceptions towards vehicle safety features. The steady level of concern over a variety of road safety issues presented in this section shows that Canadian drivers still view road safety as a topic that needs to be addressed. This finding is relevant since safety features, if used properly, can help increase overall road safety.

4.0 PERCEPTIONS AND KNOWLEDGE OF SAFETY FEATURES

A major part of TIRF's overall objectives with the survey data for this project involves reaching a better understanding of how familiar drivers are with safety features and how they perceive the potential benefits of those features. Drivers were asked questions concerning their familiarity with and opinion of ten vehicle safety features: anti-lock braking systems (ABS), electronic stability control (ESC), brake override, traction control, adaptive headlights, lane departure warning systems, brake assist, electronic brake-force distribution, collision warning systems, and driver monitoring systems. Survey participants were also asked questions about their perceptions of safety features more generally, including whether they thought safety features helped protect drivers and passengers, and whether they thought it was important to have modern safety features on their vehicle. The responses were then analyzed to look for any characteristics or patterns associated with particular demographic characteristics (e.g., age or gender).

4.1 What are Canadians' perceptions of safety features generally?

4.1.1 Overall results

Aside from asking about knowledge and perceptions of specific safety features, TIRF also asked questions pertaining to Canadian drivers' perceptions of safety features more generally, including whether safety features make them safer drivers, whether safety features will help protect vehicle occupants, whether safety features will interfere with their ability to drive safely, and whether it is important to have modern safety features on their vehicle. Participants were asked to rate their level of agreement with a series of statements about safety features on a scale of one to six, where one is strongly disagree and six is strongly agree. Drivers were categorized as agreeing if they answered with a five or a six.

4.1.2 Do drivers think that safety features will make them safer drivers?

Survey participants were asked to what extent they agree that modern safety features would make them safer drivers. Only 31.1% of Canadian drivers agreed or strongly agreed with this statement. This is a somewhat disappointing result since safety features, combined with responsible driving practices, can help significantly reduce crash risk, thereby making safer drivers.

Logistic regression was used to investigate the profile of those who said they agree or strongly agree that modern safety features make them safer drivers. Independent variables in the model included age, gender, the number of kilometres driven per month, and whether the driver had ever been injured in a motor vehicle crash. This analysis revealed that as age increases, the likelihood of drivers reporting that modern safety features would make them safer drivers also increases. More precisely, with every ten year increase in age, the chances of drivers agreeing or strongly agreeing that modern safety features will make them safer drivers increase by 10.5%.

4.1.3 Do drivers think that safety features will protect vehicle occupants?

Canadian drivers were asked whether they agreed that safety features would protect drivers and passengers in the event of a collision. Two separate questions were asked, one focusing on the added protection afforded to drivers, and the other focusing on passengers. Less than half of drivers agreed that safety features offer more protection to drivers in the event of a collision (40.3%), whereas slightly more respondents agreed that safety features offer more protection to passengers in the event of a collision (46.4%).

Thus, Canadian drivers seem to believe that safety features offer more protection to passengers than to drivers in the event of a collision. However, the majority of Canadian drivers do not agree that safety features give passengers and/or drivers added protection in the event of a collision. This is of some concern since the truth is that safety features can offer a variety of different types of protection to both drivers and passengers in the event of a collision, including helping to protect people on the inside of a vehicle with seat belts and airbags; reducing vehicle speed at impact with brake assist and ABS; and reducing the risk of involvement in the most dangerous types of collisions like head-on collisions and rollovers.

4.1.4 Demographic trends

Logistic regression was also used to determine whether those who think that safety features in new vehicles protect drivers from serious injury in the event of a collision are more or less familiar with the ten vehicle safety features. The results revealed that for all ten safety features, agreeing or strongly agreeing that you are familiar with these safety features significantly increases the likelihood of thinking that safety features in new vehicles protect drivers from serious injury in the event of a collision. More specifically:

- > Of those who were familiar with ESC, 48.3% agreed that safety features in new vehicles protect drivers from serious injury in the event of a collision, while of those who were not familiar only 34.4% agreed with this.
- > Of those who were familiar with traction control, 45.1% agreed that safety features in new vehicles protect drivers from serious injury in the event of a collision, while among those who were not familiar with traction control, only 33.6% agreed.
- > Of those who were familiar with electronic brake-force distribution, 47.1% agreed that safety features help protect drivers in the event of a collision, while among those who were not familiar with electronic brake-force distribution only 37% agreed with this.
- > Of those who were familiar with ABS, 43.6% agreed that safety features in new vehicles help protect drivers in the event of a collision, while among those who were who not familiar with ABS, only 26.9% agreed that safety features offer drivers protection in the event of a crash.
- > Of those who were familiar with brake assist, 50% agreed that safety features on new vehicles help protect drivers in the event of a collision, while among those who were not familiar with brake assist, only 36% agreed.
- > Of those who were familiar with brake override, 54.6% agreed that safety features on new vehicles help protect drivers in the event of a collision, while among those who were not familiar, only 38% agreed.

- > Of those who were familiar with adaptive headlights, 48.9% agreed that safety features help protect drivers in the event of a collision, while among those who were not familiar with adaptive headlights, only 34.4% agreed.
- > Of those who were familiar with lane departure warning systems, 47.9% agreed that safety features in new vehicles help protect drivers in the event of a collision, while among those who were not familiar, 37.3% agreed.
- > Of those who were familiar with collision warning systems, 56.1% agreed that safety features in new vehicles help protect drivers in the event of a collision, while among those who were not familiar, only 39.4% agreed.
- > Of those who were familiar with driver monitoring systems, 52.8% agreed that safety features in new vehicles help protect drivers in the event of a collision, while of those who were not familiar with it, only 39.6% agreed.

Logistic regression was again used to investigate the profile of those who agreed or strongly agreed that vehicles with safety features offer more protection to passengers (other than drivers) during a collision than vehicles without these safety features. Whether Canadians agreed that modern safety features will make them a safer driver was also included as an independent variable in this analysis.

These results showed that driving more kilometres in a typical month significantly increases the likelihood of thinking that vehicles with safety features offer more protection to passengers in the event of a collision than vehicles without these safety features. More precisely, with every extra 500 kilometres driven per month, the chances of a driver thinking that vehicles with safety features offer more protection to passengers in the event of a collision than vehicles without these safety features increases by 7.5%. It was found that as age increases, the likelihood of thinking that vehicles with safety features offer more protection to passengers in the event of a collision than vehicles without these safety features also increases. Specifically, with every ten year increase in age, the likelihood of agreeing that vehicle safety features offer protection to passengers in the event of a collision increases by 9.8%. Logistic regression also revealed that being male significantly increased the likelihood of thinking that vehicles with safety features offer more protection to passengers in the event of a collision than vehicles without these safety features. To illustrate, among males, 51.5% agreed that vehicles with modern safety features offer more protection to passengers when involved in a collision, while only 41.9% of women agreed with this.

Logistic regression was also used to see whether those who are familiar with ten vehicle safety features are more or less likely to think that vehicles with safety features offer more protection to passengers (other than the driver) in the event of a collision than vehicles without these safety features. Significant effects were found for all the safety features with the exception of collision warning systems and driver monitoring systems. It was found that generally, when drivers are familiar with safety features, the likelihood increases that those drivers think that vehicles with safety features offer more protection to passengers during a collision than vehicles without safety features. More specifically:

- > Of those who were familiar with ESC, 51.9% agreed that safety features offer more protection to passengers in the event of a collision, while among those who were not familiar with ESC, only 43% agreed with this.
- > Of those who were familiar with traction control, 48.6% agreed that safety features offer more protection to passengers in the event of a collision, while among those who were not familiar, only 38.8% agreed.
- > Of those who were familiar with electronic brake-force distribution, 52.3% agreed that safety features offer more protection to passengers in the event of a collision, while among those who were not familiar, 40.8% agreed with this.
- > Of those who were familiar with ABS, 50.6% thought that safety features offer more protection to passengers in the event of a collision, while among those who were not familiar with ABS, only 34.9% thought the same.
- > Of those who were familiar with brake assist, 54.1% agreed that safety features offer more protection to passengers in the event of a collision, while among those who were not familiar with brake assist, only 42.6% agreed with this.
- > Of those who were familiar with brake override, 58.6% agreed that safety features offer more protection to passengers in the event of a collision, while among those who were not familiar, 43.7% agreed that safety features protect passengers in the event of a crash.
- > Of those who were familiar with adaptive headlights, 59.6% agreed that safety features offer more protection to passengers in the event of a collision, while among those who were not familiar, 40.5% agreed with this.
- > Of those who were familiar with lane departure warning systems, 56.2% agreed that safety features offer more protection to passengers in the event of a collision, while among those who were not familiar with lane departure warning systems, only 42.9% agreed with this.

4.1.5 Do drivers think that safety features will interfere with their driving?

Drivers were also asked to what extent they believed that modern safety features would interfere with their ability to safely drive their vehicle. A relatively low 13.1% of respondents agreed with this. However, this number is still concerning, since a significant amount of time, research, and money goes in to making sure that safety features do not interfere at all with a driver's ability to drive safely. For the most part, safety features are designed to interfere only when the driver is practically incapable of resolving a potentially dangerous situation without technological assistance.

4.1.6 Do Canadians think it is important to have up-to-date safety features?

Given that the majority of drivers do not think safety features will help protect vehicle occupants in the event of a collision and their overall limited familiarity with safety features, it is perhaps not surprising that only 35.6% of Canadian drivers agree or strongly agree that it is important to have modern safety features on their vehicle. The fact that a large majority do not agree that this is important may also point to the difficult trade-offs discussed earlier that vehicle purchasers regularly have to make between price, function, reliability, and safety. For example, some Canadians may feel that purchasing a car within their budget is more important than having modern safety features.

4.1.7 Results summary

When asked about their perceptions of the usefulness and ease of use of safety features generally, the majority of Canadians reported no perceived benefit to having safety features on their vehicles. More precisely, many drivers did not agree that safety features would offer vehicles occupants more protection in the event of a collision, nor did they agree that safety features would make them safer drivers. Furthermore, less than one-third of Canadian drivers think that it is important to have modern safety features on their vehicles, and 13.1% believe that safety features will actually interfere with their ability to drive safely. These results suggest a mixed attitude towards the relationship between road safety and safety features; specifically, that Canadian drivers are concerned about road safety, but are not confident that vehicle safety features can help improve road safety.

Some patterns were noted among those who did agree that safety features are important and useful. Men are more likely than women to agree that safety features offer added protection to both drivers and passengers in the event of a collision. In addition, drivers who agreed that safety features offer added protection are also more likely be familiar with specific safety features.

4.2 How familiar are Canadian drivers with vehicle safety features?

4.2.1 Overall results

To test the level of familiarity with safety features, Canadians were asked to rate the level to which they agreed or disagreed with the statement “I am familiar with this feature”. Before answering, survey respondents were provided with a short description of the core functions of each feature. A rating of one corresponded to strongly disagreeing with the statement, while a six corresponded to strongly agreeing. Respondents were categorized as being familiar with the safety features if they indicated a five or six. The results of this question are illustrated in figure 4.2.1 below.

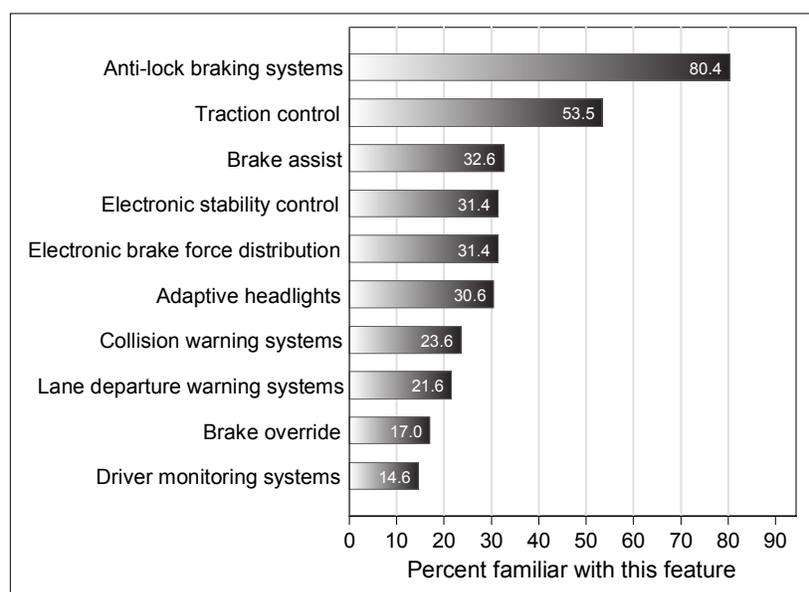


Figure 4.1.1: Familiarity with ten vehicle safety features

As can be seen in the graph above, Canadians were overwhelmingly more familiar with ABS than any other feature, with 80.4% agreeing or strongly agreeing that they are familiar with the feature. Familiarity with ABS was followed by traction control, with which 53.5% of Canadian drivers agreed or strongly agreed that they are familiar with it.

The remaining eight safety features each had less than the majority of drivers reporting that they were familiar with them. Nearly one-third (32.6%) of respondents agreed or strongly agreed that they were familiar with brake assist. This was followed by ESC and electronic brake-force distribution, each of which had 31.4% of drivers saying that they were familiar with it. Adaptive headlights were next with 30.6% citing familiarity with it. Less than a quarter (23.6%) were familiar with collision warning systems, 21.6% were familiar with lane departure warning systems, 17% were familiar with brake override, and driver monitoring systems came last with only 14.6% agreeing or strongly agreeing that they were familiar with this feature.

Of note, the general level of familiarity with ESC remains low, despite the enormous success ESC has had both in testing and in real driving situations (Rudin Brown et al. 2011; IIHS 2010). In 2011, Transport Canada conducted a public opinion poll dedicated specifically to the investigation of knowledge, attitudes, and behaviours of drivers towards ESC. The results of this poll are consistent with TIRF's latest findings, and show that Canadian drivers are still relatively unfamiliar with ESC. One positive note is that while knowledge about ESC remains low, current trends show annual increases in both the number of drivers who were familiar with ESC, and the number of drivers who considered being equipped with ESC as an important or very important feature of vehicles that they may purchase in the future (Rudin-Brown et al. 2011).

4.2.2 Demographic trends

Logistic regression was performed to investigate the profile of those who agreed or strongly agreed that they were familiar with each of the ten safety features. This section reviews the results of that analysis.

It was found that in the case of ABS, driving more kilometres in a typical month significantly increases the likelihood of being familiar with the safety system. More precisely, with every extra 500 kilometres driven per month, the chances of drivers being familiar with ABS increase by 31.3%. Other control variables were included in the analysis (e.g., gender), however no other statistically significant relationships were found.

With regards to traction control, it was also found that driving more kilometres in a typical month significantly increases the likelihood of being familiar with traction control. Using an analysis method identical to the one used for ABS, it was found that with every extra 500 kilometres driven per month, the chances of being familiar with traction control increase by 12.1%. The logistic regression also revealed that being male significantly increases the likelihood of being familiar with traction control. To illustrate, among males, 63.2% agreed or strongly agreed that they were familiar with traction control, while among females only 44.8% reported being familiar with it (see Table 4.2.2.1).

Familiar with traction control			
Gender	No	Yes	Total
Female	55.2%	44.8%	100.0%
Male	36.8%	63.2%	100.0%
Total	46.5%	53.5%	100.0%

Table 4.2.2.1 Familiarity with traction control by gender

For brake assist, the only significant profile characteristic associated with increased familiarity was gender. Among males, 42.1% reported being familiar with brake assist, and among females, 24% reported being familiar with it (see Table 4.2.2.2).

Familiar with brake assist			
Gender	No	Yes	Total
Female	76.0%	24.0%	100.0%
Male	57.9%	42.1%	100.0%
Total	67.4%	32.6%	100.0%

Table 4.2.2.2 Familiarity with brake assist by gender

With respect to ESC, it was revealed that the safer drivers think they are, the more likely they are to agree or strongly agree that they are familiar with ESC. To be more precise, with each one unit increase in self-rating of driver safety, the likelihood of being familiar with ESC increases by 14.7%. It was also found that males were more than two times more likely (an increase of 241.3%) to be familiar with ESC. Among males, 44.2% reported being familiar with ESC, while among females only 20.3% reported being familiar with it (see Table 4.2.2.3).

Familiar with ESC			
Gender	No	Yes	Total
Female	79.7%	20.3%	100.0%
Male	55.8%	44.2%	100.0%
Total	68.6%	31.4%	100.0%

Table 4.2.2.3 Familiarity with ESC by gender

Logistic regression revealed that driving more kilometres in a typical month significantly increases the likelihood of being familiar with electronic brake-force distribution. For every extra 500 kilometres driven per month, the chances of being familiar with electronic brake-force distribution increase by 8.6%. Logistic regression also revealed that being male significantly increases the likelihood of being familiar with electronic brake-force distribution. To illustrate, among males, 42.7% reported being familiar with electronic brake-force distribution, while among females only 21.1% reported being familiar with it (see Table 4.2.2.4).

Familiar with EBFD			
Gender	No	Yes	Total
Female	78.9%	21.1%	100.0%
Male	57.3%	42.7%	100.0%
Total	68.6%	31.4%	100.0%

Table 4.2.2.4 Familiarity with electronic brake-force distribution by gender

The only significant effect found for in the case of adaptive headlights was for gender. As with other features, being male significantly increases the likelihood of being familiar with adaptive headlights. Among males, 37.7% reported being familiar with adaptive headlights, while only 24.1% of females reported being familiar with adaptive headlights (see Table 4.2.2.5).

Familiar with adaptive headlights			
Gender	No	Yes	Total
Female	75.9%	24.1%	100.0%
Male	62.3%	37.7%	100.0%
Total	69.4%	30.6%	100.0%

Table 4.2.2.5 Familiarity with adaptive headlights by gender

For collision warning systems, it was again found that being male significantly increases the likelihood of being familiar with the feature. Among male drivers, 32.6% reported being familiar with collision warning systems, while only 15.1% of female drivers reported being familiar with collision warning systems (see Table 4.2.2.6).

Familiar with CWS			
Gender	No	Yes	Total
Female	84.9%	15.1%	100.0%
Male	67.4%	32.6%	100.0%
Total	76.4%	23.6%	100.0%

Table 4.2.2.6 Familiarity with collision warning systems by gender

With respect to lane departure warning systems, logistic regression revealed that the safer drivers think they are, the more likely they are to agree or strongly agree that they are familiar with lane departure warning systems. To be more precise, with each one unit increase in self-rating of driver safety, the likelihood of reporting familiarity with lane departure warning systems increases by 15.6%. It was also again found that being male significantly increases the likelihood of being familiar with this feature: among males, 28.3% were familiar with lane departure warning systems, compared to 15.9% familiarity among females (see Table 4.2.2.7).

Familiar with LDWS			
Gender	No	Yes	Total
Female	84.1%	15.9%	100.0%
Male	71.7%	28.3%	100.0%
Total	78.4%	21.6%	100.0%

Table 4.2.2.7 Familiarity with lane departure warning systems by gender

With respect to brake override, it was found that as age increases, the likelihood of being familiar with brake override decreases. With every ten year increase in age, the chances of being familiar with brake override decrease by 14.7%. Logistic regression also revealed that being male significantly increases the likelihood of being familiar with brake override. Among male respondents, 23.6% reported being familiar with brake override, while only 11.1% of female respondents were familiar with it (see Table 4.2.2.8).

Familiar with brake override			
Gender	No	Yes	Total
Female	88.9%	11.1%	100.0%
Male	76.4%	23.6%	100.0%
Total	83.0%	17.0%	100.0%

Table 4.2.2.8 Familiarity with brake override by gender

Finally, for driver monitoring systems, the relationship with age is reversed such that as age increases, the likelihood of being familiar with driver monitoring systems increases. With every ten year increase in age, the chances of being familiar with driver monitoring systems increase by 21.7%. Logistic regression again revealed that males tend to be more familiar with driver monitoring systems, with 20.2% of males reporting being familiar with driver monitoring systems, compared to only 9.3% of females (see Table 4.2.2.9).

Familiar with DMS			
Gender	No	Yes	Total
Female	90.7%	9.3%	100.0%
Male	79.8%	20.2%	100.0%
Total	85.4%	14.6%	100.0%

Table 4.2.2.9 Familiarity with driver monitoring systems by gender

4.2.3 Results summary

To summarize, the majority of Canadians have limited familiarity with several vehicle safety features, with the exception of ABS and traction control. To some extent, it is not unusual that Canadians have much greater familiarity with ABS as it has been widely available for almost thirty years, unlike newer technologies such as lane departure warning systems which have only become available in the last ten years. However this limited familiarity is still somewhat concerning and points to the need for more

effective dissemination of information about the function and design of current safety features. Of particular concern, with the exception of ABS, females tend to be much less likely to be familiar with various vehicle safety systems than males. This suggests that campaigns devoted to raising awareness about safety features would benefit from components targeted specifically towards female drivers.

4.3 Do Canadian drivers think safety features are easy to use?

4.3.1 Overall results

After being provided with a brief description of each of the safety features included in the survey, Canadians were asked whether they agreed that these features would be easy to use. Respondents were asked to rate the extent to which they agreed with the statement “I think this feature would be easy to use” on a scale of one (strongly disagree) to six (strongly agree). The results are presented below.

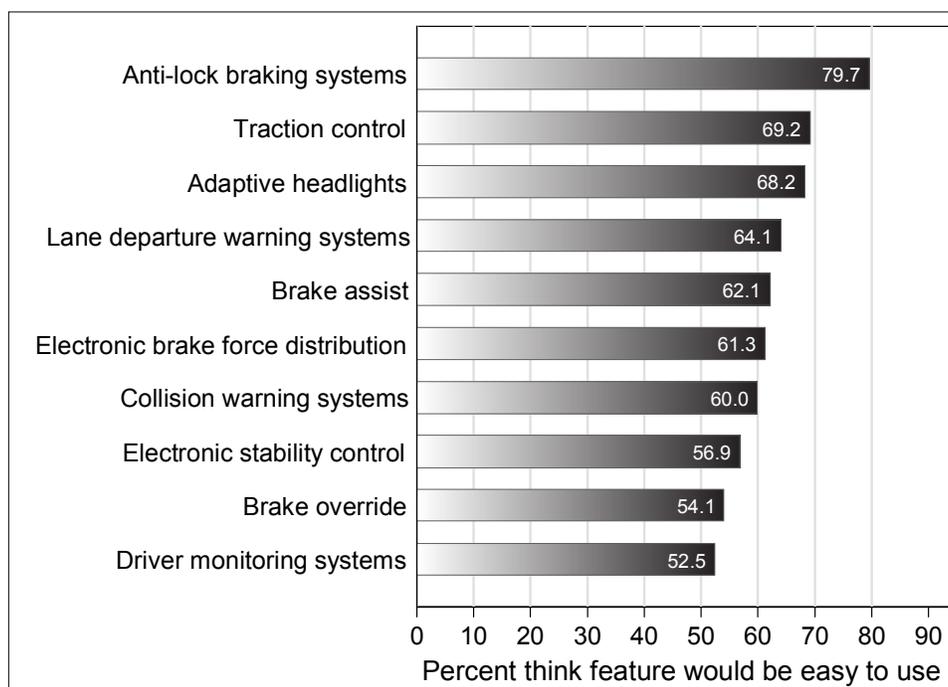


Figure 4.3.1 Perceptions of ease of use of safety features

As can be seen in Figure 4.3.1 above, a majority of Canadians agreed that each safety feature would be easy to use. The feature that most drivers agreed or strongly agreed would be easy to use was ABS at 79.7%. Next was traction control at 69.2%, adaptive headlights at 68.2%, and lane departure warning systems at 64.1%. The percentage who thought the remaining safety features would be easy to use was as follows: 62.1% agreed that brake assist would be easy to use, 61.3% agreed that electronic brake-force distribution would be easy to use, 60% agreed that collision warning systems would be easy to use, 56.9% agreed that ESC would be easy to use, 54.1% agreed that brake override would be easy to use, and just over half (52.5%) agreed that driver monitoring systems would be easy to use.

4.3.2 Demographic trends

Logistic regression was performed to investigate the profile of those who agreed or strongly agreed that each of the ten safety features would be easy to use. This section contains the results of that analysis.

Logistic regression revealed that for ABS, driving more kilometres in a typical month significantly increases the likelihood of reporting that ABS would be easy to use. More precisely, with every extra 500 kilometres driven per month, the likelihood of a driver reporting that ABS would be easy to use increases by 16.5%. Logistic regression also revealed that as age increases, the likelihood of reporting that ABS would be easy to use also increases. With every ten year increase in age, the likelihood of agreeing or strongly agreeing that ABS would be easy to use increases by 18.3%.

As for traction control, the only significant effect found was for gender. More specifically, being male significantly increases the likelihood of reporting that traction control would be easy to use. To illustrate, among males, 75.5% reported that traction control would be easy to use, compared to 63.6% of females (see Table 4.3.2.1).

Traction control easy to use			
Gender	No	Yes	Total
Female	36.4%	63.6%	100.0%
Male	24.5%	75.5%	100.0%
Total	30.8%	69.2%	100.0%

Table 4.3.2.1 Perceptions of ease of use of traction control by gender

For both adaptive headlights and lane departure warning systems, no significant effects were found regarding the profile characteristics of those who agreed or strongly agreed that either of these systems would be easy to use.

For brake assist, the only significant effect found was for gender such that being male increases the likelihood of reporting that brake assist would be easy to use. To illustrate, 67.2% of male respondents reported believing that brake assist would be easy to use, while only 57.6% of female respondents reported that they believe brake assist would be easy to use (see Table 4.3.2.2).

Brake assist easy to use			
Gender	No	Yes	Total
Female	42.4%	57.6%	100.0%
Male	32.8%	67.2%	100.0%
Total	37.9%	62.1%	100.0%

Table 4.3.2.2 Perceptions of ease of use of brake assist by gender

Regarding electronic brake-force distribution, it was found that as age increases, the likelihood of thinking that electronic brake-force distribution would be easy to use also increases. It was found that with every

ten year increase in age, the likelihood of agreeing or strongly agreeing that electronic brake-force distribution would be easy to use increases by 13%. Logistic regression revealed that having ever been injured in a motor vehicle crash increases the likelihood of thinking that electronic brake-force distribution would be easy to use. Specifically, of those who had been injured in a motor vehicle crash, 66.7% agreed or strongly agreed that electronic brake-force distribution would be easy to use. Of those who had not been injured in a motor vehicle crash, 59.9% agreed that electronic brake-force distribution would be easy to use (see Table 4.3.2.3).

EBFD easy to use			
Injured	No	Yes	Total
No	40.1%	59.9%	100.0%
Yes	33.3%	66.7%	100.0%
Total	38.7%	61.3%	100.0%

Table 4.3.2.3 Perceptions of ease of use of electronic brake-force distribution by crash injury history

Finally, it was again found that being male significantly increases the likelihood of thinking that electronic brake-force distribution would be easy to use. To illustrate, among males, 69.7% agreed that electronic brake-force distribution would be easy to use, while 53.5% of females agreed that it would be easy to use (see Table 4.3.2.3).

EBFD easy to use			
Gender	No	Yes	Total
Female	46.5%	53.5%	100.0%
Male	30.3%	69.7%	100.0%
Total	38.7%	61.3%	100.0%

Table 4.3.2.4 Perceptions of ease of use of electronic brake-force distribution by gender

As for collision warning systems, the only significant effect found was for gender. Specifically, being male significantly increases the likelihood of thinking that collision warning systems would be easy to use. Among males, 66.2% agreed that collision warning systems would be easy to use, compared to 54.1% of females who agree that collision warning systems would be easy to use (see Table 4.3.2.5).

CWS easy to use			
Gender	No	Yes	Total
Female	45.9%	54.1%	100.0%
Male	33.8%	66.2%	100.0%
Total	40.0%	60.0%	100.0%

Table 4.3.2.5 Perceptions of ease of use of collision warning systems by gender

Regarding ESC, it was found that driving more kilometres in a typical month significantly increases the likelihood of thinking this feature would be easy to use. More specifically, with every extra 500 kilometres driven per month, the chances of a driver agreeing that ESC would be easy to use increase by 10.7%. In addition, it was found that as age increases, the likelihood of agreeing that ESC would be easy to use also increases. To be more precise, it was found that with every ten year increase in age, the likelihood of agreeing or strongly agreeing that ESC would be easy to use increases by 18.2%.

The logistic regression also revealed that having ever been injured in a motor vehicle crash increases the likelihood of thinking that ESC would be easy to use. To illustrate, of those who had been injured in a motor vehicle crash, 62.9% agreed or strongly agreed that ESC would be easy to use, compared to 55.4% of drivers who have not been injured in a motor vehicle crash (see Table 4.3.2.6).

ESC easy to use			
Injured	No	Yes	Total
No	44.6%	55.4%	100.0%
Yes	37.1%	62.9%	100.0%
Total	43.1%	56.9%	100.0%

Table 4.3.2.6 Perceptions of ease of use of ESC by crash injury history

Finally, being male significantly increases the likelihood of thinking that ESC would be easy to use. More precisely, among males, 65.5% agreed that ESC would be easy to use, compared to 49.4% of females (see Table 4.3.2.7).

ESC easy to use			
Gender	No	Yes	Total
Female	50.6%	49.4%	100.0%
Male	34.5%	65.5%	100.0%
Total	43.1%	56.9%	100.0%

Table 4.3.2.7 Perceptions of ease of use of ESC by gender

In terms of brake override, it was found that driving more kilometres in a typical month significantly increases the likelihood of thinking this feature would be easy to use. With every extra 500 kilometres driven per month, the likelihood of agreeing that brake override would be easy to use increases by 8.8%. Logistic regression also revealed that being male significantly increases the likelihood of thinking that brake override would be easy to use. More precisely, among male drivers, 59.5% agreed or strongly agreed that brake override would be easy to use, compared to 49.3% of female drivers (see Table 4.3.2.8).

Brake override easy to use			
Gender	No	Yes	Total
Female	50.7%	49.3%	100.0%
Male	40.5%	59.5%	100.0%
Total	45.9%	54.1%	100.0%

Table 4.3.2.8 Perceptions of ease of use of brake override by gender

Finally, for driver monitoring systems, the only significant effect found was for age. Specifically, as age increases, the likelihood of thinking that driver monitoring systems would be easy to use also increases. For every ten year increase in age, the likelihood of agreeing or strongly agreeing that driver monitoring systems would be easy to use increases by 18.3%.

4.3.3 Results summary

To summarize, perceptions regarding how easy safety features are to use seem to be heavily influenced by whether or not the driver is male or female. Significant correlations between being male and believing that safety features would be easy to use were found for traction control, brake assist, electronic brake-force distribution, collision warning systems, ESC, and brake override. In addition, it was found that drivers who had been in crashes where the driver was injured were more likely to agree or strongly agree that electronic brake-force distribution and ESC are easy to use.

4.4 Do Canadian drivers think safety features will make them better drivers?

4.4.1 Overall results

To gauge how useful Canadian drivers perceive safety features to be in terms of making them better drivers, survey participants were asked to rate their level of agreement with the statement “this feature would make me a better driver” for each of ten safety features. Drivers were asked to use a scale of one to six, where one is strongly disagree and six is strongly agree. Drivers were characterized as agreeing that safety features would make them better drivers if they chose a five or a six. The results are presented in the figure below.

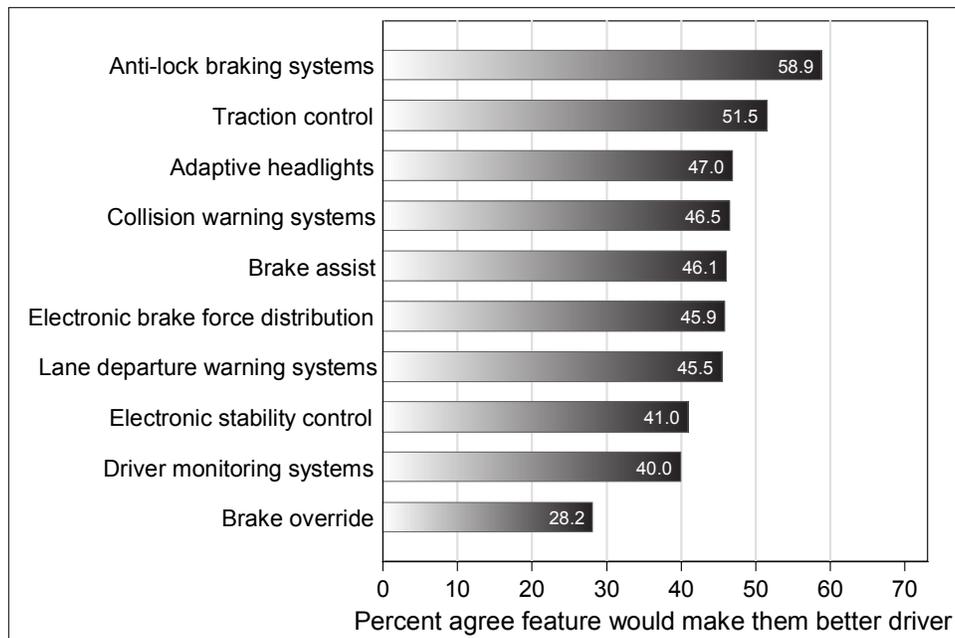


Figure 4.4.1: Perceptions of usefulness of ten safety features

As can be seen above, slightly more than half of Canadians agreed or strongly agreed that ABS (58.9%) and traction control (51.5%) would make them a better driver. As for all the other safety features, less than half of respondents agreed or strongly agreed that adaptive headlights (47%) would make them a better driver. This was followed by collision warning systems (46.5%), brake assist (46.1%), electronic brake-force distribution (45.9%), lane departure warning systems (45.5%), ESC (41%), driver monitoring systems (40%), and brake override (28.2%).

Curiously, when asked whether specific safety features would make them better drivers, an average of 45.1% agreed that it would. However, when asked whether safety features generally would make them safer drivers, only 31.1% agreed or strongly agreed. This discrepancy may be due to the effects of thinking about specific safety features versus being asked to think about all safety features generally. The added level of abstraction required to think about safety features as a whole may have resulted in a broader set of considerations influencing responses. The difference may also be due to a change in word usage between the two questions. In the case of individual safety features, drivers were asked whether they thought each would make them a “better” driver, whereas when asked to consider safety features generally, they were encouraged to think about whether they thought vehicle safety features make them a “safer” driver. Canadian drivers may tend to attribute slightly different meanings to those two terms leading to a discrepancy in responses where normally one would not be expected.

4.4.2 Demographic trends

Logistic regression was performed to investigate the profile of those who agreed or strongly agreed that they think each of the ten safety features would make them a better driver. The results of that analysis are reviewed in this section.

Logistic regression revealed that for ABS, as age increases so does the likelihood of thinking that ABS would make you a better driver. With every ten year increase in age, the likelihood of agreeing or strongly agreeing that ABS would make you a better driver increases by 13.8%. A similar pattern was noted for traction control, electronic brake-force distribution, lane departure warning systems, driver monitoring systems, and brake override. With every increase in age of ten years, the likelihood of agreeing that these features would make drivers better increased by 12.2%, 18.6%, 21.9%, 30.4%, and 30.4% respectively.

As for ESC, driving more kilometres in a typical month significantly increases the likelihood of thinking ESC would make you a better driver. More specifically, with every extra 500 kilometres driven per month, the chances of agreeing that ESC would make you a better driver increase by 7.3%. Logistic regression also revealed that as age increases, so does the likelihood of thinking that ESC would make you a better driver. With every ten year increase in age, the likelihood of agreeing or strongly agreeing that ESC would make you a better driver increases by 16%. Finally, it was found that being male significantly increases the likelihood of thinking that ESC would make you a better driver. More precisely, among males, 44.9% agreed that ESC would make you a better driver, compared to 37.5% of females (see Table 4.4.2.1)

ESC make me a better driver			
Gender	No	Yes	Total
Female	62.5%	37.5%	100.0%
Male	55.1%	44.9%	100.0%
Total	59.0%	41.0%	100.0%

Table 4.4.2.1 Perceptions of usefulness of ESC by gender

No significant characteristics or effects were found for adaptive headlights, collision warning systems, or brake assist.

4.4.3 Results summary

To summarize the strongest factor that seemed to influence perceptions of usefulness in this regard was age. Specifically, as the age of a driver increases, he or she is more likely to agree or strongly agree that safety features will make him or her a better driver. This pattern was noted for ABS, traction control, electronic brake-force distribution, lane departure warning systems, ESC, driver monitoring systems, and brake override.

4.5 Would Canadian drivers use safety features if their vehicle had them?

4.5.1 Overall results

To measure Canadian drivers' intention to use safety features, survey participants were asked whether they agreed that they would use each safety feature if they had it on their vehicle. Drivers were asked to rate their level of agreement on a scale of one (strongly disagree) to six (strongly agree). Survey respondents were characterized as agreeing that they would use a safety feature if they responded with a five or a six. Results of this question are illustrated in Figure 4.5.1 below.

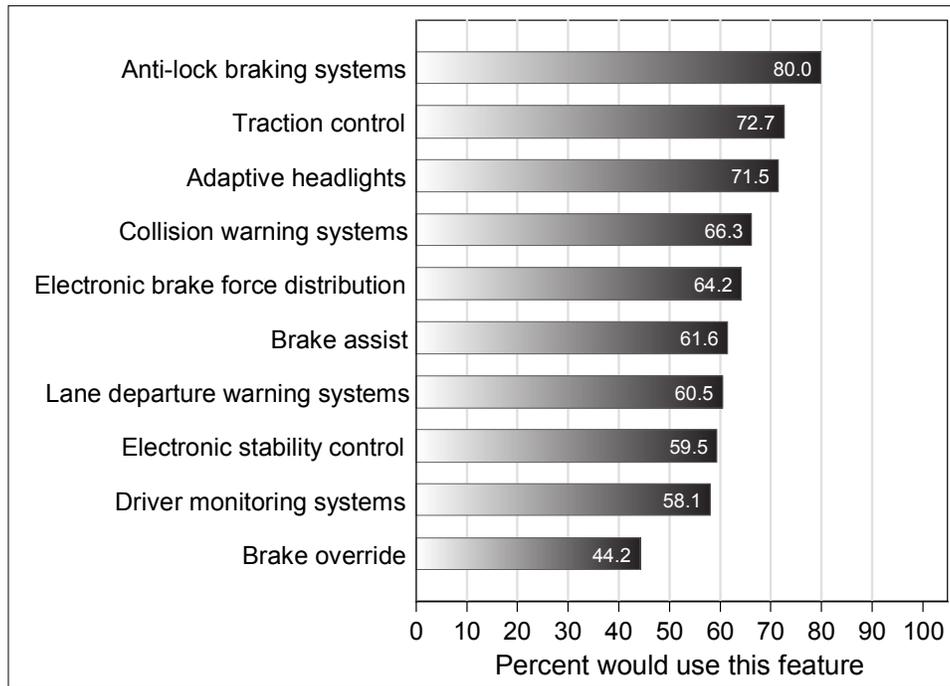


Figure 4.5.1: Willingness to use safety features if it is already on the vehicle

As can be seen, with the exception of brake override, the majority of Canadians agree or strongly agree that they would use safety features if their vehicle had them. ABS received the highest rating at 80%. This was followed by traction control (72.7%), adaptive headlights (71.5%), collision warning systems (66.3%), electronic brake-force distribution (64.2%), brake assist (58.3%), lane departure warning systems (60.5%), ESC (59.5%), and driver monitoring systems (58.1%). The only feature that less than half of Canadians agreed they would use if their vehicle had it was brake override at 44.2%. Thus, overall, a majority of Canadians would use most of these features if their vehicle had them.

4.5.2 Demographic trends

Logistic regression was performed to investigate the profile of those who agreed or strongly agreed that they would use each of the ten safety features if their vehicle had them. Age was shown to be a significant factor in whether a driver was likely to agree that he or she would use a safety feature if his or her vehicle was equipped with it.

For ABS, logistic regression revealed that as age increases, the likelihood of drivers using ABS if their vehicle had it also increases. More precisely, with every ten year increase in age, the chances of drivers using ABS if their vehicle had it increase by 34.3%. The intention to use traction control, adaptive headlights, electronic brake-force distribution, brake assist, lane departure warning systems, and brake override was revealed to be similarly influenced by age. With every ten year age increase, the likelihood of drivers agreeing that they would use those systems if their vehicle had them increases by 16.4%, 14%, 28.9%, 24%, 34.5%, and 14.4% respectively.

For collision warning systems, no significant effects were found.

With respect to ESC, it was found that as age increases, so does the likelihood of drivers using ESC if it was on their vehicle. More precisely, with every ten year increase in age, the chances of drivers agreeing that they would use ESC if their vehicle had it increase by 24.6%. Logistic regression also revealed that being male significantly increases the likelihood of drivers using ESC if their vehicle had it. More precisely, among males, 66.2% agreed that they would use ESC if their vehicle had it, compared to 53.7% of females (see Table 4.5.2.1).

I would use ESC			
Gender	No	Yes	Total
Female	46.3%	53.7%	100.0%
Male	33.8%	66.2%	100.0%
Total	40.5%	59.5%	100.0%

Table 4.5.2.1 Intention to use ESC by gender

Finally, for driver monitoring systems, the same relationships for age and gender were found. More precisely, with every ten year increase in age, the chances of drivers using driver monitoring systems if they were on their vehicle increase by 37.3%. With regards to gender, among males, 63.4% agreed that they would use driver monitoring systems if their vehicle had it, while among females, only 53.1% would use this feature (see Table 4.5.2.2).

I would use DMS			
Gender	No	Yes	Total
Female	46.9%	53.1%	100.0%
Male	36.6%	63.4%	100.0%
Total	41.9%	58.1%	100.0%

Table 4.5.2.2 Intention to use driver monitoring systems by gender

4.5.3 Results summary

To summarize, regarding the willingness to use safety features if they were already on vehicles, the majority of Canadian drivers agree that they would use safety features if their vehicle was already equipped with them. One exception was brake override, which less than half (44.2%) of respondents said they would use if their vehicle had it. Logistic regression analysis revealed some common characteristics among those who agreed that they would use safety features. In general, the older drivers are, the more likely it is that they agree or strongly agree that they would use various safety features if their vehicle had them. This correlation with age was found for nine out of ten safety features included in the survey. In addition to age, gender also made a difference as to whether drivers agreed or strongly agreed that they would use ESC and driver monitoring systems if their vehicle had them, with males being more likely to agree with this statement than females.

4.6 The effect of familiarity with safety features, perceived ease of use, and perceived usefulness on the intention to use safety features

Logistic regression was used to investigate the relationship between the intention to use each safety feature, the level of familiarity with each safety feature, how useful drivers perceive it to be, and how easy drivers think it would be to use. The dependent variable in these analyses is whether respondents agreed or strongly agreed with the statement “If my vehicle had this feature, I would use it”, i.e., those who chose a five or a six.

Regarding ESC, those who reported that they thought this feature would be easy to use were 14 times more likely to report that they would use ESC if their vehicle had it. It was also revealed that those who think that ESC will make them a better driver are 56 times more likely to report that they would use ESC if their vehicle had it. Whether respondents agreed or strongly agreed that they were familiar with this feature was also included in the model, but no significant effects were found. Additionally, other demographic variables were included in these analyses. The only other significant effect found was for age. Specifically, as age increases, so does the likelihood of drivers reporting that they would use ESC if their vehicle had it. More precisely, with every ten year increase in age, the chances of drivers agreeing that they would use ESC increase by 25.2%². The results for ESC are pictured below.

I would use electronic stability control		
Independent variable	Percentage change	p-value
familiar with feature	-24.4%	p=0.418
easy to use	+1293.7%	p=0.000
make better driver	+5522.1%	p=0.000
10 year increase in age	+25.2%	p=0.008

Table 4.6.1 Intention to use ESC

For traction control, those who reported that they thought this feature would be easy to use were nine times more to likely report that they would use traction control if their vehicle had it. In addition, those who believe that traction control will make them a better driver are 67 times more likely to report that they would use traction control if their vehicle had it. It was also found that as age increases, so does the likelihood of drivers reporting that they would use traction control. Specifically, with every ten year increase in age, the chances of drivers agreeing that they would use traction control increase by 25.4%. The results for traction control are pictured below.

² Note that 25.2% differs slightly from the percent reported previously of 24.6% in section 4.5.2. This different result of the impact of age on the dependent variable is because different multivariate models are used in both sections, i.e., additional independent variables are included in the latter model. Nevertheless, both results are very consistent and virtually the same.

I would use traction control		
Independent variable	Percentage change	p-value
familiar with feature	+8.1%	p=0.749
easy to use	+810.4%	p=0.000
make better driver	+6562.8%	p=0.000
10 year increase in age	+25.4%	p=0.004

Table 4.6.2 Intention to use traction control

As for electronic brake-force distribution, those who reported that they thought this feature would be easy to use were eleven times more likely to report that they would use electronic-brake-force distribution if their vehicle had it. Those who think that electronic brake-force distribution will make them a better driver are more than fourteen times more likely to report that they would use electronic brake-force distribution if their vehicle had it. It was also found that as age increases, the likelihood of drivers reporting that they would use electronic brake-force distribution if their vehicle had it also increases. More precisely, with every ten year increase in age, the chances of drivers agreeing that they would use electronic brake-force distribution increase by 31.2%. The results for electronic brake-force distribution are pictured below.

I would use electronic brake force distribution		
Independent variable	Percentage change	p-value
familiar with feature	+37.3%	p=0.412
easy to use	+1036.4%	p=0.000
make better driver	+1361.1%	p=0.000
10 year increase in age	+31.2%	p=0.000

Table 4.6.3 Intention to use electronic brake-force distribution

Regarding ABS, those who reported that they thought this feature would be easy to use were more than eight times more likely to report that they would use ABS if their vehicle had it. Logistic regression also revealed that those who think that ABS will make them a better driver are more than 14 times more likely to report that they would use ABS if their vehicle had it. It was also found that as age increases, the likelihood of drivers reporting that they would use ABS also increases. Specifically, with every ten year increase in age, the chances of drivers reporting that they would use ABS if their vehicle had it increase by 38.9%. Finally, it was found that being from an urban area increases the likelihood of drivers reporting that they would use ABS if it was on their vehicle. To illustrate, of those who were from an urban area, 80.8% agreed or strongly agreed that they would use ABS, while of those from rural areas, 75.5% agreed that they would use ABS if it was on their vehicle. The results for ABS are pictured below.

I would use anti-lock braking systems		
Independent variable	Percentage change	p-value
familiar with feature	+105.1%	p=0.054
easy to use	+721.6%	p=0.000
make better driver	+1332.8%	p=0.000
10 year increase in age	+38.9%	p=0.020
urban area	+178.8%	p=0.012

Table 4.6.4 Intention to use ABS

Results for brake assist revealed that those who reported that they were familiar with this feature were almost three times more likely to also report that they would use brake assist if their vehicle had it. It was also found that those who reported that they thought this feature would be easy to use were over five times more likely report that they would use brake assist if their vehicle had it. Those who think that brake assist will make them a better driver are more than 34 times more likely to report that they would use brake assist if their vehicle had it. It was additionally found that the safer drivers think they are, the less likely they are to agree or strongly agree that they would use brake assist if their vehicle had it. To be more precise, with each one unit increase in self-rating of driver safety (i.e., how safe a driver thinks they are), the likelihood of reporting that they would use brake assist if their vehicle had it decreases by 19.2%. Finally, it was found that as age increases, the likelihood of drivers reporting that they would use brake assist if their vehicle had it also increases. Specifically, with every ten year in increase in age, the chances of drivers agreeing that they would use brake assist if their vehicle had it increase by 46.3%. The results for brake assist are pictured below.

I would use brake assist		
Independent variable	Percentage change	p-value
familiar with feature	+180.3%	p=0.001
easy to use	+418.8%	p=0.000
make better driver	+3354.1%	p=0.000
increase in self-rating: driver safety	-19.2%	p=0.032
10 year increase in age	+46.3%	p=0.000

Table 4.6.5 Intention to use brake assist

Results for brake override were similar. Those who reported that they thought this feature would be easy to use were more than seven times more likely report that they would use brake override if their vehicle had it. Logistic regression also revealed that those who think that brake override will make them a better driver are 54 times more likely to report that they would use brake override if their vehicle had it. No other significant effects were found. The results for brake override are pictured below.

I would use brake override		
Independent variable	Percentage change	p-value
familiar with feature	+4.9%	p=0.898
easy to use	+640.8%	p=0.000
make better driver	+5296.2%	p=0.000

Table 4.6.6 Intention to use brake override

For adaptive headlights, results revealed that those who were familiar with this feature were almost two times more likely to report that they would use adaptive headlights if their vehicle had it. It was also found that those who reported that they thought this feature would be easy to use were over five times more likely report that they would use adaptive headlights if their vehicle had them. In addition, logistic regression revealed that those who think that adaptive headlights will make them a better driver are 30 times more likely to report that they would use adaptive headlights if their vehicle had it. Again, as age increases, the likelihood of drivers reporting that they would use adaptive headlights if their vehicle had them also increases. More precisely, with every ten year increase in age, the likelihood of drivers reporting that they would use adaptive headlights if their vehicle had them increases by 18%. The results for adaptive headlights are pictured below.

I would use adaptive headlights		
Independent variable	Percentage change	p-value
familiar with feature	+96.9%	p=0.049
easy to use	+424.2%	p=0.000
make better driver	+2906.5%	p=0.000
10 year increase in age	+18.0%	p=0.048

Table 4.6.7 Intention to use adaptive headlights

As for lane departure warning systems, those who reported that they thought this feature would be easy to use were over five times more likely report that they would use lane departure warning systems if their vehicle had it. In addition, those who think that lane departure warning systems will make them a better driver are almost 32 times more likely to report that they would use lane departure warning systems if their vehicle had it. It was also found that as age increases, the likelihood of drivers reporting that they would use lane departure warning systems if their vehicle had them also increases. More precisely, with every ten year increase in age, the chances of drivers agreeing that they would use lane departure warning systems increase by 41.8%. The results for lane departure warning systems are pictured below.

I would use lane departure warning systems		
Independent variable	Percentage change	p-value
familiar with feature	+74.0%	p=0.066
easy to use	+465.4%	p=0.000
make better driver	+3090.9%	p=0.000
10 year increase in age	+41.8%	p=0.000

Table 4.6.8 Intention to use lane departure warning systems

For collision warning systems, it was found that those who reported that they thought this feature would be easy to use were more than eleven times more likely report that they would use collision warning systems if their vehicle had it. Logistic regression also revealed that those who think that collision warning systems will make them a better driver are almost 53 times more likely to report that they would use collision warning systems if their vehicle had it. No other significant effects were found. The results for collision warning systems are pictured below.

I would use collision warning systems		
Independent variable	Percentage change	p-value
familiar with feature	-31.8%	p=0.282
easy to use	+1030.5%	p=0.000
make better driver	+5155.8%	p=0.000

Table 4.6.9 Intention to use collision warning systems

Finally, for driver monitoring systems, those who reported that they thought this feature would be easy to use were more than four times more likely report that they would use driver monitoring systems if their vehicle had it. Logistic regression also revealed that those who think that driver monitoring systems will make them a better are more than 36 times more likely to report that they would use driver monitoring systems if their vehicle had it. In addition, it was found that as age increases, the likelihood of drivers reporting that they would use driver monitoring systems if their vehicle had them also increases. Specifically, with every ten year increase in age, the likelihood of drivers using driver monitoring systems increases by 28%. Finally, it was found that being male significantly increases the likelihood of drivers reporting that they would use driver monitoring systems. To illustrate, among males, 63.4% agreed or strongly agreed that they would use driver monitoring systems if their vehicle had it, compared to 53.1% of females who agreed or strongly agreed with this. The results for driver monitoring systems are pictured below.

I would use driver monitoring systems		
Independent variable	Percentage change	p-value
familiar with feature	-53.6%	p=0.052
easy to use	+366.2%	p=0.000
make better driver	+3591.4%	p=0.000
10 year increase in age	+28.0%	p=0.001
being male	+67.9%	p=0.043

Table 4.6.10 Intention to use for driver monitoring systems

4.6.1 Results summary

To summarize, the results of the logistic regression analysis strongly suggest that perceptions about the ease of use of safety features and perceptions about whether or not safety features will make them better drivers have an influence on whether or not drivers agree that they would use those safety features if their vehicle had them. More precisely, the results suggest that the factor with the most influence over whether a driver forms the intention to use a safety feature on his or her vehicle is the extent to which he or she believes that the feature will be useful, i.e., make him or her a better driver. Familiarity with safety features seems to influence whether drivers form the intention to use a safety features in some cases, but not for all the features. In addition, it was found that age has a strong influence on whether a driver forms the intention to use a safety feature in the future, with increases in age being associated with increases in the willingness to use safety features if those features were already on vehicles. Overall, perceptions of usefulness had a more significant impact on the intention to use a safety feature than perceptions of how easy a safety feature was to use.

4.7 Results summary

To summarize, when asked about their perceptions of the usefulness and ease of use of safety features generally, the majority of Canadians reported no perceived benefit to having safety features on their vehicles. More precisely, many drivers did not agree that safety features would offer vehicles occupants more protection in the event of a collision, nor did they agree that safety features would make them safer drivers. Furthermore, less than one-third of Canadian drivers think that it is important to have modern safety features on their vehicles, and 13.1% believe that safety features will actually interfere with their ability to drive safely. These results suggest a mixed attitude towards the relationship between road safety and safety features; specifically, that Canadian drivers are concerned about road safety, but are not confident that vehicle safety features can help improve road safety.

Some patterns were noted among those who did agree that safety features are important and useful. Men are more likely than women to agree that safety features offer added protection to both drivers and passengers in the event of a collision. In addition, drivers who agreed that safety features offer added protection are also more likely be familiar with specific safety features.

The majority of Canadians have limited familiarity with several vehicle safety features, with the exception of ABS and traction control. To some extent, it is not unusual that Canadians have much greater familiarity with ABS as it has been widely available for almost thirty years, unlike newer technologies such as lane departure warning systems which have only become available in the last ten years. However this limited familiarity is still somewhat concerning and points to the need for more effective dissemination of information about the function and design of current safety features. Of particular concern, with the exception of ABS, females tend to be much less likely to be familiar with various vehicle safety systems than males. This suggests that campaigns devoted to raising awareness about safety features would benefit from components targeted specifically towards female drivers. Given the overall limited familiarity that Canadian drivers have with safety features – in particular, female Canadian drivers – it is somewhat unsurprising that many do not fully appreciate or understand the safety benefits for driver and passengers associated with having safety features on their vehicle.

While the majority of drivers believe that safety features are easy to use, largely irrespective of whether they were familiar with safety features, perceptions regarding how easy safety features are to use seem to be heavily influenced by whether or not the driver is male or female. Significant correlations between being male and believing that safety features would be easy to use were found for traction control, brake assist, electronic brake-force distribution, collision warning systems, ESC, and brake override. In addition, it was found that drivers who had been in crashes where the driver was injured were more likely to agree or strongly agree that electronic brake-force distribution and ESC are easy to use.

With respect to perceptions of the usefulness of vehicle safety features, the strongest factor that seemed to influence perceptions of usefulness in this regard was age. Specifically, as the age of a driver increases, he or she is more likely to agree or strongly agree that safety features will make him or her a better driver. This pattern was noted for ABS, traction control, electronic brake-force distribution, lane departure warning systems, ESC, driver monitoring systems, and brake override.

Regarding the willingness to use safety features if they were already on vehicles, the majority of Canadian drivers agree that they would use safety features if their vehicle was already equipped with them. One exception was brake override, which less than half (44.2%) of respondents said they would use if their vehicle had it. Logistic regression analysis revealed some common characteristics among those who agreed that they would use safety features. In general, the older drivers are, the more likely it is that they agree or strongly agree that they would use various safety features if their vehicle had them. This correlation with age was found for nine out of ten safety features included in the survey. In addition to age, gender also made a difference as to whether drivers agreed or strongly agreed that they would use ESC and driver monitoring systems if their vehicle had them, with males being more likely to agree with this statement than females.

The results of the logistic regression analysis strongly suggest that perceptions about the ease of use of safety features and perceptions about whether or not safety features will make them better drivers have

an influence on whether or not drivers agree that they would use those safety features if their vehicle had them. More precisely, the results suggest that the factor with the most influence over whether a driver forms the intention to use a safety feature on his or her vehicle is the extent to which he or she believes that the feature will be useful, i.e., make him or her a better driver. Familiarity with safety features seems to influence whether drivers form the intention to use a safety features in some cases, but not for all the features. In addition, it was found that age has a strong influence on whether a driver forms the intention to use a safety feature in the future, with increases in age being associated with increases in the willingness to use safety features if those features were already on vehicles. Overall, perceptions of usefulness had a greater influence on the intention to use a safety feature than perceptions of how easy a safety feature was to use.

In the section that follows, self-reported data concerning driver behaviour are analyzed in light of the conclusions reached in the previous two sections. More precisely, Section Five is devoted to estimating the level of behavioural adaptation that road-users are likely to observe given significant technological advances in safety technology, as well as any demographic trends or other relationships existing among those who report being more willing to drive less carefully knowing that they have safety features on their vehicle.

5.0 DRIVER BEHAVIOUR

In addition to measuring familiarity with and perceptions of vehicle safety features among Canadian drivers, TIRF explored self-reported unsafe driving behaviour and the link between an increased willingness to engage in such unsafe driving habits on the one hand and the knowledge that a driver has safety features on his or her vehicle on the other. Gauging drivers' willingness to change their behaviour in the presence of safety features can shed light on whether, and to what extent behavioural adaptation and/or risk homeostasis play a role in lowering the overall positive effect of vehicle safety features on road safety. In addition, data that speak to whether drivers feel comfortable paying less attention to driving when they have safety features on their car can help either support or reject the belief, cited by 64.8% of survey respondents, that other drivers rely too much on safety features and do not pay enough attention to their driving. Finally, self-reported data on the frequency of current and hypothetical unsafe driving behaviours help to contextualize more general concerns about road safety by exposing the circumstances and characteristics that influence some drivers to engage in the same behaviours that they cite as being very or extremely serious road safety issues.

Information on driver behaviour was collected in three different ways. First, survey respondents were asked to use a scale of one (never) to six (very often) to measure how often they engage in various activities while driving, including speeding, driving while distracted, drinking and driving, failing to wear a seat belt, falling asleep at the wheel, driving while tired, and tailgating. Responses were coded as frequently doing these things if respondents chose a four, five or six. Second, drivers had two different scenarios described to them and were asked whether they would pass a vehicle or drive the speed limit under the road conditions described without safety features and with safety features. Third, drivers were asked to rate their level of agreement with statements like "vehicle safety improvements make it less likely to get into an accident, meaning I can drive faster" on a scale of one to six, with one corresponding to "strongly disagree", and six corresponding to "strongly agree". This section details the results of this investigation.

5.1 How many drivers report engaging in dangerous behaviour while driving?

5.1.1 Overall results

Drivers were asked to rate how often they engage in six different dangerous driving behaviours: failing to wear a seat belt, driving well over the speed limit, driving when tired, falling asleep at the wheel, tailgating other drivers, driving when distracted, and driving after drinking alcohol. Seat belt use turned out to be a non-issue, with an overwhelming majority of drivers (95.5%) indicating that they often wear their seat belts while driving. When riding as a passenger in the front seat, 94.5% of drivers report often wearing their seat belts. Self-reported seat belt use decreases slightly among backseat passengers, but 88.7% of survey participants still report often wearing their seat belt in the back seat. These results concerning seat belt use are consistent with other surveys which show that the vast majority of Canadians wear their seat belts as drivers and passengers. For example, in 2007 Transport Canada concluded that 93% of Canadians

use their seat belt (Transport Canada 2007). The data from the rest of the self-reported frequency ratings is illustrated in Figure 5.1.1 below.

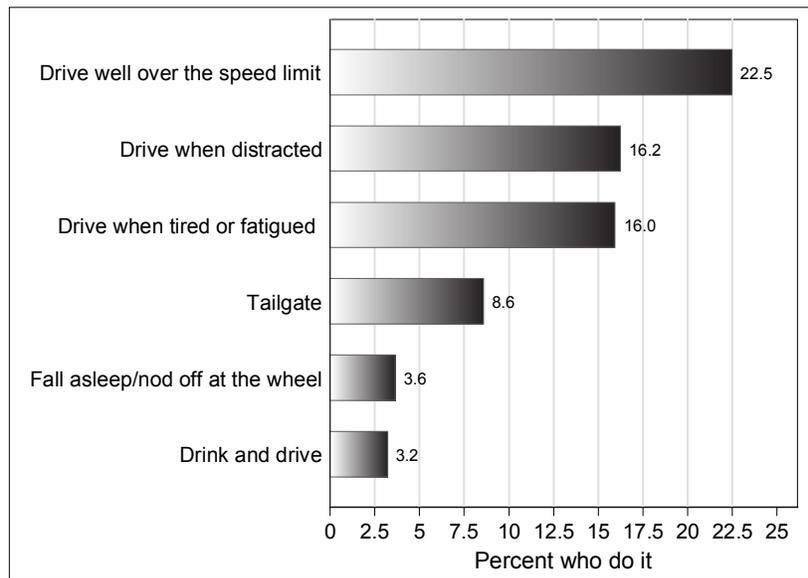


Figure 5.1.1: Self-reported frequency of engaging in dangerous driving behaviours

As shown in the graph above, over one-fifth of respondents (22.5%) reported that they often drive well over the posted speed limit, 16.2% reported that they often drive when distracted, 16% reported that they often drive when tired, 8.6% reported that they often tailgate other drivers, 3.6% reported that they often fall asleep at the wheel, and 3.2% reported that they often drink and drive.

Other public opinion polls and surveys have sought to estimate the frequency of dangerous driving behaviours. For example, in Transport Canada's 2007 report on speeding in Canada, self-reported data showed that 58% of Canadians admit to speeding on highways; 39% admit to speeding on two-lane highways and country roads; and 13% admit to speeding on residential streets (Transport Canada 2007). Transport Canada's conclusions concerning how many drivers speed show higher frequencies of speeding than the current findings, however this may be attributable to ambivalent attitudes towards what constitutes speeding or differences in the way survey questions were asked. For example, TIRF asked Canadian drivers specifically about how often they drive "well over the speed limit", while Transport Canada did not use the word "well" and instead asked about driving "over speed limits". The addition of the word "well" in TIRF's survey, combined with differing public uses of the term "speeding" may have encouraged some drivers to deny that they frequently drive well over the speed limit.

The present results about the prevalence of fatigued or drowsy driving are consistent with other very recent TIRF findings which show that 14.3% of Canadians report often driving while tired or fatigued (Vanlaar et al. 2011).

The self-reported data concerning the level of drinking and driving may seem low, given that estimates as to the number of drivers who have driven after consuming alcohol tend to hover around the 20% mark. For example, a 2011 survey by Vanlaar et al. revealed that 19.2% of drivers admitted to driving after consuming any amount of alcohol in the past 30 days (Vanlaar et al. 2012). This number, however, includes all those who have driven after consuming any alcohol, even if some of the 19.2% of drinking drivers do so very infrequently. Conversely, the survey concerning vehicle safety features asked specifically about the frequency of drinking driving behaviour, with 3.2% admitting that they often drink and drive.

Finally, since it is difficult to measure the frequency of distracted driving, some of the statistics regarding prevalence diverge. Results from one of TIRF's recent opinion polls, published in the 2011 RSM devoted to distracted driving, show that 85.7% of Canadian drivers read road signs, and 67% talk to passengers. The fact that only 16.2% of survey respondents reported driving while distracted suggests that drivers may not consider reading road signs or talking to passengers to be a source of distraction. Using a GPS and talking on a hands-free phone are more readily accepted by the driving community as sources of distraction, and self-reported data about how often drivers engage in these two activities while driving are more consistent with the 16.2% who reported driving while distracted: 19.9% admitted to frequently talking on a hand-free phone, and 17.4% reported frequently using a GPS to navigate (Vanlaar et al. 2011).

5.1.2 Demographic trends

Logistic regression was used to investigate the profile of those drivers who admit to engaging in dangerous behaviours behind the wheel. The results of that analysis are discussed in this section.

With respect to driving well over the speed limit, it was found that being concerned about excessive speeding decreases the likelihood of reporting frequently driving well over the posted speed limit by 42.4%. In other words, among drivers who admit to often driving well over the posted speed limit, most of them would not say that they are concerned about excessive speeding as a road safety issue. This finding supports previous TIRF research, specifically on mapping how drivers' perceptions of risk and overall social concern influence their participation in unsafe driving behaviour like excessive speeding. This research revealed that, in the case of excessive speeding as well as distracted driving, using a cell phone while driving, and using illegal drugs while driving, someone who believes these behaviours are risky is more likely to be concerned about them (Vanlaar et al. 2008). This conclusion is corroborated by the current data concerning speeding which show that many drivers who speed are not concerned about speeding as a road safety issue. To illustrate, with respect to driving well over the speed limit, 18.7% of those who are concerned about driving well over the speed limit admit to this behaviour, compared to 29.8% of those who were not concerned about it.

Other demographic variables were also included in the analyses and it was additionally found that the safer a driver thinks they are, the less likely they are to report that they often drive well over the speed limit. To be more precise, with each one unit increase in self-rating of driver safety (i.e., how safe a driver thinks they are), the likelihood of reporting often driving well over the speed limit decreases by 21.5%. Logistic

regression also revealed that as age increases, the chances of admitting to driving well over the speed limit decrease such that with every ten year increase in age, the chances of reporting often driving well over the speed limit decrease by 13.1%. This relationship between speeding behaviour and age has been reported across many areas of road safety research which show that young drivers – particularly young male drivers – are overrepresented as excessive speeders (Vanlaar et al. 2007; Williams et al. 2006)

Regarding frequently driving while distracted, logistic regression revealed that the safer a driver thinks they are, the less likely they are to report that they often drive when distracted. Specifically, with each one unit increase in self-rating of driver safety, the likelihood of reporting often driving when distracted decreases by 28.1%. Logistic regression also revealed that as age increases, the chances of admitting to driving when distracted decrease. More precisely, with every ten year increase in age, the chances of admitting to often driving when distracted decrease by 13.6%. This relationship with age has been confirmed by other research on distracted driving trends (Vanlaar et al. 2007; NHTSA 2010). For example, in 2010, the National Highway Traffic Safety Administration (NHTSA) in the United States found that instances of distracted driving were most common among male drivers aged 16-25 (24.4%) and least common among male drivers aged 65 and older (12.7%) (NHTSA 2010). Concern about distracted driving in general and concern about drivers using cell phones were also included as an independent variable in the analysis, but no significant effects were found.

With respect to driving while tired or fatigued, it was found that the safer drivers think they are, the less likely they are to report that they often drive when tired or fatigued. Specifically, with each one unit increase in self-rating of driver safety, the likelihood of reporting often driving when tired or fatigued decreases by 23.1%. Logistic regression also revealed that as age increases, the chances of admitting to driving when tired or fatigued decreases such that with every ten year increase in age, the chances of admitting to driving when tired or fatigued decrease by 19.8%.

With respect to falling asleep at the wheel, logistic regression revealed that the safer a driver thinks they are, the less likely they are to report that they often fall asleep or nod off at the wheel. To illustrate, with each one unit increase in self-rating of driver safety, the likelihood of reporting often falling asleep or nodding off at the wheel decreases by 22%. Logistic regression also revealed that being male significantly increases the likelihood of reporting often falling asleep or nodding off at the wheel; among males, 5.5% reported that they often fall asleep or nod off at the wheel, compared to 2% among females.

In terms of tailgating, it was found that the safer a driver thinks they are, the less likely they are to report often tailgating. More precisely, with each one unit increase in self-rating of driver safety, the likelihood of reporting often tailgating decreases by 25.5%. It was also found that being male significantly increases the likelihood of reporting tailgating. To illustrate, among males, 10.4% reported that they often tailgate, compared to 7.1% among females.

Finally, for drinking and driving, logistic regression revealed that the safer drivers think they are, the less likely they are to report driving after drinking. Specifically, with each one unit increase in self-rating of

driver safety, the likelihood of reporting often drinking and driving decreases by 29.1%. It was again found that being male significantly increases the likelihood of reporting often drinking and driving. To illustrate, among males, 4.7% said that they often drink and drive, while among females, only 1.9% said that they often do this.

In summary, of the drivers who admitted to engaging in various driving behaviours that they also reported were dangerous, some trends emerged relating to how those drivers tended to rate themselves in terms of safety, age, and gender. For the most part, the higher drivers rated themselves in terms of safety, the less likely it was that they would report engaging in dangerous driving behaviours. A similar trend was noted for age, with older drivers being less likely to report that they engage in such dangerous driving behaviour. Gender was associated in a similar way; results suggest that females are less likely than males to report that they often engage in unsafe driving behaviours. In the case of speeding, drivers who report that they are concerned about excessive speeding are 42% less likely to say that they speed. No other behaviour showed a similar correlation with concern.

5.2 Do drivers adapt their behaviour when they know they have safety features?

5.2.1 Overall results

Measuring the willingness to drive more dangerously in a vehicle that is equipped with modern safety features is a good way to determine the extent to which drivers will adapt their behaviour in ways that undermine the benefits of having safety features in the first place. After being asked to rate the seriousness of different road safety issues and to report the frequency with which they currently engage in dangerous behaviours on the road, drivers were asked how likely it would be that they would engage in various driving behaviours if their vehicle had all ten of the safety features discussed in earlier sections of the survey. Respondents were reminded that safety features help drivers maintain control of their vehicle, will warn drivers if they are making sloppy driving errors such as drifting out of their lane, and help with visibility. The results are illustrated below.

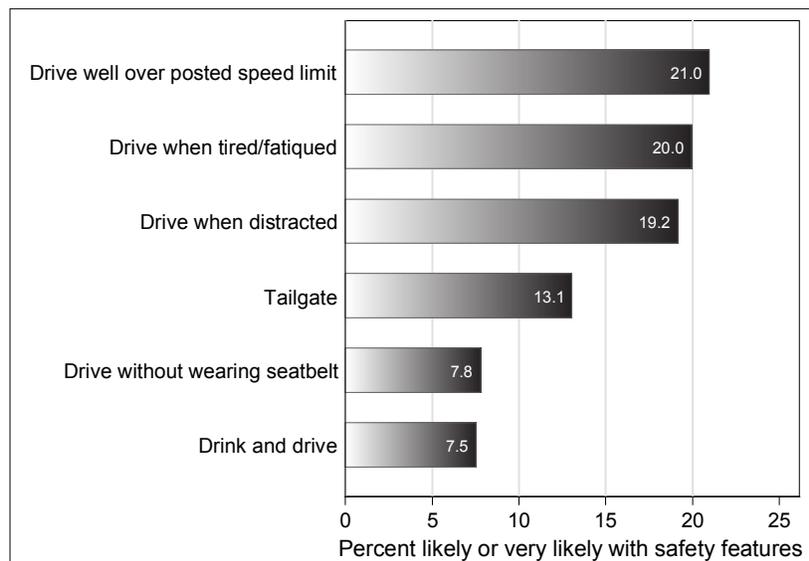


Figure 5.2.1 Willingness to engage in dangerous behaviour in a vehicle that has safety features

As can be seen in Figure 5.2.1, more than one-fifth of drivers (21%) said that they would drive well over the speed limit if their vehicle had all the safety features previously discussed. Exactly one-fifth (20%) of drivers said that they would drive when tired if they had all ten safety features, followed by 19.2% who said that they would likely drive distracted if they had all the vehicle safety features. Fewer Canadians reported that they would tailgate (13.1%), that they would drive without wearing a seat belt (7.8%), or drink and drive (7.5%) if their vehicle had all these safety features.

The results of this question suggest that at least some drivers would adapt their behaviour to some extent if they knew that they had a vehicle fully-equipped with safety features. The percentage increase in people who say that they would drive after drinking and tailgate if they had safety features is telling. While 3.2% of survey participants reported drinking and driving often (see Figure 5.1.1), this number more than doubled when asked how often they would do it if their vehicle had safety features. More precisely, 7.5% of respondents agreed that they would be likely to drink and drive if their vehicle had safety features. In a similarly concerning trend, 4.5% more drivers said that they would be likely to tailgate with safety features (13.1% versus 8.6%). This is particularly problematic since tailgating is arguably the most detrimental driving behaviour in the context of accruing benefits from safety features. All safety features need sufficient space between vehicles to produce the safety benefit, and tailgating significantly reduces the chances that a safety feature is able to work properly.

Canadian drivers were also asked to rate how much they agree with two statements relating to behavioural adaptation using a scale of one (strongly disagree) to six (strongly agree). Of some concern, 11.5% agreed or strongly agreed that vehicle safety improvements make it less likely to be involved in a crash, meaning that they can drive faster. Almost the same number (11.2%) agreed or strongly agreed that with recent vehicle safety improvements, drivers do not have to worry as much when driving on slippery road surfaces such as icy roads. Both of these results point to a certain level of ongoing risk homeostasis, where drivers react to the reduced crash-risk that results from having safety features by increasing their crash-risk (for example, by driving faster or less carefully in poor conditions) back to levels that approximate or exceed crash-risk in the absence of safety features.

5.2.2 Two driving scenarios

Drivers were read two different scenarios and asked what they would do, first if they did not have safety features on their vehicle; and, second if they had all ten vehicle safety features. The differences between what drivers were willing to do in each case highlights problematic behavioural adaptation.

The first scenario told drivers to imagine that they are driving on a rural road in early winter that is covered in a thin layer of snow. Drivers were reminded that roads are sometimes slippery in these conditions. The scenario continued with drivers approaching a slightly slower vehicle, and making the decision to pass. Drivers were then asked to report how confident they would feel passing without safety features versus with safety features. When Canadians were asked how confident they would be passing knowing that their vehicle had various safety features, 28.4% reported that they would be confident or very confident

passing in this situation. Only 12.3% said that they would feel confident passing in this situation without vehicle safety features.

For the second scenario, Canadians were read the following: "Imagine you are driving on a well-maintained highway. It is raining hard, but not so hard that it affects your ability to see. The speed limit is 90km/h. You feel that it may be risky to drive the speed limit". Drivers were then asked how likely it is that they would drive the speed limit or faster if they knew their vehicle had safety features. Results showed that 17.2% said they would be likely or very likely to drive the speed limit or faster under those conditions. Only 11% said that they would be likely to drive the speed limit or faster in the described conditions without any safety features.

What the results from the two scenario questions reveal is that some drivers report feeling more at ease driving in ways that they would normally find risky when they have safety features on their vehicle. Even when drivers feel that what they are about to do is dangerous, e.g., pass on slippery roads or drive the speed limit in inclement weather, drivers report that they would not only do these things anyway but also do them with more confidence if they had safety features. This suggests that having safety features on their vehicle instills a sense of security in drivers that may then prompt them to drive more dangerously and less cautiously. Behavioural modifications like the ones demonstrated in the driving scenarios can not only increase the frequency of dangerous driving on the roads, but can also seriously undermine the effectiveness of these safety features.

5.2.3 Characteristics of drivers who would drive less carefully if they had safety features

Logistic regression was used to investigate the profile of those who reported that they would engage in various dangerous driving behaviours if their vehicle had safety features.

With respect to driving well over the posted speed limit, it was found that being concerned about excessive speeding significantly decreases the likelihood by 47% of reporting that they would drive well over the posted speed limit if their vehicle had all these safety features. To illustrate, among those who thought speeding was a serious problem, 16.6% would speed if their vehicle had modern safety features, while among those who did not think speeding was a serious problem, 29.7% agreed that they would drive well over the speed limit if their vehicle had modern safety features. Other demographic variables were also included in the analyses and it was additionally found that the safer drivers think they are, the less likely they are to report that they would drive well over the speed limit if their vehicle had all these safety features. To be more precise, with each one unit increase in self-rating of driver safety (i.e., how safe a driver thinks they are), the likelihood of reporting they would drive well over the speed limit if their vehicle had all these safety features decreases by 17.2%.

Logistic regression also revealed that as age increases, the chances of drivers admitting to driving well over the speed limit if their vehicle had all these safety features decreases. More precisely, with every ten year increase in age, the likelihood of drivers admitting to driving well over the speed limit if their vehicle had all these safety features decreases by 15.5%. Finally, it was also found that being male significantly increases

the likelihood of drivers reporting that they would drive well over the speed limit if their vehicle had all these safety features. To illustrate, among males, 25.3% reported that they would be likely or very likely to drive well over the speed limit if their vehicle had all ten safety features, while among females, 17.1% said they would modify their behaviour in this way.

With respect to driving a vehicle equipped with modern safety features while tired or fatigued, it was found that the safer a driver thinks they are, the less likely they are to report that they would drive when tired or fatigued if their vehicle had modern safety features. Specifically, with each one unit increase in self-rating of driver safety, the likelihood of reporting often driving when tired or fatigued if their vehicle had all these safety features decreases by 12.2%. Logistic regression also revealed that as age increases, the chances of admitting to driving when tired or fatigued if their vehicle had all these safety features decreases. More precisely, with every ten year increase in age, the chances of drivers admitting to driving when tired or fatigued if their vehicle had all these safety features decrease by 13.9%.

Regarding driving when distracted in a vehicle that has safety features, logistic regression revealed that being concerned about drivers using cell phones significantly decreases the likelihood of reporting that they would drive while distracted if their vehicle had all these safety features by 47.5%. To illustrate, of those who said that cell phone use was a serious road safety problem, 15.8% would drive while distracted if their vehicle had modern safety features, while among those who said that cell phone use was not a serious road safety problem, 28% agreed that they would drive while distracted if their vehicle had modern safety features. Concern about distracted driving in general was also included as an independent variable in the analysis, but no significant effects were found. Logistic regression also revealed that the safer a driver thinks they are, the less likely they are to report that they would drive while distracted if their vehicle had modern safety features. Specifically, with each one unit increase in self-rating of driver safety, the likelihood of drivers reporting that they would drive while distracted if their vehicle had all ten safety features decreases by 11.2%.

With respect to tailgating, it was found that being concerned about tailgating significantly decreases the likelihood of reporting that they would tailgate if their vehicle had all these safety features by 42.8%. To illustrate, of those drivers who said that tailgating was a serious road safety problem, 10.1% agreed that they would be likely to tailgate if their vehicle had modern safety features, while among those who said that tailgating was not a serious road safety problem, 18.2% said that they would tailgate if their vehicle had modern safety features. It was also found that the safer a driver thinks they are, the less likely they are to report that they would tailgate if their vehicle had all these safety features. Specifically, with each one unit increase in self-rating of driver safety, the likelihood of drivers reporting they would tailgate if their vehicle had all these safety features decreases by 13.7%. Logistic regression also revealed that as age increases, the chances of admitting to tailgating in a vehicle equipped with safety features decreases such that with every ten year increase in age, the chances of drivers reporting that they would tailgate if their vehicle had safety features decreases by 13.8%.

With respect to seat belt use, it was found that the safer a driver thinks they are, the less likely they are to report that they would not wear their seat belt if their vehicle had all these safety features. Specifically, with each one unit increase in self-rating of driver safety, the likelihood of drivers reporting they would not wear their seat belt if their vehicle had all ten safety features decreases by 15.1%. Logistic regression also revealed that being male significantly increases the likelihood of drivers reporting that they would drive without wearing a seat belt if their vehicle had all these safety features. To illustrate, among males, 10.7% said that they would likely drive without a seat belt if their vehicle had all these safety features; among females, only 5.2% said that they would be likely to modify their behaviour in this way.

Finally, with respect to drinking and driving, logistic regression revealed that the safer a driver thinks they are, the less likely they are to report that they would drink and drive if their vehicle had all ten safety features. Specifically, with each one unit increase in self-rating of driver safety, the likelihood of drivers reporting they would drink and drive if their vehicle had modern safety features decreases by 16.5%. Logistic regression also revealed that reporting having ever been injured in a motor vehicle crash significantly decreases the likelihood of drivers reporting they would drink and drive if their vehicle had all these safety features. To illustrate, of those who said that they had been injured in a motor vehicle crash, 4.6% said that they would be likely to drink and drive if their vehicle had all ten safety features. In comparison, of those who reported never having been injured in a motor vehicle crash, 8.3% said that they would likely drink and drive if their vehicle had all ten safety features.

5.2.4 Behavioural adaptation and familiarity with safety features

Logistic regression was used to investigate whether the level of familiarity with safety features influences some drivers to adapt their behaviour in light of having safety features.

With respect to driving well over the speed limit in a vehicle with modern safety features, the only significant effect found was for collision warning systems. Specifically, those who said they were familiar with collision warning systems were significantly more likely to report that they would drive well over the posted speed limit if their vehicle had all of the ten safety features. To illustrate of those who reported that they were familiar with collision warning systems, 27.6% also said that they would be likely to drive well over the posted speed limit if their vehicle had all ten safety features. In comparison, of those who were not familiar with collision warning systems, 19.5% reported that they would likely drive well over the speed limit if their vehicle was equipped with modern safety features.

Regarding seat belt use in a vehicle equipped with modern safety features, the only significant effect found was again for collision warning systems. Specifically, those who said they were familiar with collision warning systems were significantly more likely to report that they would drive without wearing a seat belt if their vehicle had all of the ten safety features. To illustrate, of those who said that they were familiar with collision warning systems, 11.9% also said that they would likely drive without wearing a seat belt if their vehicle had all ten safety features. Of those who reported no familiarity with collision warning systems,

6.8% said that they would likely drive without wearing a seat belt if their vehicle were well equipped with safety features.

With respect to driving while tired or fatigued in a vehicle with modern safety features, no significant effects regarding familiarity with safety features were found. The same was the case for those driving while distracted, tailgating, and drinking and driving in a vehicle with all ten modern safety features.

To summarize, there does not appear to be a strong relationship between behavioural adaptations and being familiar with vehicle safety features. One exception is collision warning systems, familiarity with which tended to correlate with an increased willingness to speed and drive without a seat belt if the vehicle was well-equipped with modern safety features.

5.2.5 Behavioural adaptation and perceptions of usefulness of safety features

Logistic regression was also used to investigate whether those who would adapt their behaviour would be more or less likely to see safety features as useful using various indicators of respondents' perceptions of safety features. Specifically, the independent variables used in these analyses included whether respondents agreed that modern safety features will interfere with their ability to safely drive their vehicle, whether they agreed that modern safety features will make them a better driver, whether they agreed that safety features in new vehicles protect drivers from serious injury in the even of a collision, and whether they agreed that larger vehicles such as SUVs offer more protection to passengers during a collision than smaller vehicles.

With respect to driving well over the speed limit in a vehicle with safety features, it was found that thinking that modern safety features will interfere with their ability to safely drive their vehicle increases the likelihood of drivers reporting that they would do this. More precisely, agreeing or strongly agreeing that modern safety features will interfere with their ability to safely drive their vehicle increases the likelihood of drivers reporting that they would likely drive well over the posted speed limit if their vehicle had all these safety features by 99.3%. No other significant effects were found.

No significant effects were found with respect to driving while tired or fatigued in a vehicle with modern safety features.

Regarding driving when distracted in a vehicle with modern safety features, it was found that thinking that modern safety features will interfere with their ability to safely drive their vehicle increases the likelihood of drivers reporting they would drive distracted in a vehicle equipped with all ten safety features. More precisely, agreeing or strongly agreeing that modern safety features will interfere with their ability to safely drive their vehicle increases the likelihood of drivers reporting that they would likely drive when distracted if their vehicle had all these safety features by 89.1%. No other significant effects were found.

Regarding tailgating in a vehicle equipped with all ten safety features, the results were similar, yet more pronounced. It was found that agreeing or strongly agreeing that modern safety features will interfere with their ability to safely drive their vehicle significantly increases the likelihood of drivers reporting that they

would likely tailgate if their vehicle had all these safety features by 152%. No other significant effects were found.

Likewise, with respect to driving without a seat belt in a vehicle that has all ten safety features, it was found that thinking that modern safety features will interfere with their ability to safely drive their vehicle increases the likelihood of drivers reporting they would do this. More precisely, agreeing or strongly agreeing that modern safety features will interfere with their ability to safely drive their vehicle increases the likelihood of drivers reporting that they would likely or very likely drive without wearing a seat belt if their vehicle had all these safety features by 191.7%. No other significant effects were found.

Finally regarding drinking and driving in a vehicle equipped with modern safety features, it was found that agreeing or strongly agreeing that modern safety features will interfere with their ability to safely drive their vehicle significantly increases the likelihood of drivers reporting that they would likely or very likely drink and drive if their vehicle had all these safety features by 152%. No other significant effects were found.

To summarize, results of the analysis suggest that believing safety features will interfere with the ability to drive safely is closely associated with significant behavioural adaptations in response to having safety features on vehicles. In particular, drivers who agree that safety features will interfere with their ability to drive safely are significantly more likely to agree that they would drive well over the speed limit, drive while distracted, tailgate, drive without a seat belt, and drink and drive if they know that their vehicle has all ten modern safety features.

5.2.6 Behavioural adaptation and perceptions of ease of use of safety features

Logistic regression was used to investigate whether those who would adapt their behaviour in light of having safety features think that the safety features would be easy to use. The results of that analysis are reviewed in this section.

With respect to driving well over the speed limit in a vehicle that has all ten modern safety features, the only significant effect found was for ESC. Specifically, those who said they think ESC would be easy to use were significantly less likely to report that they would drive well over the posted speed limit if their vehicle had all of the ten safety features. To illustrate, of those who agreed that ESC would be easy to use, 19% said that they would drive well over the posted speed limit if their vehicle had modern safety features. In comparison, of those who said that ESC would not be easy to use, 25% said that they would be likely to drive well over the speed limit if their vehicle had modern safety features.

Regarding driving while tired or fatigued in a vehicle with all ten modern safety features, logistic regression revealed that those who said that ABS would be easy to use were significantly less likely to report that they would drive when tired or fatigued if their vehicle had all of the ten safety features. To illustrate, of those who agreed that ABS would be easy to use, 17.9% said that they would likely drive while tired or fatigued in a vehicle that had all ten safety features. In comparison, of those who said that ABS would not be easy to use, 27.3% said that they would drive while tired or fatigued if their vehicle had modern safety features.

Those who said they think adaptive headlights would be easy to use were also significantly less likely to report that they would drive when tired or fatigued if their vehicle had all of the ten safety features. To illustrate, among those who said that adaptive headlights would be easy to use, 18.6% said that they would likely drive while tired or fatigued if their vehicle had modern safety features, while among those who said that adaptive headlights would not be easy to use, 26.3% said that they would drive while tired or fatigued in a vehicle similarly equipped. In addition, drivers who said they think driver monitoring systems would be easy to use were also significantly less likely to report that they would drive when tired or fatigued if their vehicle had all of the ten safety features. Among drivers who said that driver monitoring systems would be easy to use, 18.4% said that they would drive while tired or fatigued in a vehicle that was equipped with all ten safety features. In comparison, of those who said that driver monitoring systems would not be easy to use, 25.3% said that they would likely drive while tired or fatigued in a vehicle with modern safety features.

Regarding distracted driving in vehicles with modern safety features, the only significant effect found was for ABS. Specifically, it was found that those who said that ABS would be easy to use were significantly less likely to report that they would drive distracted if their vehicle had all of the ten safety features. To illustrate, of those who said that ABS would be easy to use, 17.9% said that they would drive while distracted if their vehicle had modern safety features. In comparison, of those who said that ABS would not be easy to use, 26.6% agreed that they would likely drive while distracted in a vehicle with modern safety features.

Regarding tailgating in a vehicle with safety features, it was found that those who said they think ABS would be easy to use were significantly less likely to report that they would tailgate if their vehicle had all of the ten safety features. To illustrate, among drivers who agreed that ABS would be easy to use, 12.2% said that they would likely tailgate other drivers if their vehicle had modern safety features. In comparison, of those who said that ABS would not be easy to use, 19.2% said that they would tailgate other if their vehicle was equipped with all ten safety features. Drivers who said they think driver monitoring systems would be easy to use were also significantly less likely to report that they would tailgate if their vehicle had all of the ten safety features. Of those drivers who said that driver monitoring systems would be easy to use, 11.3% said that they would tailgate others if their vehicle had modern safety features, while among drivers who said that driver monitoring systems would not be easy to use, 16.8% said that they would likely tailgate others if their vehicle was similarly equipped.

With respect to the non-use of seat belts in vehicles with modern safety features, logistic regression revealed that those who said they think traction control would be easy to use were significantly less likely to report that they would drive without wearing a seat belt if their vehicle had all of the ten safety features. Among those who said that traction control would be easy to use, 6.8% said that they would likely drive without a seat belt if their vehicle had modern safety features. In comparison, among those who said that traction control would not be easy to use, 11.5% said that they would likely not wear their seat belt if their vehicle had all ten safety features. In addition, those who said they think adaptive headlights would be easy

to use were also significantly less likely to report that they would drive without wearing a seat belt if their vehicle had all of the ten safety features. Specifically, of those who said that adaptive headlights would be easy to use, 6.4% said that they would likely drive without a seat belt if their vehicle had modern safety features, while of those who said that adaptive headlights would not be easy to use, 12% said that they would likely drive without wearing a seat belt if their vehicle had all ten modern safety features.

Finally, with respect to drinking and driving in a vehicle with modern safety features, logistic regression revealed that those who said they think traction control would be easy to use were significantly less likely to report that they would drink and drive if their vehicle had all of the ten safety features. Specifically, among those who said that traction control would be easy to use, 6.4% said that they would likely drink and drive if their vehicle had modern safety features, while among those who said that traction control would not be easy to use, 10.3% said that they would drink and drive if their vehicle had modern safety features. Those who said they think adaptive headlights would be easy to use were also significantly less likely to report that they would drink and drive if their vehicle had all of the ten safety features. Of those who said that adaptive headlights would be easy to use, 6.2% said that they would likely drink and drive if their vehicle had modern safety features. In comparison, of those who said that adaptive headlights would not be easy to use, 12% said that they would likely drink and drink if their vehicle was similarly equipped. Lastly, those who said that driver monitoring systems would be easy to use were also significantly less likely to report that they would drink and drive if their vehicle had all of the ten safety features. Specifically, of those who said that driver monitoring systems would be easy to use, 6.2% said that they would likely drink and drive if their vehicle had all ten safety features. Of those who said that driver monitoring systems would not be easy to use, 10.5% said that they would likely drink and drive if their vehicle had modern safety features.

To summarize, drivers who agree that they would modify their behaviour if their vehicle was equipped with modern safety features were significantly more likely to disagree that certain safety features – in particular ABS, traction control, driver monitoring systems, and adaptive headlights – were easy to use.

5.3 Results summary

To summarize, concerns over the possibility of negative behavioural adaptation in response to safety technology innovations are well-founded. A concerning percentage of drivers report that they would likely engage in driving practices that are widely regarded as unsafe, including driving after drinking and tailgating if their vehicle had all ten safety features. These drivers tend to be younger, male, rate themselves as less safe, and be less concerned about the road safety ramifications of their specific type of behavioural adaptation.

On a more positive note, the fact that drivers who admit to likely engaging in problematic behavioural adaptation also tended to rate themselves lower in terms of safe driving suggests that many drivers are, to some extent, aware of how safe they really are. While some drivers may still have an over-exaggerated

sense of how safe their driving is, many driver self-ratings do reflect the fact that they admit to likely driving less safely if they had safety features. In addition, it was found that perceptions about whether safety features are easy to use tend to play a role in whether or not drivers modify their behaviour in light of having safety features. Specifically, of those drivers who report likely detrimental behaviour modifications, perceptions about the ease of use of safety features are generally low, i.e., drivers do not think safety features would be easy to use.

6.0 AWARENESS OF FACTORS AFFECTING THE PERFORMANCE OF SAFETY FEATURES

TIRF's investigation of familiarity with and perceptions of safety features also touched on Canadian drivers' awareness of factors affecting the performance of safety features, specifically whether they notice warning lights indicating potential problems with safety features, and whether they consider overall vehicle safety when purchasing aftermarket accessories (e.g., back-up cameras, seatcovers, hood deflectors, rims). The purpose of gauging driver attitudes towards warning lights and aftermarket accessories was to determine, among other things, the extent to which drivers seem to trust that their safety features would continue to function irrespective of any interfering action on the part of the driver, and to uncover any existing demographic trends.

6.1 Do Canadian drivers respond to dashboard warning lights?

6.1.1 Overall results

Survey participants were asked to rate the extent to which they agreed with the statement that they quickly notice warning lights for vehicle safety systems on the dashboard of the vehicle, such as engine, brake, or low fuel lights. A response of one corresponded to strongly disagreeing, while a response of six corresponded to strongly agreeing. In total, 73.8% of Canadian drivers said that they agreed or strongly agreed that they quickly notice warning lights (i.e., selected a five or a six).

Drivers were then asked to again rate the extent of their agreement with the statement that when they do notice warning lights for vehicle safety systems on the dashboard of the vehicle, they immediately address the issue. Fewer drivers said that they addressed warning lights immediately, with only 66.3% of people agreeing or strongly agreeing that they did.

Of some concern, 26.2% of drivers surveyed did not agree that they quickly notice warning lights on the dashboard relating to vehicle safety systems. This is somewhat problematic, because a driver who is not aware of warning lights may continue to think that he or she has the benefit of the extra protection afforded by safety features, and so may tend to drive less cautiously. In reality, this driver may no longer be operating a vehicle with functioning safety systems and may not receive the maximum protection.

6.1.2 Demographic trends

TIRF investigated the characteristics of Canadian drivers who did not agree that they quickly notice warning lights in order to expose any underlying trends or patterns in the profile of these drivers. Logistic regression was used to investigate the profile of those who notice warning lights for vehicle safety systems on the dashboard of their vehicle. This analysis revealed that the safer a driver thinks they are, the more likely they are to agree or strongly agree that they notice warning lights for vehicle safety systems on the dashboard of their vehicle. To be more precise, with each one unit increase in self-rating of driver safety (i.e., how safe a driver thinks they are), the likelihood of reporting noticing warning lights on the dashboard of the vehicle

increases by 12.2%. It was also found that as age increases, the likelihood of reporting noticing warning lights on the dashboard of the vehicle also increases. Specifically, with every ten year increase in age, the chances of reporting noticing warning lights on the dashboard of the vehicle increase by 18.7%. Other control variables were included in the analysis (e.g., gender); however, no other statistically significant relationships were found.

Logistic regression was also used to see whether those who quickly notice warning lights pertaining to vehicle safety systems on the dashboard of their vehicle are more or less familiar with ten vehicle safety features. These analyses revealed that those who said they were familiar with ESC were significantly more likely to report that they quickly notice warning lights for vehicle safety systems on the dashboard of their vehicle. To illustrate, of those who reported that they are familiar with ESC, 81.6% also reported that they quickly notice warning lights on the dashboard. In comparison, of those drivers who reported no familiarity with ESC, 71.2% said that they quickly notice warning lights on the dashboard.

It was also found that those who said they were familiar with ABS were significantly more likely to report that they quickly notice warning lights for vehicle safety systems on the dashboard of their vehicle. In this case, of those who agreed that they were familiar with ABS, 77.3% said that they quickly notice warning lights for vehicle safety systems on the dashboard, while among those who were not familiar with ABS, only 57.5% said that they quickly notice warning lights on the dashboard.

It was also found that those who said they were familiar with driver monitoring systems were significantly more likely to report that they quickly notice warning lights for vehicle safety systems on the dashboard of their vehicle. To illustrate, of those who cited familiarity with driver monitoring systems, 83.4% said that they quickly notice warning lights for vehicle safety systems on the dashboard. In comparison, among those who were not familiar with driver monitoring systems, 73.1% said that they quickly notice warning lights relating to vehicle safety systems.

To summarize, older drivers and drivers who rate themselves highly in terms of safety are also more likely to agree that they quickly notice warning lights on the dashboard of their vehicles. Also, familiarity with ESC, ABS, and driver monitoring systems was correlated with quickly noticing warning lights on the dashboard.

6.2 Aftermarket accessories

Aftermarket accessories like remote starters, seat warmers, and floor mats are popular items among car-buyers. However, drivers may not always be aware of the effects that aftermarket accessories³ could have on overall vehicle safety and safety feature performance. Some accessories come into close contact with crucial components of vehicle safety systems and therefore may have a detrimental influence on the performance of those systems.

6.2.1 How many Canadians purchased aftermarket accessories?

³ Note that when respondents were asked about aftermarket accessories, the questions did not differentiate between accessories that are produced by the vehicle manufacturer and those sold in store. Respondents were simply asked whether they have bought accessories for their vehicle and were given a few examples of commonly purchased accessories such as seat covers, security alarms, or rims.

Canadians were asked if they have bought aftermarket accessories for their vehicle and 43.2% indicated that they had. The remaining 56.8% reported that they had not bought aftermarket accessories for their vehicle.

Canadians who said that they had purchased aftermarket accessories were then asked to list three accessories that they have bought for their vehicles. By far, the most common accessory listed first was floor mats (42.9%). This was followed by remote starters/lockers (11%), interior comfort items such as seat warmers or steering wheel covers (8%), and exterior appearance items such as hubcaps and spoilers (6.7%). The remaining answers given were under 5% and include accessories like licence plate accessories, weather protection items, tires, and rims.

TIRF conducted further analyses to find out if there were any common characteristics among drivers who purchased aftermarket accessories. Logistic regression was used to investigate the profile of those who have bought aftermarket accessories for their vehicle including their top priority when buying a new vehicle.

Results showed that driving more kilometres in a typical month significantly increases the likelihood of buying aftermarket accessories. More precisely, with every extra 500 kilometres driven per month, the chances of drivers admitting to buying aftermarket accessories increase by 9.1%. Logistic regression also revealed that being male significantly increases the likelihood of reporting purchasing aftermarket accessories. In this case, among males, 47.9% had purchased an aftermarket accessory for their vehicle, while among females, 39% had purchased an aftermarket accessory. It was also found that having ever been injured in a motor vehicle crash increases the likelihood of admitting to buying aftermarket accessories. Specifically, of those who reported having been injured in a motor vehicle crash, 51.4% had purchased an aftermarket accessory for their vehicle. In comparison, among those who reported never having been injured in a motor vehicle crash, 41.1% had purchased an aftermarket accessory for their vehicle.

With regard to Canadians' top priorities when buying a new vehicle, it was found that those whose top priority when buying a new vehicle was the power or performance of the vehicle were significantly more likely to report they bought aftermarket accessories for their vehicle. More precisely, those who said they have bought aftermarket accessories for their vehicle were almost four times more likely to report that their top priority when buying a new vehicle was the power or performance of the vehicle.

Finally, it was found that those who listed passenger capacity as their top priority when buying a new vehicle more likely to report that they bought aftermarket accessories. More precisely, those who said they have bought aftermarket accessories for their vehicle were more than 27 times more likely to report that their top priority when buying a new vehicle was passenger capacity.

6.2.2 Do Canadian drivers think aftermarket accessories are safety tested?

Canadians were asked how likely they think it is that aftermarket accessories have been safety tested using a scale from one to six where one meant not likely at all and six meant very likely. Slightly more than one-fifth of Canadians (22.2%) reported that they think it is likely or very likely (i.e., chose a five or a six) that aftermarket accessories have been safety tested. Drivers were also asked to use the same scale to indicate how likely it is that the safety testing of aftermarket accessories is regulated to the same extent as vehicle safety testing. Almost one-fifth of Canadian drivers (17.6%) agreed that this was likely or very likely. In addition, drivers were asked whether they assumed an aftermarket accessory is safe because it is sold in-store. A little over one-third (33.8%) answered yes.

Drivers were surveyed about whether they thought it was important to look for aftermarket accessories that were produced by the same manufacturer as their vehicle and designed for their vehicle model. Using a scale from one (not important) to six (very important), only about one-third of Canadians said that it was important or very important that aftermarket accessories are produced by the same manufacturer as their vehicle. Finally, 30.5% of Canadian drivers said that they would buy an aftermarket accessory not specifically designed for their vehicle.

6.3 Aftermarket accessories and safety features performance

Survey participants were asked how likely they think it is that aftermarket accessories may negatively affect safety features built in to their vehicles using a scale of one (not likely at all) to six (very likely). Only 14.7% reported that it was likely or very likely that aftermarket accessories may undermine built-in vehicle safety features.

This low percentage is concerning particularly in light of the fact that approximately two-thirds of Canadians do not think it is important to match vehicle manufacturers with aftermarket accessory manufacturers. When an aftermarket accessory designed for a specific make or model of vehicle is purchased and installed on a vehicle of a different make or model, it is difficult to predict the extent to which this accessory may interfere with the built-in safety features of the vehicle. Furthermore, since most aftermarket accessories are not safety tested or regulated to the same extent as vehicles, there is very little information available concerning the potentially negative effects of aftermarket accessories on safety features particularly when installed on vehicles for which they were not specifically designed or tested. Given limited information, consumers are likely to make assumptions regarding the safety of these accessories (e.g., to assume they are safe for any vehicle because they are sold in-store), which in turn puts them at an increased risk of buying an accessory that is incompatible with the proper functioning of the built-in safety systems on their particular vehicle.

Logistic regression was used to see whether those who think that aftermarket accessories may negatively affect vehicle safety features are more or less familiar with ten vehicle safety features. Significant effects were only found for ESC and brake assist. Specifically, those who reported that they were familiar with ESC were significantly more likely to report that they think that aftermarket accessories may negatively affect

vehicle safety features. To illustrate, among those who reported being familiar with ESC, 81.6% agreed that aftermarket accessories may negatively affect the performance of vehicle safety features, while among those who were not familiar with ESC, 71.2% of drivers held similar beliefs about aftermarket accessories. Finally, drivers who reported that they were familiar with brake assist were also significantly more likely to report that they think that aftermarket accessories may negatively affect the performance of vehicle safety features. More precisely, among those who reported being familiar with brake assist, 75.3% agreed that aftermarket accessories may negatively affect the performance of vehicle safety features, while among those who reported no familiarity with brake assist, 72.1% agreed that aftermarket accessories could negatively affect vehicle safety features.

6.4 Results summary

To summarize, it seems that while the majority of Canadians notice and respond to warning lights on the dashboard related to vehicle safety systems in an appropriate and timely way, there appears to be confusion regarding the safety of aftermarket accessories. A concerning number of drivers assume that aftermarket accessories are safety tested, or are safe simply because they are sold in-store.

Specifically, drivers require more information about how important it is that the aftermarket accessories that they purchase are produced by the same manufacturer as their vehicle, and/or are designed for their vehicle model. The majority of Canadian drivers do not think it is important for the manufacturer of their accessories and of their vehicles to match. This is problematic because mismatching aftermarket accessories across vehicle makes and models can potentially contribute to that an aftermarket accessory negatively interfering with the performance of a vehicle safety system. In order to ensure that built-in vehicle safety systems are able to perform at optimal levels, drivers are encouraged to discard assumptions about the safety of aftermarket accessories and to instead seek more accurate information about these items and the extent of their potential safety implications.

7.0 CONCLUSION

The results of TIRF's poll on attitudes, perceptions, and behaviours towards modern vehicle safety features expose a lingering knowledge gap about such safety features among Canadian car-buyers. Specifically, although drivers consistently rank safety as one of the most important considerations when buying a new car, they are generally still unfamiliar with many common safety features. With the exception of ABS and traction control, only about one-third of Canadian drivers reported having any familiarity with several vehicle safety features. Of note, ESC, which has shown remarkable potential to reduce serious collisions and rollovers, received few reports of driver familiarity. In addition, men generally reported being far more knowledgeable about safety features than women. Perhaps on a related note, men also agreed that safety features would be easy to use more often than women.

When perceptions of ease of use, perceptions of usefulness, and levels of familiarity were compared with the willingness to use safety features if they were on vehicles, results showed that drivers who perceive safety features as being more useful to them (i.e., agreed or strongly agreed with the statement "this feature would make me a better driver") were much more likely to agree that they would use that safety feature if it was on their vehicle. Corroborating this finding, drivers who said that safety features would interfere with their ability to drive safely were much less likely to agree that they would use safety features if they were on their vehicle. Thus, perceptions of usefulness or, conversely, lack of usefulness, have a very significant influence on whether drivers will use new technology.

A similar relationship was found between perceptions of ease of use of safety features and willingness to use them if they were on vehicles, but the correlation was not as strong. In the case of brake assist and adaptive headlights, familiarity with those safety features was strongly linked to being more willing to use them if they were on vehicles. However, a driver's level of familiarity with the rest of the safety features was not revealed to have a great influence on their intentions to use them. Finally, age was consistently shown to have a significant impact on the willingness to use safety features, with increases in age being correlated with increases in a driver's willingness to use safety features.

It is important to note that while the strong influence of perceptions of usefulness on the intention to use safety features was made very clear, overall many Canadian drivers reported that they do not perceive safety features generally as being useful to protect vehicle occupants in the event of a crash. Similarly, the majority of drivers did not agree that it was important to have up-to-date safety features on their vehicle. These results expose the need to clarify and cement the connection between safety features and road safety. Drivers must have access to information about the usefulness of safety features so that they can properly determine whether or not to use them. It seems likely that while familiarity was not as strongly correlated with the intention to use safety features as were perceptions of usefulness, learning more about safety features and becoming more familiar with how and when to use them can encourage drivers to form more accurate perceptions of the usefulness of those features, which, in turn, will likely contribute to an overall increased willingness to use safety features.

Analysis of the survey responses also revealed that many Canadian drivers admit that they would drive less cautiously if they knew that their vehicle had all ten safety features included in the survey. More precisely, drivers showed an increased willingness to drive while distracted, drive tired, drive after consuming alcohol, tailgate other drivers, and drive without wearing a seat belt. These results suggest that safety features can deliver a false sense of security to drivers, which may result in problematic behavioural adaptation. Younger drivers, males, drivers who rate themselves low in terms of safety, and drivers who are relatively unconcerned about other road safety issues seem to be particularly susceptible to this false sense of security and are more prone to problematic behavioural adaptation as a consequence. Finally, believing that safety features are difficult to use seems to influence negative behavioural adaptation, with more drivers who report likely detrimental behaviour modification also saying that they do not think certain safety features would be easy to use.

When it comes to awareness of factors that affect the performance of safety features, Canadian drivers seem to be aware of the relevance of warning lights on the dashboard to overall vehicle safety, with the majority of drivers reporting that they notice and respond immediately to lights on the dashboard. However, the potentially negative effects of aftermarket accessories are generally not understood or not appreciated. This suggests that drivers are in need of more information regarding the safety, safety regulations, standards and testing of aftermarket accessories, and that this information must be accessible to drivers who would otherwise assume that all or most aftermarket accessories have little or no effect on the performance of vehicle safety systems in different makes and models of vehicles.

Future research in the area of driver familiarity with and perceptions of vehicle safety features can take several directions. TIRF's current findings already suggest areas where more work is required to bring public attitudes towards vehicle safety more in line with research evidence. In addition, the results contained in this report can be used to investigate the best ways to encourage drivers to use new safety features, and the specific age and gender groups that may require more targeted information. The need to make safety information more widely available is made especially clear by the general lack of familiarity with safety features, but in addition to this, the strong influence of perceptions of usefulness on the willingness to use safety features suggests that focusing in particular on how safety features benefit drivers in real-world driving situations may significantly increase overall willingness to use them. Safety features have been carefully engineered to be as easy to use as possible, and drivers seem to be aware of this, with a strong majority of Canadian drivers reporting that they think safety features would be easy to use. However, data concerning low perceptions of usefulness suggest that this is an area that may require more focused attention, and may have significant effects in terms of encouraging drivers to use modern safety features.

Finally, the results in this report suggest that some degree of negative behavioural adaptation can be expected to accompany advances in vehicle safety technology. To help mitigate the tendency towards this type of behavioural adaptation, drivers must be made aware of the design and function limitations of these safety features. Furthermore, drivers should be encouraged to appreciate their crucial role in the driving experience, and to understand how abandoning that role to greater and lesser extents undermines both

the effectiveness of safety features and overall road safety. For this purpose, the profiles of drivers that would be most likely to adapt their driving behaviour in ways that are detrimental to the performance of safety features have been mapped to help form the basis of more tailored, demographic-specific campaigns to raise awareness of safety features and to reduce instances of problematic behavioural adaptations.

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