

THE CASE FOR A 0.05% CRIMINAL LAW BLOOD-ALCOHOL CONCENTRATION LIMIT FOR DRIVING

Erika Chamberlain and Robert Solomon

June 2002

Corresponding Author

Robert Solomon
Faculty of Law
University of Western Ontario
London, Ontario, Canada
N6A 3K7
rsolomon@uwo.ca

We would like to thank Drs. R. Mann, S. Pitel, B. Pless, E. Single and the anonymous reviewers for their helpful comments on earlier versions of this paper. We are also indebted to Mothers Against Drunk Driving (MADD) Canada for its financial support of the project.

INTRODUCTION

Canada established its current 0.08% *Criminal Code* blood-alcohol concentration (BAC) limit for drivers in 1969.[1]* At the time, this was a substantial improvement, as it established a *per se* BAC limit under the criminal law and required impaired driving suspects to provide breath samples. However, in the more than three decades that have followed, breath-testing instruments have become more accurate, public attitudes toward impaired driving have hardened, and scientific research has established that impairment begins at levels below 0.08%. In response, the international trend was and continues to be to reduce *per se* BAC limits to 0.05% or lower. The legal BAC limits of various countries are not always uniformly reported. The legal limit is reported to be 0.05% in numerous countries, including: Argentina, Australia, Austria, Belgium, Bulgaria, Croatia, Denmark, Finland, France, Germany, Greece, Iceland, Israel, Italy, Macedonia, the Netherlands, Norway, Portugal, Slovenia, and Spain. Russia and Sweden have a legal limit of 0.02%, and Poland has a limit of 0.03%. Finally, the official limit is reported to be 0.00% in the Czech Republic, Hungary, Malaysia, Romania, Saudi Arabia, and Turkey, while Japan's limit is 0.00% in practice.[2][3][4]

Nevertheless, the Canadian federal government has been reluctant to follow this international trend. In 1999, the House of Commons Standing Committee on Justice and Human Rights received numerous submissions supporting a 0.05% BAC limit. However, in its final report, *Toward Eliminating Impaired Driving*,[5] the Standing Committee rejected the proposals to lower the *Criminal Code* BAC limit to 0.05%. The Committee's reasons included: "a lack of

* The *Criminal Code*, R.S.C. 1985, c. G46, defines the offence of impaired driving to include both driving while one's ability to do so is impaired by alcohol or drugs (s. 253(a)) and driving with a BAC above 0.08% (s. 253(b)). Although drinking drivers with BACs below 0.08% may be convicted under s. 253(a), this is uncommon. Consistent with usual practice in Canada, we have used the term "impaired driver" in a narrower sense to refer to drivers with BACs above 0.08%, unless otherwise indicated.

scientific evidence that there would be any value in lowering the legal BAC limit”, a “lack of consensus among experts in the field”, “a loss of public support”, and “additional enforcement burdens.” Finally, concerns were expressed that there would be insufficient police and judicial resources to cope with a lower BAC limit, because it would “more than double the number of drivers who would be liable to prosecution.”

Unfortunately, the Committee failed to carefully analyze the 0.05% issue or consider the growing body of relevant research. The concerns the Committee expressed about a 0.05% BAC limit were either unfounded or exaggerated, and its conclusion on the issue is contrary to the weight of evidence on the traffic safety benefits of lowering BAC limits. In our view, the 0.05% issue warrants a far more thorough consideration, particularly in Canada.

Despite the progress that has been made, impaired driving remains, by far, the leading criminal cause of death[6][7][8] and one of the leading criminal causes of injury[6][9] in Canada. In recent years, alcohol-related crashes have claimed between two and three times as many lives annually as all violent crimes combined.[8] Alcohol-related crashes have been estimated to cost Canadian society between 1.5 and 10 billion dollars a year.[10] Opinion poll data indicate that millions of Canadians continue to drink and drive, many in situations when they thought they were over the legal limit.[11][12][13] As we shall discuss, Canada already lags far behind the world leaders in traffic safety in terms of the high percentage of impairment among its fatally-injured drivers.

The purpose of this paper is to review the evidence regarding the potential benefits of creating a 0.05% *Criminal Code* offence in Canada. Although the exact details must be left to the legislative process, what is envisaged is a federal summary conviction offence that would include: ticketing and other streamlined procedures for processing cases; the option of entering a

guilty plea without a court appearance; substantially lower penalties than the existing 0.08% BAC offence; and provisions to protect first-time 0.05% BAC offenders who do not re-offend from having a permanent criminal record.

Unlike the situation in many jurisdictions, no single level of government in Canada has comprehensive constitutional authority over impaired driving. Under the *Constitution Act, 1867*,^[14] the federal government may enact criminal offences prohibiting various aspects of drinking and driving, but has no authority to regulate driving or licensing. Even if the federal government wanted, it could not impose administrative licence suspensions on drinking drivers or interfere with the provinces' and territories' administrative licence suspension initiatives. In turn, the provinces and territories have broad authority over roads, driving and licensing, and can create offences in relation to these matters. However, the provinces and territories do not have the constitutional authority to create crimes.

The proposed criminal 0.05% offence would not replace, but rather would complement, both the existing *Criminal Code* impaired driving offences and the provincial and territorial administrative licence suspension legislation. Thus, for example, an Ontario driver whose tested BAC was 0.07% would be subject to both a 12-hour licence suspension under the provincial *Highway Traffic Act*^[15] and a criminal charge of driving with a BAC above 0.05% under the federal *Criminal Code*.^[16]

This paper is divided into four sections. The first briefly examines the research on the adverse effects of small amounts of alcohol on driving-related skills and abilities. The second section reviews the studies on the increased relative risks of fatal crashes among drivers at various BAC levels. In the third section, we discuss the real-world impact of lowering various administrative and criminal BAC limits in Canada and abroad. The fourth section addresses the

arguments, drawn primarily from the Committee report, that have been raised in opposition to introducing a 0.05% *Criminal Code* BAC offence in Canada.

In the conclusion, we argue that the evidence supports the introduction of a 0.05% *Criminal Code* offence. Contrary to the Committee report, we suggest that a 0.05% *Criminal Code* BAC limit is an essential element of any meaningful reform of Canada's federal impaired driving laws. Although the issue falls outside the scope of this paper, in our view the other essential element is the enactment of broader and more efficient police powers to stop vehicles, detect drinking drivers, and gather evidence of impairment.

Given the unique constitutional division of legislative powers between Canada's federal and provincial governments, there is no exact parallel that can be drawn from the international experience with lower BAC limits. Moreover, no two jurisdictions have identical legislation governing police powers, driver licensing, alcohol regulation, or the other variables that would likely affect the impact of lowering various types of BAC limits. Since there is no one conclusive study or perfect analogy, all of the relevant evidence from Canada and abroad must be considered. In our view, one cannot predict the exact nature or specific magnitude of the traffic safety benefits that will result from creating a new *Criminal Code* 0.05% BAC offence. Nevertheless, as will be shown, the weight of the evidence indicates that this measure will contribute to significant reductions in drinking and driving, and resultant crashes, injuries and fatalities.

While this paper focuses on Canada's legal and enforcement framework, the majority of the discussion is applicable to any country contemplating a change in its legal BAC limit. Evidence on the effects of alcohol on driving-related skills and the relative risk of crash is relevant to drivers in any jurisdiction. The review of the real-world experience with lower BAC

limits encompasses diverse BAC laws drawn from numerous countries. Moreover, many of the arguments made against a 0.05% *Criminal Code* BAC limit in Canada have been raised before in other jurisdictions and, no doubt, will be raised again whenever lower BAC limits are proposed.

SECTION I. EFFECTS OF LOW DOSES OF ALCOHOL

International medical and traffic safety studies spanning several decades have established that driving-related skills and driving performance are adversely affected by relatively small and moderate amounts of alcohol. As early as 1960, a British Medical Association report stated that “a concentration of 50 mg% of alcohol in 100 ml of blood while driving a motor vehicle is the highest that can be accepted as entirely consistent with the safety of other road users.”[17] More recently, the authors of a review of 109 studies on the effects of low doses of alcohol concluded that there is “strong evidence that impairment of some driving-related skills begins with any departure from a zero BAC.”[18] Moreover, they found that those skills and abilities considered to be most important for driving were among the most sensitive to alcohol. We briefly summarize below the evidence relating to several of the key skills and abilities.

(a) Vision

Studies consistently show that visual functions are adversely affected at BACs as low as 0.03%.[18] Because alcohol generally has a relaxing effect on muscles, it impairs the ability to control the fine, discrete muscles that move and focus the eyes.[19] Specifically, BACs between 0.03% and 0.05% interfere with voluntary eye movements and impair the eyes’ ability to rapidly track a moving target.[20] The ability to track objects is critical to driving, as drivers must be able to focus on certain objects and track them as the object and their own vehicles move. A

driver's ability to focus is impaired by alcohol's relaxing effect on the muscle that controls the shape of the eye's lens.[19]

Further, research indicates that drivers who have been drinking move their eyes less frequently and fixate on one area for longer periods of time. Visual acuity is hampered because alcohol reduces the amount of oxygen in the bloodstream, and thereby impairs the sensitivity of the cones at the back of the eyeball, which help to transmit colour images from the retina to the brain. Drinking drivers may also suffer from double vision, as their relaxed eye muscles impair the eyes' ability to work together. This affects the driver's ability to judge distance, which has been found to be impaired at BACs as low as 0.047%.[18] As a result of this decreased depth perception, drivers may have difficulty changing lanes, passing other cars, or determining whether a vehicle is moving toward or away from them.[19]

Alcohol can also affect a driver's night vision.[21] Drivers who have been drinking have a slower recovery rate from headlight glare, as it takes longer for their pupils to enlarge again after being exposed to bright light.[19] The alcohol-reduced sensitivity of the rods and cones exacerbates the already difficult task of seeing in low light, reducing a driver's ability to detect objects in the field of view. This is of particular concern because drinking drivers tend to be more prevalent at night.[22] Finally, drivers who have consumed relatively moderate amounts of alcohol have reduced peripheral vision, and are less likely "to perceive or recognize objects and signals outside the central visual field." [23] One study found that the deficit in peripheral detection ability is 6% at a BAC of 0.02%, and 20% at BACs between 0.05% and 0.08%.[23]

(b) Vigilance and Drowsiness

Low doses of alcohol have a negative effect on vigilance and drowsiness.[18] In their 2000 literature review, Moskowitz and Fiorentino reviewed nine studies on vigilance,

comprising eighteen separate test results. Every study found impairment of vigilance tasks at BACs of 0.03% and above. These studies generally tested the subjects' ability to sustain attention or remain alert over extended periods of time. These skills are critical if drivers are to remain watchful for hazards, particularly when the drive is long, routine or uneventful.

Somewhat related to the vigilance issue are the studies that show that drivers with BACs as low as 0.01% are likely to fall asleep faster than sober drivers.[18] This is particularly important because recent studies have indicated that drowsy drivers are a notable traffic safety concern. For example, the Australian Federal Office of Road Safety has estimated that 25% to 35% of all fatal crashes involve driver fatigue.[24] Traffic authorities in New Zealand estimated that fatigue is involved in 5% of injury crashes and 8% of fatal crashes. However, they noted that these figures likely underestimate the problem, given the difficulty of recognizing fatigue as a contributing factor in a crash.[25]

Further, approximately one-third of all fatal crashes involving fatigue in New Zealand also involved a driver who had been drinking.[25] A similar pattern was found in a New York study, where more than one in three drivers surveyed after a drowsy driving crash admitted that they had consumed alcohol.[26] Even small amounts of alcohol can enhance the effects of drowsiness, and the risk patterns for drowsy and drinking drivers often overlap.[26] As with alcohol-related crashes, driver fatigue crashes most often occur during late-night hours[26][27] or on the weekend,[28] involve a single vehicle,[26] and cause serious injuries or death.[29] Alcohol-related and driver fatigue crashes are also more likely to involve young male drivers than other types of crashes.[26] While some of these similarities can be attributed to lifestyle patterns, it is notable that drowsiness affects the same set of driving-related skills as low doses of alcohol, particularly reaction time, vigilance and information processing.[26]

(c) Psychomotor Skills

Low doses of alcohol can adversely affect the psychomotor skills related to driving, especially steering and braking. One study indicated that significant impairment of steering ability begins with BACs as low as 0.035%.^[30] Similarly, a Canadian study conducted on closed roads and airport taxiways found that subjects with a mean BAC of 0.06% had significantly impaired performance in steering accuracy.^[31] In another study, drivers with a mean BAC of 0.042% hit substantially more cones in an evasive manoeuvre at 50 km per hour.^[32] That study also recorded significant declines in braking ability at that same BAC. Finally, a more recent American experiment, which tested impairment at various BACs on a closed driving course, found that braking ability was decreased by approximately 30% at BACs of 0.03%.^[33]

(d) Information Processing

Alcohol consumption adversely affects the brain's ability to process information. Drivers who have been drinking take longer to respond to stimuli like road signs and traffic signals. As a result, they tend to take notice of fewer sources of information than drivers with 0.00% BACs.^[20] Alcohol also affects the ability to reason and form a decision, which results in drivers taking longer to respond to road hazards.^[34] Taken together, these factors suggest that drivers who have consumed even small or moderate amounts of alcohol will have a delayed response to traffic situations. While most studies have examined and found impairment of information processing skills under "normal" driving conditions, the risks would likely be greatly increased in more demanding or emergency situations, such as poor weather or a potential crash.

The United States Transportation Research Board has used a four-stage model to explain the driver's decision-making process.[35] According to this model, a driver must see a situation developing, recognize it, decide how to respond, and perform the required physical tasks, such as braking and steering. This model combines perceptual, cognitive and psychomotor abilities. The Board concluded that the first three stages are directly and adversely affected by low BACs, in terms of both speed and accuracy. Moreover, while the speed of response in the final phase is not measurably affected by small amounts of alcohol, the Board noted that this stage is often compromised by a "speed-accuracy trade-off." In other words, subjects respond as quickly, but more inaccurately. This risk of an inappropriate or inaccurate response occurs at BACs as low as 0.021%. Thus, drivers who have consumed even small amounts of alcohol are less likely to respond as quickly or appropriately when confronted by a hazard requiring a quick decision, such as suddenly encountering a cyclist on the road.

(e) Divided Attention Skills

In addition to information processing, drivers' ability to recognize and respond appropriately to dangerous situations is also dependent on the ability to divide their attention between or among tasks. Experimental studies have reported that small amounts of alcohol have their greatest effects on divided attention skills, which may be impaired even at BAC levels below 0.01%.[18] The tests that measure these skills require the subjects to perform two tasks at the same time, typically a central tracking task and a peripheral visual search task. This closely resembles driving, which, for example, requires drivers to maintain their lane position while constantly scanning the environment for hazards.

These effects of alcohol were recently examined in a National Highway Traffic Safety Administration (NHTSA) study, involving 168 subjects of various ages with different patterns of

drinking.[36] It required the subjects to perform both divided attention and driving simulator tasks. The divided attention test required the subjects to perform a tracking task in combination with a peripheral search and recognition task. The driving simulator tested the subjects' abilities in rural, suburban and urban environments, with various traffic hazards and peripheral signals. In total, the two sets of tests involved fourteen different response measures.

Prior to the tests, the subjects participated in practice sessions to become familiar with the apparatus. The subjects' performance without drinking was then tested to provide a baseline for comparison (the "pre-treatment score"). The official tests were performed on two days, one week apart. On each of the testing days, half of the subjects received a placebo and half were tested at 0.02% BAC intervals on a descending scale. To produce this descending scale, most subjects were given sufficient alcohol to obtain a BAC of 0.10%, while the light drinkers were provided with alcohol to a peak BAC of 0.08%. The subjects then participated in the tests as their BACs declined to 0.00%. The final driving simulator tests were performed when the subjects' BACs were 0.02%, while the final divided attention tests were performed when the subjects' BACs reached 0.00%. The authors, Moskowitz *et al.*, noted that testing on a descending BAC may underestimate impairment, which is generally more pronounced as an individual's BAC is rising.

A subject's performance was classified as "impaired" if he or she scored more poorly, relative to his or her pre-treatment score, with alcohol than with the placebo. Although it is beyond the scope of this paper, it is interesting that the individuals' driving-related skills remained adversely affected by their drinking even after their BACs had fallen to 0.00%.

Of the divided attention tasks, the researchers measured reaction time, tracking error, and the number and percentage of incorrect responses on the peripheral search and recognition task.

The measures most sensitive to low doses of alcohol were tracking error and reaction time. Figure 1 illustrates Moskowitz *et al.*'s findings with respect to selected divided attention tasks.

[Insert Figure 1 approximately here]

On the driving simulator, Moskowitz *et al.* examined speed deviation, lane deviation, the number of times over the speed limit, reaction time, the number of collisions, and the number and percentage of incorrect responses to peripheral road signals. Of these, the most sensitive to small amounts of alcohol were lane deviation, speed deviation, and the number of times the subject exceeded the speed limit. Figure 2 illustrates the study's conclusions respecting selected measures on the driving simulator.

[Insert Figure 2 approximately here]

On the whole, the study found that, at a BAC of 0.04%, more than half of the subjects were "impaired" in all but two of the fourteen response measures. By 0.06%, more than half were impaired in all of the responses measured. Furthermore, the individual response measures for each part of the study were added together to produce a composite score, or "performance index," for the divided attention skills and for the driving simulator tasks. As indicated in the above graphs, the performance indices revealed that 82% of the subjects' divided attention skills were impaired at a BAC of 0.06%, and 84% had impaired performance on the driving simulator at the same BAC. The authors stated that the "major conclusion of this study is that a majority of the driving population is impaired in some important measures at BACs as low as 0.02% BAC. Although research at BACs below 0.03% has been limited, the scientific literature contains no evidence of a threshold BAC below which impairment does not occur."

Apparently, the authors did not test subjects whose peak BACs were in a more moderate range. In fairness, it may well be argued that subjects whose peak BACs were, for example,

0.04% would have performed better than if their peak BACs were 0.10% and they were tested when their BACs had fallen to 0.04%. This fact may help explain the high levels of impaired performance the authors witnessed at very low BAC levels.

(f) Summary

Both laboratory and field studies indicate that important driving-related skills are adversely affected by relatively small amounts of alcohol. The affected skills include vision, steering, braking, vigilance and, more importantly, information processing and divided attention tasks. The studies have never been seriously challenged, suggesting a reasonable consensus among experts about the adverse effects of small and moderate amounts of alcohol on driving-related skills and abilities. Admittedly, the effects identified in controlled laboratory experiments are likely different from those that would occur in real-world driving situations. Studies like those described above cannot predict with certainty the nature and magnitude of the effects that small and moderate amounts of alcohol will have on actual drivers. However, since one cannot test alcohol impairment on public roads, we must draw what reasonable conclusions we can from laboratory, driving simulator, and closed access course testing.

SECTION II. THE RELATIVE RISK OF CRASH AT VARIOUS BACS

In this section, we examine the research on the relative risk of crash at various BAC levels, with particular emphasis on the 0.05% to 0.10% range. Given the adverse effects of relatively small and moderate amounts of alcohol on critical driving skills and abilities, it is not surprising that the relative risk of a fatal crash rises sharply at BAC levels well below 0.10%.

(a) Early Studies

Beginning with Borkenstein's landmark "Grand Rapids Study" in 1964,[37] early studies established that a driver's relative risk of crash is directly related to his or her BAC. Although Borkenstein's study has been criticized for failing to accurately identify the crash risk associated with the variables of age, sex and drinking practices,[36] its overall conclusion that the relative risk of crash increases with a driver's BAC has not been challenged. Two similar early studies were performed in Vermont (1971)[38] and Adelaide, Australia (1980).[39]

Each of these studies examined the relative risk for drivers with various BACs, and each showed a correlation between BAC and the relative risk of crash. Interestingly, calculations of "accident involvement ratio" prepared by the authors of the Adelaide study also showed that the risks increase with crash severity. The Grand Rapids Study examined any crashes that were reported to police, while the Adelaide Study examined crashes "to which an ambulance was called," and the Vermont Study examined fatal crashes. At BACs of 0.07% to 0.09%, for example, the studies showed accident involvement ratios of 1.77, 3.2 and 4.1, respectively. This pattern of increased risk is consistent with the later relative risk studies.

(b) Recent Studies

A 1991 American study reported that, for drivers with BACs in the 0.05% to 0.09% range, the risk of a fatal single-vehicle crash for males aged 25 and over was nearly nine times higher than for their counterparts with BACs of 0.01% or below.[40] Updating the 1991 study using 1996 data, Zador, Krawchuk and Voas reported in 2000 that, "each 0.02 percentage point increase in the BAC of a driver with a nonzero BAC more than doubled the risk of receiving a fatal injury in a single-vehicle crash among male drivers aged 16-20, and nearly doubled the comparable risk among the other driver groups." [41]

[Insert Table 1 approximately here]

It should be noted that Zador, Krawchuk and Voas used a statistical modeling method to obtain their results. The case (crash) data reflect a census of all U.S. crashes through the Fatality Analysis Reporting System (FARS), while the exposure data (drinking and driving without a crash) reflect survey data from a much narrower sample (the 1996 National Roadside Survey). Thus, the study may be more valuable in so far as it shows a general risk pattern rather than the actual magnitude of the risk for a specific driving population.

As illustrated in Table 1, the relative risks rise sharply in the 0.080% to 0.099% BAC range, which is particularly relevant to the current Canadian criminal BAC limit. Although Canada's *Criminal Code* BAC limit is 0.08%, surveys indicate that most police in Canada will not charge impaired drivers unless both of the BAC readings taken for evidentiary purposes (hereinafter "evidentiary breath tests") are 0.10% or higher.[42] This is largely due to the Canadian courts' acceptance of certain defences and the margin of error they attribute to breath-testing machines. Consequently, Canada has a *de facto* criminal BAC limit of 0.10%, leaving drivers in the 0.081% to 0.099% range largely immune from criminal sanction.

Canadian research has also documented the increased risks associated with BACs below 0.10%.[43][44] A Traffic Injury Research Foundation (TIRF) study indicated that drivers with BACs of 0.051% to 0.08% are 7.2 times more likely to be involved in a fatal crash than drivers with 0.00% BACs.[45] In addition, TIRF has consistently documented the extremely high relative risks among young drinking drivers.[46][47] One of their earlier youth studies reported that 16-19 year-old drivers with BACs of 0.08% to 0.099% have forty times the risk of a fatal crash than comparable youth who have not consumed alcohol.[48]

Research also shows that the relative risk of crash per trip at low to moderate BACs is much higher for infrequent drinkers than for regular drinkers with the same BAC. For example,

an American report indicated that, at the relatively moderate BAC of 0.06%, the risk of crash relative to their sober counterparts increases nearly 700% for those who drink on an annual basis, 425% for those who drink monthly, and only 50% for those who drink daily.[49] It is likely that the relative risk for infrequent drinkers is even more disproportionate at the high BAC levels typically associated with serious traffic crashes. This research challenges the emphasis that has been placed on the so-called “hard core” drinking drivers relative to the more stereotypical “social” drinkers who only occasionally drink immoderately.

(c) Summary

The data on the relative risk of crash have not been seriously challenged by opponents of lower BAC limits. Rather, opponents have focused on the more elevated relative risks that are found at extremely high BACs, discounting the risks at lower BACs. However, the research suggests that it is inappropriate to ignore the substantially elevated risks in the 0.050% to 0.099% BAC range, particularly for young, infrequent and occasional drinkers.

SECTION III. EXPERIENCE WITH LOWER BAC LIMITS

(a) Introduction

Given the diverse nature of the various types of BAC laws, care must be exercised in drawing parallels. For the purposes of our analysis, we have therefore divided the BAC laws into three broad types. The first type are administrative BAC laws, the violation of which typically results in a licence suspension. Although the driver is sanctioned, he or she has not committed any offence, and there are generally no long-term licensing or other consequences. In Canada, the current provincial and territorial 12 to 24-hour administrative licence laws, most of which are based on a 0.05% BAC, would be among the least intrusive of this type of BAC law.

In many cases, the driver is simply required to relinquish the wheel to a sober, licensed passenger, and to surrender his or her licence, which can be retrieved from the police 12 to 24 hours later.

The second type of BAC law creates a regulatory offence, typically under the highway traffic or driver licensing legislation. The driver is usually subject to a small fine and a modest licence suspension, and a record of the offence is maintained. Such offences, particularly if repeated or coupled with other driving infractions, can have significant licensing consequences, but they do not carry the social stigma or legal consequences of a criminal offence.

The third type of BAC laws creates a criminal offence. Although there is considerable variation in these laws, those who violate a criminal BAC limit will likely be subject to a substantial fine and licence suspension. Moreover, they may face incarceration if their BACs are very high (above 0.15%), they are in a crash involving personal injury or death, or they have a prior impaired driving conviction. These offenders will also have what is generally referred to as a criminal record and will be subject to the various disabilities that this entails.

In the following section, we describe the Canadian and international experience with lower BAC limits. The discussion is divided into four subsections. The first examines the American experience in lowering the criminal BAC level from 0.10% to 0.08%. In the second subsection, we analyze the impact of introducing zero or low administrative BAC limits for young and novice drivers. The third subsection describes the effects of the short-term provincial and territorial administrative licence suspension legislation in Canada. Finally, in the fourth subsection, we document the international experience with legal BAC limits of 0.05% or lower.

(b) Lowering the Criminal BAC Limit from 0.10% to 0.08% in American States

Beginning with Utah in August 1983, a number of American states have lowered their criminal *per se* limits from 0.10% to 0.08%. As of March 2002, 32 states, Puerto Rico and the District of Columbia had introduced 0.08% BAC legislation.[50] In the fall of 2000, Congress passed the *Transportation Appropriations Bill*, which will allow the federal government to withhold 2% of certain highway construction funds from states that do not enact 0.08% *per se* limits by 2004.[51] The penalty increases to 8% by 2007. As the number of states with 0.08% criminal BAC limits is almost certain to increase, the body of American research on lower BAC limits should grow correspondingly. Nevertheless, the existing research already provides considerable data regarding the effects of lower criminal BAC limits on impaired driving and related crash statistics.

As indicated, the American evidence reflects the impact of lowering the criminal BAC limit from 0.10% to 0.08%, and thus provides only an indirect comparison for the proposed change from 0.08% to 0.05% in Canada. The effects of a lower limit in Canada will not be directly proportional to those that occurred in the United States. However, the overall weight of the American studies shows that the lower criminal BAC limits did have a beneficial effect, and one can expect that a lower criminal limit in Canada would follow a similar trend. As explained earlier, given police charging practices, a 0.05% *Criminal Code* offence in Canada would most directly affect drivers with BACs of 0.07% to 0.10%. Thus, the American 0.08% experience may be more relevant to a Canadian 0.05% law than it might first appear.

A preliminary assessment of the first five states to introduce 0.08% BAC limits showed promising results.[52] As illustrated in Table 2, four of the five states had statistically significant decreases in alcohol-related fatal crashes after implementing the legislation. Maine was the only state to have no statistically significant decreases in alcohol-related fatal crashes after

introducing a 0.08% BAC limit. However, a later study noted that Maine's results might have been affected by its relatively small number of monthly traffic fatalities, as well as the "overall long-term downward trend" in such fatalities, which it was experiencing at the time of the report.[53] The preliminary assessment did not consider other factors that might possibly have influenced the statistics, nor did it consider overall crash rates or trends.[52] Consequently, the results do not provide strong evidence that the lower BAC limits caused a reduction in alcohol-related crash fatalities. Nevertheless, the data indicate that lower criminal BAC limits were associated with reduced alcohol involvement in fatal crashes.

[Insert Table 2 approximately here]

Moreover, a more recent time series analysis of eleven states by Aspler *et al.* did consider the effects of confounding factors, particularly administrative licence revocation laws, in its analysis of 0.08% BAC limits.[53] That study confirmed the promising findings of the preliminary assessment, and concluded that lowering the BAC limit had a deterrent effect. Seven of the eleven states experienced statistically significant decreases in at least one measure of alcohol involvement in traffic fatalities. Of note, four states had statistically significant reductions in fatally injured drivers with BACs over 0.10%, five had reductions in the number of fatally injured drivers testing positive for alcohol, and three had significant reductions in the ratio of high-BAC to sober drivers. Four states had no statistically significant reductions in the measures that were reported.

Scientific support for the 0.08% BAC limit in the United States has not been unanimous. A study of North Carolina's decision to lower the limit from 0.10% to 0.08% in October 1993 found that there was "little clear effect" of the lower limit on alcohol-related crashes in the state.[54] However, the authors noted that North Carolina was already experiencing an ongoing

decline in alcohol-related fatal crashes, and that the sharpest declines had occurred in early to mid-1992 – only a little more than a year before the 0.08% BAC limit took effect. Thus, while alcohol involvement in fatal crashes decreased by 36% between 1991 and 1995, the authors concluded that no specific declines could be attributed to the lower BAC limit. However, the authors also noted that North Carolina has a reputation for being “tough” on drinking drivers, and that awareness of the new 0.08% limit was not particularly high.

In addition, a 1999 General Accounting Office (GAO) report criticized the methodology and conclusions of several early 0.08% BAC studies.[55] The GAO also criticized more recent studies due to their “mixed” results, but spoke more approvingly of their methodology. Not surprisingly, the alcohol industry has been quick to publicize one clause from the GAO’s conclusion: “the evidence does not conclusively establish that .08 BAC laws by themselves result in reductions in the number and severity of crashes involving alcohol.”[56][57][58] However, for the reasons discussed below, we believe that the publicity surrounding this clause in the GAO’s conclusion is misleading.

Most importantly, the GAO’s statement was taken out of context. The first clause of the statement reads: “indications are that .08 BAC laws in combination with other drunk driving laws as well as sustained public education and information efforts and strong enforcement can be effective.” It is misleading to omit this first half of the much-cited conclusion. Second, the clause itself must be read carefully. Obviously, laws that are not publicized or enforced are unlikely to produce results that will “conclusively establish” their effectiveness. Moreover, to our knowledge, it has not been suggested that the mere enactment of lower BAC limits is sufficient. Rather, it is generally accepted that a more comprehensive approach is required, including measures to increase public awareness and improve enforcement.

In any event, several recent studies have reaffirmed the promising results of the earlier studies. In 2000, Hingson, Heeren and Winter examined the impact of 0.08% *per se* laws in the six states that lowered their limits in 1993 and 1994.[59] They compared fatal crash data in each of those states with a nearby state that retained a 0.10% BAC limit. In order to address concerns with their previous study,[60] the authors chose comparison states based on four criteria: a common border, similar population size, 75% or more of fatally injured drivers tested for BAC, and similar trends in the proportion of alcohol-related fatal crashes. The authors then performed a meta-analysis of the overall relative change due to the 0.08% BAC laws across the six state pairs, in order to prevent any anomalies that may have resulted from the individual state pairings.

The meta-analysis revealed that the six states with 0.08% BAC limits had a 6% greater relative decline in the percentage of fatally injured drivers with BACs above 0.10% than the comparison states. Similar results were found regarding trends in the number of fatal crashes involving a driver who had been drinking. These results are helpful, given that the reductions were independent of administrative licence revocation laws. The authors concluded with a recommendation that all states adopt 0.08% BAC laws.

More recently, a study of Illinois's lower BAC limit, introduced in 1997, showed a 13.7% decrease in the number of fatally injured drivers who had been drinking.[61] This included reductions at both high and low BACs. Notably, the five adjacent states of Indiana, Iowa, Kentucky, Missouri and Wisconsin, all of which had 0.10% BAC limits, experienced no statistically significant changes in alcohol-related fatalities. The study estimated that the 0.08% BAC law may have saved 47 lives in Illinois in the first year of its implementation.

A 2000 study by Voas, Tippetts and Fell examined the effects of key alcohol safety laws in all fifty states and the District of Columbia.[62] The study analyzed data from the Fatality

Analysis Reporting System (FARS) over a sixteen-year period, and controlled for potential confounding measures, such as vehicle miles travelled, unemployment rates, alcohol consumption, and safety belt laws. The authors estimated that the reductions attributable to the effects of the 0.08% BAC laws were 7.8% fewer fatalities among drivers with BACs between 0.01% and 0.09%, and 8% fewer fatalities among drivers with BACs above 0.10%. Translated into the number of crashes, the 0.08% BAC laws were estimated to have prevented 274 fatalities in 1997 in the sixteen states that had such laws in effect. Further, the authors estimated that, had all states had 0.08% BAC laws throughout 1997, an additional 590 lives could have been saved.

Finally, the effectiveness of 0.08% BAC laws was most recently examined by Shults *et al.* in a meta-analysis published in late 2001.[63] The authors identified nine research studies that had sufficient design quality and execution, all of which examined data from police reports of crashes on public roads. The states covered by the studies were geographically diverse and had varying population densities. The meta-analysis found that 0.08% BAC laws resulted in a median reduction of 7% in alcohol-related motor vehicle fatalities. More importantly, the meta-analysis concluded that the studies “provide *strong evidence* that .08 BAC laws are effective in reducing alcohol-related crash fatalities” (emphasis added). This was the highest level of confidence assigned to an intervention in the study.

Although some of the earlier American research has been questioned, the overall weight of evidence suggests that lowering the criminal BAC limit has positive effects on alcohol-related fatal crashes. The lower limit is particularly effective when combined with administrative licence revocation laws, but is also beneficial when introduced independently of such laws. Moreover, the statistics indicate that the lower limit reduced both the number of fatally injured drivers who had been drinking and the number who had BACs above 0.10%, suggesting that it

helped to reduce drinking and driving among drivers at various BAC levels. In its totality, the American research, particularly the most recent work, strongly supports the view that lower criminal BAC limits reduce alcohol-related crashes. While a 0.05% criminal BAC offence in Canada may not have exactly the same impact, it is likely that the law would have similar positive results.

Furthermore, one must consider that every American state already has a minimum drinking age of 21 and a BAC limit of 0.02% or less for drivers under 21.[63] These initiatives have already reduced impaired driving among young drivers, a population that has, by far, the highest relative risk of crash death at all BAC levels. Were these laws not already in effect, the American 0.08% laws would likely have had a greater impact on young drivers, and thus on the overall reductions in alcohol-related crashes. In Canada, the legal drinking age is lower than in the United States. While some provinces have graduated licensing programs with low administrative BAC limits, no jurisdiction imposes such a BAC limit on all drivers under 21. Therefore, a reduction in the *Criminal Code* BAC limit in Canada would likely result in greater declines in alcohol-related crashes among these young drivers. In turn, this should also contribute to sharper declines in the total number of alcohol-related crashes in Canada relative to the American experience.[46]

(c) Lower Limits for Young and Beginning Drivers

Zero and low administrative BAC limits have been enacted for young and beginning drivers in numerous jurisdictions, often as part of a graduated licensing program.[64][65][66] Such drivers are generally recognized as being uniquely vulnerable to the risk of an alcohol-related crash, because they are typically both inexperienced drivers and inexperienced drinkers.[63] Clearly, these BAC limits are specifically targeted, regulatory in nature, and are not

directly comparable to a general 0.05% BAC *Criminal Code* offence. Nevertheless, the experience with zero and low limits may shed some light on the expected effects of a 0.05% criminal BAC offence.

Zero and low BAC restrictions have consistently been shown to reduce alcohol-related traffic deaths among youth. A study of the American states that introduced these limits for young drivers between 1983 and 1992 found a 16% decrease in single-vehicle nighttime fatal crashes among affected drivers, while such crashes in “control” states increased by 1%.[64] The largest improvement, a 22% decrease in fatal single-vehicle nighttime crashes, occurred in states that implemented a zero BAC limit.

A more recent NHTSA study also reported the positive effects of a zero BAC restriction. For example, when Maine introduced a zero BAC restriction for all drivers under the legal drinking age in 1995, the number of nighttime single-vehicle injury crashes among such drivers fell by 36%.[66] Similarly, when Oregon extended its zero BAC restriction to include all drivers under 21 years of age, it experienced a 40% reduction in nighttime single-vehicle crashes among affected drivers. Finally, the positive impact of zero and low BAC restrictions was confirmed in a meta-analysis published in 2001, which reviewed four American and two Australian studies.[63]

The American and Australian studies are consistent with the research in those Canadian jurisdictions that have introduced zero BAC restrictions as part of their graduated licensing programs. For example, an Ontario survey of licensed high school students, conducted before and after the introduction of graduated licensing, indicated a 25% reduction in the number of males who reported driving after drinking any alcohol.[67] Moreover, a recent evaluation of

Ontario's graduated licensing program attributed a 27% decrease in alcohol-related collisions to the zero BAC restriction.[68]

The success of zero and low BAC restrictions for young drivers suggests that a criminal 0.05% BAC offence for all drivers would also have a beneficial effect. Both laws are intended to discourage drinking before driving, and to make drivers aware of the dangers of impaired driving. Moreover, both laws encourage drivers to carefully consider the amount of alcohol they consume, and to plan ahead and arrange alternate transportation if they intend to drink. Finally, both laws recognize that driving after drinking even moderate amounts of alcohol will noticeably increase the risk of a crash.

Interestingly, as Table 3 illustrates, the relative risk of crash for young drivers at low BAC levels is lower than that for older drivers at moderate BAC levels.

[Insert Table 3 approximately here]

If traffic safety experts consider the above relative risks sufficiently compelling to introduce zero or low BAC restrictions for young drivers, then these risks should also be sufficient to warrant a 0.05% *Criminal Code* BAC limit for all drivers. It is incongruous to speak of these risks as "high" or "elevated" in terms of youth,[48] but "marginal" in terms of other drivers.[69] Instead, the similar elevated risks of crash involvement should be addressed by lower BAC limits, regardless of the segment of the population affected.

The willingness to enforce stricter laws for youth may, in part, reflect a protective attitude toward this population, who are already at an increased risk of crash. Such policy considerations may help to politically justify more restrictive BAC laws for youth, even though older drivers with "moderate" BACs have a similar or higher relative risk of fatal crash. Nevertheless, the positive experience with introducing zero and low BAC limits suggests that a general *Criminal*

Code 0.05% BAC offence would also reduce impaired driving, even among those with relatively moderate BACs.

(d) Provincial and Territorial 0.05% BAC Administrative Licence Suspensions

All of the Canadian provinces and territories, with the exception of Quebec, have some form of administrative “0.05%” BAC licence suspension in force. British Columbia first introduced an administrative 0.05% BAC licence suspension in 1977, followed by, *inter alia*, Ontario in 1981 and New Brunswick in 1985.[70][71][72] Under the federal *Criminal Code*, the police may demand a roadside breath test from a driver who is suspected of having any alcohol in his or her body. Generally, the provincial and territorial legislation now authorizes the police to suspend a driver’s licence for 12 or 24 hours, depending on the jurisdiction, if the driver refuses the test or registers a BAC of 0.05% or higher.[73][74][75] The BAC threshold is 0.04% in Saskatchewan and 0.06% in the Northwest Territories. Moreover, in some provinces, the police can suspend a driver’s licence if they believe that the driver is impaired, even in the absence of a confirmatory breath test.[76] For ease of reference, we will hereinafter refer to all of the various types of provincial and territorial roadside suspension provisions globally as “provincial” or “administrative” 0.05% BAC laws. It must be remembered that these provisions do not create offences and, with few exceptions, carry no long-term consequences.

To our knowledge, no extensive review of the provincial 0.05% BAC laws has been undertaken in Canada, and only one study exists that addresses the issue.[77] Due to the short follow-up period, the study’s conclusion that Ontario’s 0.05% BAC law may have had “a small, short-term effect on the proportion of Ontario’s alcohol-related fatalities” is not surprising. The researchers noted that media coverage of the new law was scant and that there was a corresponding lack of awareness among the public. Most importantly, however, only 59% of

police administrators reported that their forces owned roadside screening devices at the time of the study, and only 40% of uniformed officers had ever used such a device. Without screening devices, police simply could not enforce a 0.05% BAC roadside suspension law. Thus, the one existing study examining provincial 0.05% laws is of little relevance today, when such devices are more readily available and in use.

It is likely that, as public awareness grew and more police obtained and began using screening devices, the impact of the administrative 0.05% BAC laws increased. Indeed, a number of more long-term trends suggest that such laws have had a positive effect on impaired driving. In Ontario, alcohol-related crashes steadily declined in the decade following the introduction of the administrative 0.05% BAC law.[78] Between 1982 and 1991, the rate of drinking drivers involved in crashes per 1,000 licensed drivers fell by 58%. Similarly, between 1982 and 1989, the number of non-drinking drivers involved in crashes increased by 37%, while the number of drinking drivers involved in crashes decreased steadily. However, the declines in Ontario's alcohol-related crash statistics can be attributed, in part, to the collective impact of several other factors, including the hardening of public attitudes toward impaired driving, other changes in the Ontario traffic legislation, and substantive amendments to the *Criminal Code's* impaired driving provisions.

Nevertheless, similar positive results have occurred in the other Canadian jurisdictions that subsequently introduced administrative 0.05% BAC limits. Moreover, the confounding variables of the 1980s did not likely play a significant role in the impaired driving reductions that followed the introduction of an administrative 0.05% BAC law in Prince Edward Island in 1993 and in Newfoundland and Labrador in 1994.[79][80] In the year following the laws' introduction, alcohol involvement in fatal crashes declined from 64% to 36% in Prince Edward

Island, and from 47% to 27% in Newfoundland and Labrador.[7] While both provinces have experienced fluctuations in impaired driving since introducing their 0.05% BAC laws, there has been a general reduction in the percentage of fatally injured drivers with positive BACs.[7]

Although the evidence is incomplete, general trends suggest that the provincial 0.05% BAC laws have contributed to reductions in alcohol-related crashes and fatalities. These trends are particularly promising because the current provincial 0.05% laws in Canada are only administrative in nature, create no offence and, thus, carry no penalty. In most jurisdictions, the driver is simply inconvenienced for 12 or 24 hours. We suggest that a 0.05% *Criminal Code* offence, coupled with the existing 0.05% administrative licence suspensions, would have a considerably greater positive impact than the administrative licence suspensions alone. In Canada, a criminal charge is viewed as a far more serious matter than a provincial charge, let alone a transitory administrative licensing sanction. The proposed 0.05% *Criminal Code* offence would carry a fine, a substantial driving prohibition, and a permanent criminal record (except for first offenders who do not re-offend).

It may be argued that some police may be inclined to proceed with only the administrative licence suspension because of the added work involved in laying a *Criminal Code* charge. However, the streamlined enforcement and processing features of the proposed 0.05% offence should partially address this concern. In any event, this problem does not justify opposing a 0.05% *Criminal Code* offence, but rather underscores the need to enhance enforcement powers and streamline the processing of impaired driving charges.[81] This would improve the certainty of punishment and help maximize the deterrent impact of the new *Criminal Code* offence.

(e) International Experiences with BAC Limits of 0.05% or Lower

The 0.05% BAC limit is standard in most of the western world. Those jurisdictions that have lowered their legal BAC limits have experienced general reductions in drinking and driving, and in the related deaths and injuries. Among the primary holdouts on a 0.05% BAC limit are Canada, New Zealand, the United States and the United Kingdom. Although a 1998 report from the House of Lords Select Committee on European Communities recommended that the United Kingdom introduce a 0.05% BAC limit, the government rejected that recommendation in March 2000.[82] This decision appears to have been influenced, in part, by pressure from the alcohol industry.[83]

It is difficult to obtain definitive information on whether the 0.05% BAC law in a particular country creates a regulatory or criminal offence. The existing reviews of this legislation are contradictory in how they characterize the offences.[2][3] Nevertheless, the penalties and procedures most countries adopt in their 0.05% BAC legislation suggest that it creates a regulatory, rather than a criminal, offence.

It is important to emphasize, however, that these 0.05% regulatory offences are not comparable to the 0.05% administrative licence suspensions in Canada. In most countries, drivers with BACs of 0.05% are committing an offence and receive a fine and a licence suspension lasting several weeks or months.[2] Conversely, the provincial 0.05% laws in Canada create no offence, involve a mere 12 to 24-hour licence suspension and generally have no long-term consequences. In several important respects, the proposed 0.05% *Criminal Code* BAC offence more closely resembles the regulatory offences in many of the 0.05% BAC jurisdictions.

The balance of this subsection examines the international experience with BAC limits of 0.05% or lower in terms of traffic safety, public attitudes and its relevance to Canada.

i. Impact on Traffic Safety

Numerous jurisdictions have published reports on the positive traffic safety results of their low BAC limits.[84] For example, a long-term study of the Netherlands' 1974 0.05% BAC law suggested that it contributed to a broad and sustained decline in the total number of drinking drivers.[85] In Belgium, where the BAC limit was reduced to 0.05% in 1994, there was a 10% decrease in traffic fatalities in 1995, and a further 11% decrease in 1996.[21] Another study examined the impact of the French decision to lower its BAC limit from 0.08% to 0.05% in September 1996. In the province of Haute-Savoie, where the study was conducted, annual alcohol-related crash fatalities fell from about 100 prior to the legal change to 64 in 1997.[86]

Sweden's 0.02% BAC limit has also shown positive results. Although the country introduced a 0.05% BAC limit in the 1950s, the move to an even lower limit in 1990 further improved traffic safety. A 1997 study by Norström and Laurell reported that, in the six years following the introduction of the 0.02% BAC limit, there was a 9.7% reduction in fatal crashes, an 11% reduction in single-vehicle crashes, and a 7.5% reduction in all crashes.[87] The authors emphasized that the clearest effects occurred in fatal and single-vehicle crashes, the categories of crashes in which alcohol is most likely to be involved. This suggests that crash reductions cannot be attributed solely to existing trends, but were caused, in part, by the lower BAC limit. Their results are supported by a 2000 study, which estimated that the 0.02% BAC limit resulted in an approximate 10% decrease in fatal crashes and a 12% decrease in severe personal injury crashes.[88]

Norström and Laurell also examined the average BAC of convicted drinking drivers and found that it had decreased by 9% between 1987 and 1991.[87] In fact, a comparison of the BAC distribution indicated that, while drivers with BACs above 0.15% made up 57.1% of all impaired driving offenders in 1987, their proportion dropped to 47.4% in 1991. Taken together,

these figures suggest that the lower BAC limit reduced the degree of impairment among the highest BAC offenders.

In Austria, the legal BAC limit was lowered from 0.08% to 0.05% in January 1998.[89] A recent study of this change found that there was an overall 9.37% decrease in alcohol-related crashes relative to the total number of crashes. However, the authors noted that intense media and enforcement campaigns also occurred around the time that the limit was lowered, making it nearly impossible to attribute the reductions to any one of these factors, at least in the short term. Nevertheless, the authors concluded that “lowering the legal BAC-limit from .08% to .05% in combination with intensive police enforcement and reporting in the media leads to a positive short-term effect.” This supports the view that a 0.05% BAC limit, as part of a comprehensive approach to fighting impaired driving, can have beneficial effects.

In 1997, Henstridge, Homel and Mackay conducted a time series analysis of random breath testing and 0.05% BAC laws in Australia, controlling for seasonal effects, weather, economic trends, road use, alcohol consumption, and day of the week.[90] Although the primary focus of the study was the impact of random breath testing, its findings on the impact of 0.05% BAC laws were also noteworthy. The study statistically removed the impact of other countermeasures in order to determine the specific percentages of the declines that were attributable directly to either random breath testing or the lower BAC limit. The report, which analyzed traffic data for periods ranging from thirteen to seventeen years, indicates that those states that reduced their BAC limits from 0.08% to 0.05% experienced positive results.

For example, after Queensland reduced its *per se* BAC limit to 0.05% in December 1982, there was a 14% reduction in serious collisions and an 18% reduction in fatal collisions.[90] These results were not confounded by the effects of random breath testing, as it was not

introduced until eight years later. Similarly, the 0.05% BAC restriction in New South Wales was estimated to have reduced serious collisions by 7%, fatal collisions by 8%, and single-vehicle nighttime collisions by 11%. This translated into the prevention of 605 serious, 75 fatal, and 296 single-vehicle nighttime collisions per year. While the 0.05% BAC limit was only introduced two years before random breath testing in New South Wales, the authors factored this into their analysis and attempted to determine the crash reductions specifically attributable to each of the interventions.

A 1994 study in South Australia, where the legal BAC limit was not changed until 1991, reported that the number of nighttime drivers who had been drinking was reduced by 14.1%.^[91] However, a second study of South Australia in 1995 found that the 0.05% BAC limit did not significantly affect the number of fatally injured drivers who were legally impaired.^[92] Nevertheless, even this latter study found some positive effects, as the percentage of legally impaired, crash-involved drivers with BACs over 0.15% decreased from 60% in 1991 to 56% in 1993.

This last figure supports other Australian research indicating that the lower BAC limit has a substantial effect on drivers with high BACs (above 0.15%). For instance, a study in the Australian Capital Territory examined random breath-testing data for the 12 months prior to and after the 0.05% BAC limit was enacted.^[93] This included approximately 92,000 tests in 1990 and 82,000 tests in 1991. The researchers found a 34% decrease in the percentage of random breath-tested drivers with BACs between 0.15% and 0.199%, and a 58% decrease in the percentage above 0.20%. Similarly, the breath tests taken for evidentiary purposes following crashes showed a 31% decrease in drivers with BACs above 0.15%, and a 46% decrease in

drivers above 0.20%. The authors suggested that the decreases among high-BAC drivers may reflect that heavy drinkers were taking steps to avoid driving after drinking.

Given that drivers at high BAC levels are at the greatest relative risk of crash, such reductions would have a substantial impact on the number of alcohol-related deaths and injuries in Canada. TIRF has estimated that drivers with BACs above 0.15% are 243.8 times more likely to be involved in a fatal crash than drivers with zero BACs.[45] A recent American study found that male drivers aged 21 to 34 with BACs of 0.15% and higher are 572 times more likely to be killed in a single-vehicle crash than sober drivers of the same age.[41] Thus, even though a 0.05% BAC limit would appear to be aimed at drivers with moderate BACs, its potential impact on the behaviour of high-BAC drivers has important traffic safety implications.

ii. Impact on Public Attitudes and Driving Behaviour

The international studies also suggest that lower BAC limits may contribute to positive changes in public attitudes toward drinking and driving. For example, roadside surveys in Germany indicated that the impending introduction of a 0.05% limit contributed to positive changes in the BAC distribution of drinking drivers.[94] The authors suggested that this “anticipatory effect” resulted from the enhanced police patrols and publicity that preceded the legal change. Moreover, some drivers erroneously believed that the 0.05% BAC limit had already been enacted. In any case, the study indicated that drivers were motivated to change their drinking habits by an impending or perceived change in the legal limit.

It has also been suggested that lower BAC limits encourage drivers to keep a better count of the drinks they consume in order to stay within the limit.[95] In this way, a lower BAC limit can have a strong preventive impact. For example, a study of the Danish 0.05% BAC law, introduced in March 1998, found that the legal change motivated Danes to reduce their alcohol

consumption before driving.[96] The number of drivers who abstained before driving rose from 37% to 41%, and the number who drank one drink or less increased from 71% to 80% between 1997 and 1998. The top two reasons given for the change in drinking behaviour were that the legal limit had been lowered, and that the respondent's attitude toward drinking and driving had changed.

The preventive impact of a lower BAC limit was also illustrated by an Australian survey of drinking behaviour.[97] It suggested that the lower limit helped to make people more aware of the need to control their drinking before driving. Those who planned to drive home drank less than those who were not driving. Moreover, a large majority felt it was wrong to violate the legal BAC limit. The authors also noted that even heavy drinkers generally chose either not to drive home or to moderate their drinking if they were driving.

Canadian attitudes would not necessarily change in the same manner or to the same degree as those in other countries that have introduced lower BAC limits. However, it is noteworthy that changes in BAC limits generally appear to change attitudes for the better in terms of traffic safety and drinking behaviour.

iii. The International Experience and its Relevance to Canada

The traffic safety benefits of 0.05% BAC limits are influenced by various factors, including the related drinking and driving legislation, enforcement, legal traditions, geography, and drinking behaviour. Thus, a 0.05% offence will not likely have the identical impact in Canada that it has had in any other country. Moreover, we will not be able to assess its precise impact unless and until such an offence is created. In the interim, we believe that Canada should examine and learn from the international experience.

As illustrated in Figure 3, Canada has a much higher rate of legal impairment among fatally injured drivers than a number of comparable countries. This is likely due to a number of factors, including enforcement practices, other countermeasures, and the methods by which alcohol-attributed fatalities are defined and assessed. Nevertheless, the comparison shows a correspondence between the legal BAC limit and the percentage of fatally injured drivers who were legally impaired. For example, the top four countries all have BAC limits of 0.05% or lower, while three of the bottom four countries have BAC limits of 0.08% or higher.

[Insert Figure 3 approximately here]

Currently, approximately 3,000 people die in motor vehicle crashes in Canada every year.[98] A recent Canadian study, reviewing the international experience, reported that lowering the criminal BAC limit to 0.05% could result in reductions of 6% to 18% in total crash fatalities, or between 185 and 555 fatalities a year.[3] Based on this study, the maximum saving of lives would be equivalent to eliminating almost all homicides in Canada.[8] While we might be more cautious about drawing parallels from the international experience, the evidence suggests that lowering the *Criminal Code* BAC limit will contribute to traffic safety benefits.

iv. Summary

Virtually every jurisdiction that has introduced a BAC limit of 0.05% or lower has experienced some traffic safety benefits in terms of reduced crashes, injuries and fatalities. Some countries have also had reductions in the mean BACs of impaired drivers and in the ratio of high-BAC to moderate-BAC drivers. In fact, both Sweden and the Australian Capital Territory reported that the lower BAC limit had significant effects on high-BAC drivers. This is supported by evidence of the lower limit's ability to change public attitudes about drinking and driving, and make drivers more conscious of their drinking and the need to plan for alternative

transportation. In summary, the international experience with BAC limits of 0.05% and lower provides strong support for the creation of a criminal 0.05% BAC offence in Canada.

SECTION IV. ANSWERING THE CRITICISMS OF A 0.05% *CRIMINAL CODE* BAC OFFENCE IN CANADA

Introduction

In this section, we respond to the arguments that have been raised in opposition to a 0.05% *Criminal Code* BAC offence in Canada. These criticisms are drawn largely from the submissions to, and conclusions of, the House of Commons Standing Committee on Justice and Human Rights.

(a) “There is a Lack of Consensus Among Experts on the Issue of Lower BAC Limits.”

The Standing Committee on Justice and Human Rights expressed concern over the “lack of consensus among experts in the field” about the benefits of a lower BAC limit. Given the state of the research, this argument appears to be unfounded or, at the very least, outdated. As indicated, there is a general consensus that critical driving-related skills are adversely affected at BACs below 0.05%, and that the skills that are most important to driving are also among the most sensitive to alcohol. There is a parallel body of unchallenged research on the increased relative risk of fatal crash at “moderate” BACs. These risks are particularly pronounced at BACs between 0.08%-0.099%, a range that is essentially immune from criminal sanction under Canada’s current law.

The clear trend in the international community has been to lower BAC limits. Moreover, numerous leading medical, accident prevention and traffic safety organizations in the world support BAC limits of 0.05% or lower, including: the World Medical Association, the American

and British Medical Associations, the European Commission, the European Transport Safety Council, the Royal Society for the Prevention of Accidents, the World Health Organization, the International Transportation Safety Association, the American Association for Automotive Medicine, the American College of Emergency Physicians, and the Australian Transport Safety Bureau.[95][99][100][101][102] In Canada, the lower limit is supported by, among others, the Canadian Medical Association, the Canadian Public Health Association, the Centre for Addiction and Mental Health, the Council on Drug Abuse, the Addictions Foundation of Manitoba, and MADD Canada.[5]

(b) “There is no evidence that a 0.05% BAC offence would save lives.”

As noted, the consistent bodies of research on the effects of low doses of alcohol on driving-related skills and the increased relative risk of crash at “moderate” BACs have gone largely unchallenged. Rather, most of the criticism in Canada relates to whether a lower *Criminal Code* BAC limit would actually save lives. For example, one researcher said that there are “relatively few” valid evaluation studies of lower BAC limits and that scientific evidence supporting such an amendment is “scant.”[103] Similarly, one report before the Standing Committee stated that, “[i]n most cases, the reported effects [of 0.05% BAC laws] can be attributed to other programs or policies that were introduced at the same time as the lower limit, or to ongoing high profile countermeasure campaigns, and/or a continuation of an existing downward trend in alcohol-related crashes.”[69]

While these criticisms may have had some merit at the time of the last legislative review, more recent studies suggest that important traffic safety benefits can be attributed to lower BAC limits, independent of “confounding factors.” For example, in their comprehensive study, Henstridge, Homel and Mackay found that, in Queensland alone, the 0.05% BAC limit prevented

599 serious collisions and 91 fatal collisions in each year of its implementation.[90] As indicated, this study controlled for seasonal effects, weather, economic trends, road use, alcohol consumption, and day of the week. It also statistically removed the impact of other countermeasures, such as random breath testing, to determine the percentage of the decline that was directly attributable to the lower BAC limit. Furthermore, Queensland did not even introduce random breath testing until eight years after the 0.05% BAC limit came into force.

Internationally, the depth and breadth of the research showing the traffic safety benefits of 0.05% BAC limits has dramatically increased in recent years. Studies reporting the benefits of lower BAC limits have emerged from, *inter alia*, Australia, Austria, Belgium, France, Germany, the Netherlands and Sweden.[85]-[97] Some of this research is more relevant to the Canadian situation than others.

As explained, the closest parallel to the Canadian proposal is perhaps the recent experience of various American states in lowering their criminal BAC limits from 0.10% to 0.08%. The studies of Apsler *et al.*; Hingson, Heeren and Winter; Voas, Tippetts and Fell; and Shults *et al.* discussed above have all concluded that this measure has significant traffic safety benefits.[53][59][62][63]

Because there is no exact parallel to Canada's social circumstances and constitutional division of powers, it is important to review all the evidence. This includes the effects of establishing zero and low BAC limits for young and beginning drivers and Canada's own experience with provincial administrative 0.05% BAC laws. While not entirely analogous, these experiences provide some indication of the potential effects of lowering the *Criminal Code* BAC limit in Canada. The weight of the evidence suggests that lower BAC limits, however fashioned, help to reduce impaired driving and related injuries and deaths.

(c) “A 0.05% BAC offence would interfere with social drinking.”

It has been argued that a 0.05% BAC limit would interfere with “social” drinking, thereby causing huge losses to the alcohol and hospitality industries.[104][105][106] We view the concern about the profitability of these industries to be, at best, of peripheral importance in setting traffic safety policy. Moreover, for the reasons outlined below, a 0.05% *Criminal Code* offence would not interfere with “social” drinking, but rather might impinge on more excessive consumption by those intending to drive. In any event, the 0.05% BAC laws in Europe and Australia have not reportedly triggered any such calamitous impact on industry profits.

More particularly, some critics express concern that a 0.05% BAC law would prevent individuals from enjoying a glass of wine with dinner or a drink after work.[107][108] They also argue that a lower BAC limit would unfairly criminalize social drinkers.[109] This argument is flawed. First, it takes more than a drink or two for the average person to reach a BAC of 0.05%. Second, given the margin of error currently accepted by our courts, a 0.05% law would likely be enforced, in practice, at a 0.07% BAC level. As Tables 4 and 5 illustrate, it takes a considerable amount of alcohol for an average person to reach this BAC.

[Insert Tables 4 and 5 approximately here]

Furthermore, in preparing these tables, we adopted several conservative assumptions that would significantly overestimate an average person’s BAC at the time that breath samples would be taken for evidentiary purposes. First, we assumed that the individuals were drinking on an empty stomach. Second, our calculations were based on the assumption that the drivers were subject to evidentiary breath testing almost immediately after they finished drinking and started driving, yet at a time when all the alcohol in their gastro-intestinal system had been absorbed. This “theoretical instantaneous BAC”, as NHTSA describes it,[110] ignores the inevitable delays that exist in apprehending and processing impaired drivers. For example, the driver may not be

stopped by the police until well after he or she stops drinking. Similarly, it will likely take the police considerable time to: question the driver after stopping the vehicle; subject the driver to a roadside breath test; transport the driver to the police station; inform the driver of his or her right to legal counsel; give the driver a reasonable opportunity to contact and consult with counsel; conduct the first evidentiary breath test; wait the 15 minutes required by the Canadian *Criminal Code*; and conduct the second evidentiary breath test.[42] Thus, at the time of evidentiary breath testing, the driver's BACs might well have fallen considerably below what is indicated in Tables 4 and 5.

Clearly, a 0.05% BAC limit, which is likely to be enforced as a 0.07% limit, will not interfere with Canadians who engage in "social drinking." In contrast, the current *de facto* BAC limit of 0.10% permits consumption of alcohol at levels that very few Canadians would consider tolerable, let alone responsible, for individuals who intend to drive.

(d) "A 0.05% *Criminal Code* BAC offence would decrease public support for the law."

Due to its alleged restriction of "social" drinking, some opponents suggest that a lower *Criminal Code* BAC limit would reduce public support for the law. Putting aside the demonstrable risk posed by drivers with BACs under the current *de facto* limit of 0.10%, the concern about public support seems unfounded in any event.

This concern is largely based on the 1999 *National Opinion Poll on Drinking and Driving*, in which the authors concluded that fewer than 20% of Canadians "believe that the BAC limit of 80 mg% should be lowered." [11] However, rather than asking participants this precise question, the researchers asked a more general question phrased in terms of whether the participants "think that [the current 0.08%] limit is appropriate." In response, 27% of the participants replied that the limit was not appropriate. Of these, 72% suggested that the 0.08%

limit should be lowered. The “fewer than 20%” figure reflects this 72% of the 27% who replied that the limit was inappropriate. However, it does not follow that the majority of Canadians would oppose a lower BAC limit. It merely indicates that they did not suggest, on their own initiative, that the BAC limit should be lowered.

Conversely, surveys that specifically ask respondents whether they support a lower BAC limit have had much more favourable results. A 1997 survey found that 60% of Canadians either support or strongly support a reduced BAC limit.[111] Similarly, as Figure 4 illustrates, a 2001 national opinion poll conducted for MADD Canada found that two-thirds of Canadians strongly support or support a reduction in the *Criminal Code* BAC limit to 0.05%.

[Insert Figure 4 approximately here]

Interestingly, an American study found that support for lower legal BAC limits increases when respondents are told how many beers it takes to reach the current BAC limit. When asked how many beers a person should be allowed to drink within two hours before driving, approximately 70% gave an answer equivalent to a BAC of 0.05% or lower.[49] In addition, when asked to state the number of beers that they would personally be able to drink and still drive safely, only one-third of respondents gave an estimate that exceeded 0.04% BAC. Finally, more than three-quarters agreed or strongly agreed with the statement that “[p]eople should not be allowed to drive if they have drunk any alcohol at all.” Thus, although opponents of a 0.05% *Criminal Code* offence suggest that it would reduce public support, surveys indicate that the majority of Canadians believe that the federal government should lower the amount of alcohol an individual can legally consume before driving.

Furthermore, as indicated by the public attitude studies in some countries, a lower BAC limit may help change public attitudes about drinking and driving.[96][97] Drivers are more

likely to appreciate the risks posed by drinking and driving and consider it a serious offence. Drivers may become more conscious of the number of drinks they consume prior to driving. In addition, as the benefits of the lower BAC limit are communicated to the public in terms of reduced crashes, injuries and deaths, public perceptions will likely be more favourable. Consequently, lowering the BAC limit is likely to increase, rather than decrease, public support for the law.

(e) “A 0.05% BAC offence would not deter ‘hard core’ drinking drivers.”

Opponents of lower BAC limits claim that they not only criminalize “social drinkers,” but also detract attention from the small minority of so-called “hard core” drinking drivers.[69][109] It is suggested that “social drinkers” have already changed their behaviour due to the public education campaigns of the 1980s and 1990s, and that a very small number of “hard core” drinking drivers are largely responsible for the remaining impaired driving problem in Canada.[112] The proponents of the “hard core” stereotype present statistics indicating that a large percentage of alcohol-positive, fatally injured drivers had BACs well above the current legal limit.[7] In fact, “hard core” drinking drivers are often defined as those with BACs of 0.15% or higher.[112][113][114]

In addition to blaming most of the problem on “hard core” drinking drivers, the proponents of this view state that this recalcitrant group is undeterrable.[109] They argue that it “is naïve to suggest that these hard core drinking drivers will suddenly be prompted to obey a new, lower limit.”[69] The primary supporters of this view before the Standing Committee were the alcohol and hospitality industries.[5]

There are two major problems with this line of analysis. First, the attempt to create a rigid dichotomy between “social drinkers” and “hard core” drinkers is flawed.[115] Second, and

equally importantly, the real-world evidence suggests that lower BAC limits do, in fact, deter high-BAC drinking drivers.

The purported dichotomy between “hard core” and “social” drinkers ignores those people who usually drink moderately, but occasionally drink to excess. These people are not alcohol dependent, problem drinkers, or persistent impaired drivers, and would not generally be viewed as “hard core” drinkers. For example, a sizeable number of young people, especially males, engage in periodic binge drinking of such a magnitude to reach BACs of 0.15%.^[116] Two-thirds of the undergraduate students who participated in the 1998 *Canadian Campus Survey* admitted to having five or more standard Canadian drinks (13.46 grams of alcohol) in a sitting in the two or three months prior to the survey, and one-third reported having eight or more drinks in a sitting during that period.^[117] In addition, 26.5% of the undergraduate males admitted to driving “after drinking too much.” This behaviour is confirmed by the fact that BACs over 0.15% are not uncommon among fatally injured young drivers.^[46]

Furthermore, despite whatever progress may have been made among so-called “social drinkers,” a sizeable percentage of the Canadian population continues to drink and drive. Unfortunately, there are no current national roadside breath-testing data available. The 1999 *National Opinion Poll on Drinking and Driving* reported that 19.3% of licensed drivers admitted to recently driving within two hours of drinking, and 54% of those do so at least three times a month.^[11] More recently, TIRF reported in late 2001 that 1.6 million Canadians drove at least once in the past year when they thought they were over the legal limit, and a 2001 Goldfarb survey indicated that 40% of Canadians have driven at some time when they thought they were over the legal limit.^{[12][13]} While self-reported data on drinking and driving should be interpreted with caution, these figures suggest that Canada’s drinking and driving problem

cannot be solely attributed to what one commentator described as the “dangerous 1%” – the “hard core” drinking drivers.[118]

Granted, there are a small number of people who frequently drive with high BACs, and they are, no doubt, dramatically over-represented in alcohol-related crashes. However, given the sheer number of people who occasionally drink excessively before driving, this much larger group is probably responsible for a majority of the alcohol-related crashes, injuries and deaths. Indeed, the research indicates that such occasional drinkers are at a much higher relative risk of crash per trip than frequent drinking drivers with the same BACs.[49]

Moreover, even if the above rhetoric about the “hard core” drinking driver were accepted, it does not follow that such drivers cannot be deterred. Indeed, studies show that lower BAC limits reduce impaired driving across BAC levels, including very high ones. As indicated, after Sweden lowered its BAC limit to 0.02%, the average BAC of convicted impaired drivers, as well as the percentage of impaired drivers with BACs above 0.15%, fell substantially.[87] Similarly, drivers with high BACs were strongly affected by the 0.05% BAC limit in the Australian Capital Territory. In particular, there was a 34% decrease in the percentage of drivers with BACs between 0.15% and 0.199%, and a 58% decrease in the percentage above 0.20%.[93] These studies suggest that high-BAC drivers might still drive illegally, but a large number of them will drive at lower BAC levels than before.

The American experience with 0.08% laws also lends some support to the view that lower BAC limits affect drivers across the range of BACs. The 2001 meta-analysis of 0.08% BAC laws in the United States reported that the lower limit reduced the number of fatalities involving drivers with BACs of 0.10% or higher.[63] Similarly, Voas, Tippetts and Fell reported in 2000 that the 0.08% BAC limit contributed to an 8% decrease in the number of fatally injured

drivers with BACs above 0.10%.[62] Unfortunately, neither study provided a specific analysis of drivers with BACs above 0.15%.

In summary, it is misleading to attribute Canada's alcohol-related crash problem to a small number of "hard core" drinking drivers, as there is a considerable number of so-called "social drinkers" who occasionally drink excessively before driving. However, in so far as high-BAC drivers do contribute disproportionately to the impaired driving problem, international research indicates that lower BAC limits would reduce drinking and driving and fatalities among such drivers.

(f) "A 0.05% BAC offence would overburden the courts."

A common criticism of a lower *Criminal Code* BAC limit is that the number of arrests will "more than double," and that the "police and the courts simply do not have the resources to deal with this situation." [69] However, the American experience with 0.08% BAC limits suggests that this criticism is exaggerated. In a recent Illinois study on the effects of a lower criminal BAC limit on the justice system, researchers made site visits to Chicago, Springfield and Peoria to interview police, prosecutors, judges, and licensing officials.[61] They reported that law enforcement officers did not express major concerns with the new law. Although impaired driving arrests increased by 11% between 1996 and 1998, the police were not overwhelmed with the new arrests. The officers stated that they felt more confident making arrests in formerly "borderline" cases – that is, where the driver's BAC was 0.10% to 0.12%. Prosecutors and judges noted a similar "lowering of the bar" with respect to "borderline" cases, and reported that there were fewer defence counsel challenges. Like the police, they did not report any change in their policies or procedures.

Similarly, since California reduced its *per se* BAC limit to 0.08% in 1990, there has been little impact on court administrators and judges, and no increase in the number of requests for jury trials or appeals of convictions.[119] Finally, while some Australian states have had 0.05% BAC limits for twenty years, there is no evidence in the literature about a crisis in their law enforcement or judicial systems.

While it is true that a 0.05% BAC limit would make more drivers potentially liable to prosecution, it does not necessarily follow that the police and the courts will be overburdened with cases. The number of charges may initially rise to reflect the new BAC threshold. Nevertheless, if adequately enforced, the lower *Criminal Code* limit should have a substantial general deterrent effect over time, resulting in a reduction in the total number of people who drive after drinking. A violation of a 0.05% *Criminal Code* limit would constitute a federal criminal offence, with its accompanying social opprobrium. Consequently, it is unlikely that Canadians would continue to drink and drive at the same rates and levels as they do now. In fact, a study of the Australian Capital Territory indicated that the number of drivers with BACs between 0.05% and 0.08% decreased after the BAC limit was lowered from 363 per 10,000 tests in 1990 to an estimated 34 per 10,000 tests in 1991.[93] Furthermore, the streamlined procedures outlined as part of the proposed 0.05% BAC offence would help to reduce whatever increased burden the offence might entail.

(g) “A 0.05% BAC offence would cost too much to enforce.”

As a corollary to the criticism that a 0.05% BAC offence would overburden the criminal justice system, some opponents suggest that a lower limit would substantially increase enforcement costs.[69] A commentator quoted in a recent Canadian study estimated that a lower BAC limit would increase court costs by \$40 million.[3] For the reasons stated above, we would

question costs predictions based on the assumption that Canadians will continue to drink and drive at current rates. While enforcement costs may initially increase, the general deterrent effect of the lower limit should ultimately lead to fewer charges and a reduction in enforcement and court costs.

Moreover, the “costs” criticism fails to consider the potential savings generated by reductions in alcohol-related crashes, injuries and deaths.[10] While it is not clear that a criminal 0.05% BAC offence would raise criminal justice costs substantially, even if it did, these costs would most likely be more than outweighed by the benefits. Although various states in Australia have had 0.05% BAC laws for ten to twenty years, there has been no outcry about increased costs. Rather, a review article in the early 1990s indicated that the lower limit resulted in financial savings of \$76 million in New South Wales and \$32 million in Queensland.[102]

A recent study by Stanford University’s Institute for Economic Policy Research examined the potential costs of decreasing the legal BAC limit from 0.10% to 0.08% in New York State.[120] Based on a conservative estimate of the number of crashes avoided and lives saved, the author estimated that a 0.08% BAC law would save \$9 to \$11.4 billion (U.S.) in its first ten years. This included savings in property damage, insurance administrative costs, legal costs, emergency medical services, workplace costs and travel delay. Conversely, the estimated costs of the additional arrests and prosecutions were only \$80 million over the ten years, or less than 1% of the most conservative estimate of the law’s costs benefits.

The fear that a lower BAC limit would increase criminal charges and costs appears somewhat misguided. There were more than twice as many impaired driving charges per year in the early 1980s as there are now in Canada, yet there was no flood of police or prosecutorial complaints.[121][122] In our view, the increased costs argument appears to mask an unstated

premise that impaired driving is not a “real” criminal offence. For example, no one in Canada would suggest that we decriminalize assault merely because the courts are overburdened with assault charges. Similarly, the fear of increased costs should not be used to oppose criminalizing driving behaviour that poses serious risks to the public.

(h) “A 0.05% BAC offence would be too difficult to enforce.”

Opponents of a 0.05% *Criminal Code* BAC limit argue that it would create enforcement problems, as police often use visible signs of impairment to determine whether to demand breath samples.[69] They suggest that, at a BAC of 0.05%, a driver will likely exhibit fewer and less obvious signs of impairment than at higher BAC levels, making it more difficult for police to develop the requisite grounds to demand breath tests.

This argument ignores the existing police powers and enforcement practices in Canada. In order to demand a breath sample on an approved roadside screening device, police only require a reasonable suspicion that the driver has any alcohol in his or her body.[123] This is a low threshold test, and can often be satisfied by the odour of alcohol on a driver’s breath, a flushed face, or the driver’s admission that he or she has been drinking or has just come from a licensed establishment. In addition, one can anticipate that Canadian police will increasingly use improved enforcement technology, including passive alcohol sensors. These small devices, often built into a police flashlight, test a sample of the ambient air around a driver’s mouth, and can detect whether the driver has been drinking.[124] A positive reading on a passive alcohol sensor would provide the reasonable suspicion required to demand a test on an approved screening device in Canada.

Moreover, most approved screening devices in Canada are already calibrated to register a “warn” at a BAC of 0.05%, the level at which most provinces will impose a short-term roadside

licence suspension. The approved screening devices are only used for preliminary testing, and the results are not admissible at trial as evidence of the driver's BAC. In order to demand a breath sample on an "approved instrument", which can be used for evidentiary purposes, the police need reasonable and probable grounds to believe that the driver has committed an impaired driving offence, that is, that the driver's BAC is over the legal limit.[125] If a *Criminal Code* BAC limit of 0.05% were in force, a reading of "warn" on an approved screening device would be sufficient to provide the reasonable and probable grounds necessary to demand an evidentiary test on an approved instrument.

It should also be emphasized that a lower BAC limit would lower the threshold of "reasonable and probable grounds" required to demand evidentiary breath samples. While drivers with BACs of 0.05% will typically exhibit fewer signs of impairment than those with BACs of 0.08%, the *Criminal Code* only requires that the reasonable and probable grounds relate to the commission of a particular offence. If the offence were defined as driving with a BAC of 0.05%, rather than 0.08%, the threshold degree and evidence of impairment would correspondingly be lower. In fact, this would facilitate, rather than hinder, enforcement.

The concern about alleged enforcement difficulties also ignores the fact that police are already enforcing, in various provinces and territories, zero BAC limits for young or beginning drivers, low BACs for commercial drivers, and provincial 0.05% BAC limits for the rest of the driving population. If these lower limits can be adequately administered under the current law, there is no reason that a *Criminal Code* 0.05% BAC offence should be rejected because of alleged enforcement difficulties.

(i) “The provinces and territories already have 0.05% BAC laws.”

Some critics have argued that a 0.05% *Criminal Code* offence is unnecessary because it is already illegal to drive with a BAC of 0.05% under provincial and territorial law. In fact, it is not illegal to drive with a BAC of 0.05% in any province or territory. Unlike the situation in most international jurisdictions, the provincial administrative 0.05% laws in Canada do not create any offence. Nor do these laws result in a licence revocation. As indicated, the 0.05% laws merely empower the police to temporarily suspend a driver’s licence. In most Canadian jurisdictions, these suspensions are not officially recorded and carry no long-term consequences for drivers. Indeed, for most affected drivers, the suspension merely requires that a sober, licensed passenger take over the wheel.

Thus, the deterrent impact of a mere 12 or 24-hour provincial licence suspension is simply not comparable to that of a 0.05% *Criminal Code* offence. Those who violate the federal law would be guilty of a federal criminal offence, and would be subject to a fine and federal driving prohibition. Except for first-time offenders who do not re-offend, the driver would have a criminal record, with its attendant civil disabilities and social stigma. These consequences would give the *Criminal Code* 0.05% BAC limit an increased deterrent impact, above and beyond that of the current provincial laws.

It has also been suggested that a 0.05% BAC *Criminal Code* offence would conflict with the provincial 0.05% legislation. This concern is completely unwarranted. Drivers whose BACs are 0.05% or higher would still be subject to short-term provincial licence suspensions. As discussed, a federal 0.05% limit would likely be subject to a margin of error and be enforced at a level around 0.07% BAC. The police could simply recalibrate the screening devices used at roadside to reflect a “fail” at the new 0.07% *de facto* federal limit. Drivers with BACs above this limit would be detained and taken for evidential breath testing. If their BAC was confirmed to

be in excess of 0.07%, they would then be charged under the new *Criminal Code* offence. The two sets of laws would still work together to keep drinking drivers off the roads and to enforce criminal charges against those who pose the most substantial risks.

CONCLUSION

There is more than sufficient evidence to support a *Criminal Code* BAC limit of 0.05% in Canada. Experiments conducted in laboratories, on driving simulators, and on closed access courses consistently demonstrate that critical driving-related skills, particularly information processing and divided attention tasks, are adversely affected by low doses of alcohol. These effects are reflected in research on the relative risk of crash, which has repeatedly documented substantially elevated risks for drivers with BACs below the current legal limit. Indeed, drivers with BACs between 0.05% and 0.08% are at even greater relative risk of crash than young drivers with lower BACs.

Support for a lower BAC limit is not limited to the laboratory or abstract calculations of risk. There is substantial evidence of the positive real-world impact of low BAC limits both in Canada and abroad. This includes research on the impact of: lowering the criminal BAC limit from 0.10% to 0.08% in about half of the American states; establishing administrative zero or low BAC limits for young drivers; introducing 12 to 24-hour administrative provincial licence suspensions for drivers with BACs over 0.05%; and enacting BAC limits of 0.05% or lower in various jurisdictions around the world. Jurisdictions that have established lower BAC limits have generally experienced benefits in terms of reduced alcohol-related crashes, injuries and deaths, as well as overall decreases in drinking and driving. In a number of jurisdictions, there

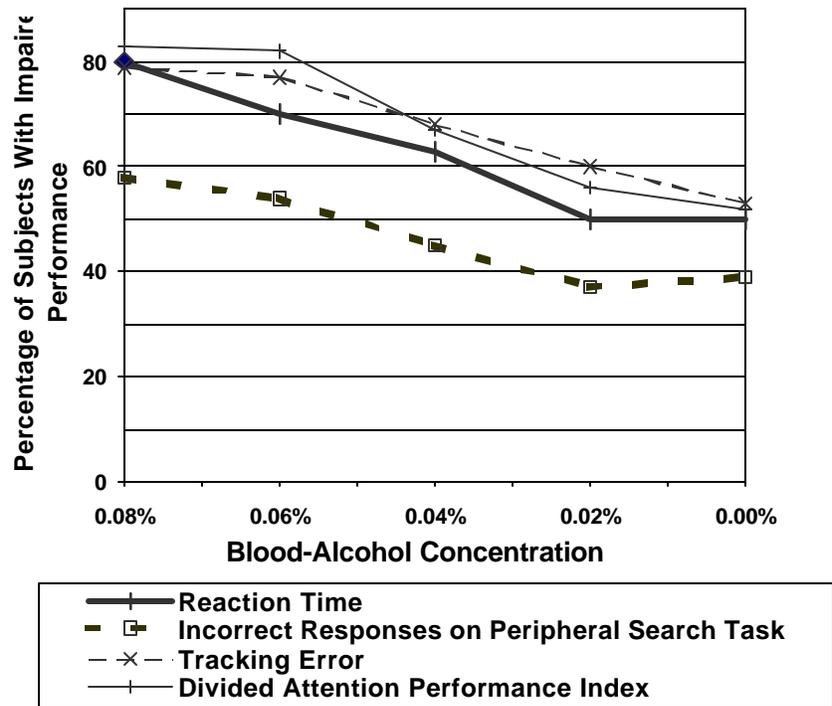
were significant decreases among high-BAC drivers, indicating that a lower BAC limit would help to reduce impaired driving among even this constituency.

Unfortunately, existing Canadian law allows individuals to drink considerable amounts of alcohol and then drive without criminal sanction. Given the margin of error accepted by Canadian courts, a 200-pound man can drink over six bottles of beer or more than a bottle of wine in a two-hour period, and get behind the wheel of his car reasonably confident that he will be immune from criminal liability, even if stopped by the police. Indeed, it is unlikely that the man would even be charged. In our view, Canada's 0.08% BAC limit sends drivers an ambiguous message, at best. They are not admonished to refrain from drinking and driving. Rather, the message in Canada appears to be "Don't drive when you're very drunk, but any lesser level of impairment is fine." The *status quo* does not require clear boundaries to be drawn between drinking occasions and driving.

Not surprisingly, millions of Canadians continue to drink and drive.[11][13] Canada remains far behind many comparable democratic countries in reducing alcohol-related traffic deaths and injuries,[126] even though most of these countries have far higher per capita rates of alcohol consumption.[127] For example, while Germans consume 70% more alcohol than Canadians,[127] Transport Canada has reported that only 11% of Germany's fatally injured drivers were impaired (as defined as having a BAC of 0.05% or higher).[126] In contrast, 32% of Canada's fatally injured drivers were reported to be impaired (as defined as having a BAC of 0.08% or higher).[126] These other countries have succeeded to a far greater extent in inducing their populations to separate drinking from driving. Their laws are deterring drinking and driving and protecting the public, whereas ours are deterring police and protecting drinking drivers from criminal sanction.

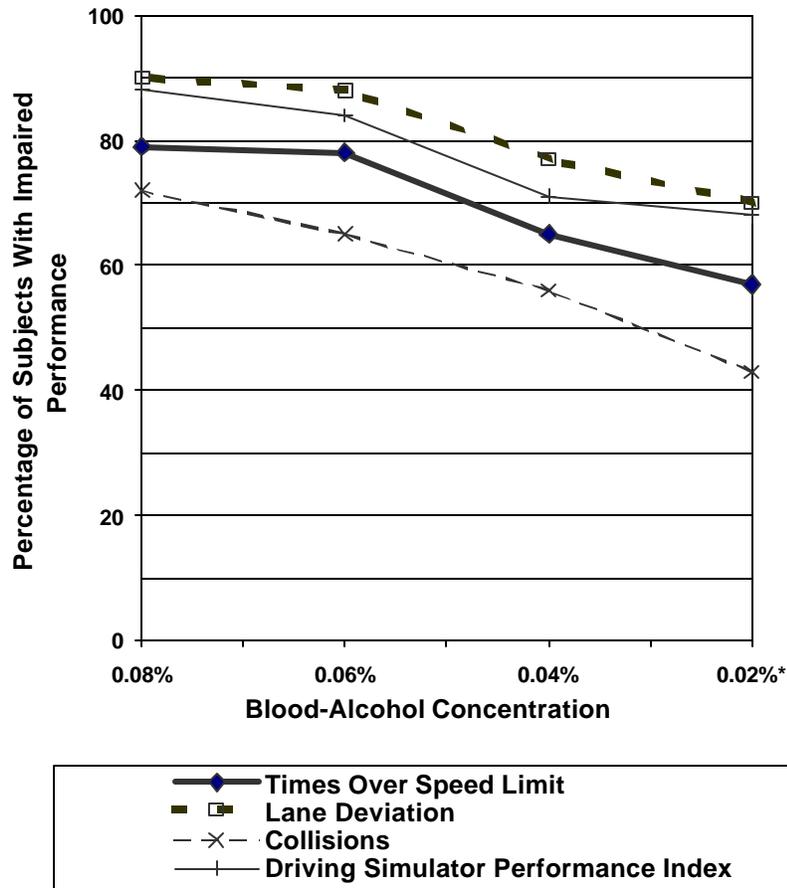
In its *Road Safety Vision 2001*, Canada's federal government stated that its goal was to "make Canada's roads the safest in the world." [128] It is unclear how the federal government can, in good faith, aspire to this noble end while ignoring the research demonstrating the benefits of 0.05% BAC limits. As long as drivers with BACs of up to 0.10% are largely immune from criminal liability, Canada will continue to lag behind the world leaders in traffic safety. More importantly, impaired driving will remain this country's leading criminal cause of death and one of its leading criminal causes of injury.

Figure 1. Impairment of Selected Divided Attention Tasks at Various BACs



Source: Moskowitz H, Burns M, Fiorentino D, *et al.* *Driver Characteristics and Impairment at Various BACs*. Washington: National Highway Traffic Safety Administration, 2000.

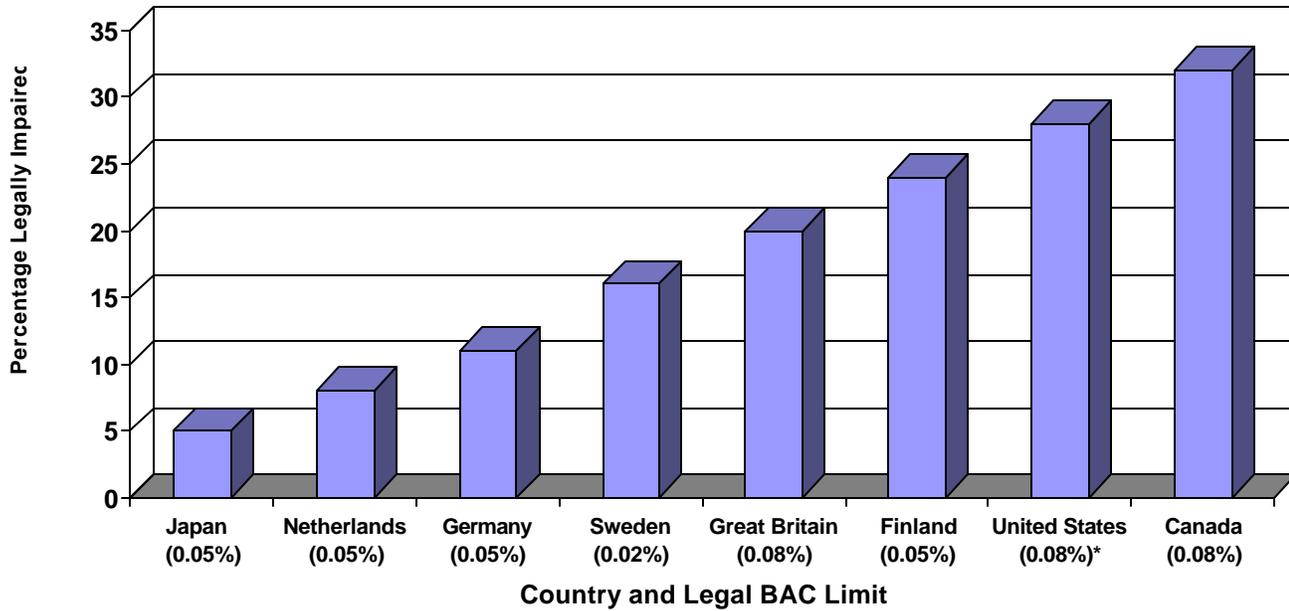
Figure 2. Impairment of Selected Skills on a Driving Simulator at Various BACs



*The last tests on the simulator were conducted when the subjects' BACs were 0.02%.

Source: Moskowitz H, Burns M, Fiorentino D, *et al.* *Driver Characteristics and Impairment at Various BACs*. Washington: National Highway Traffic Safety Administration, 2000.

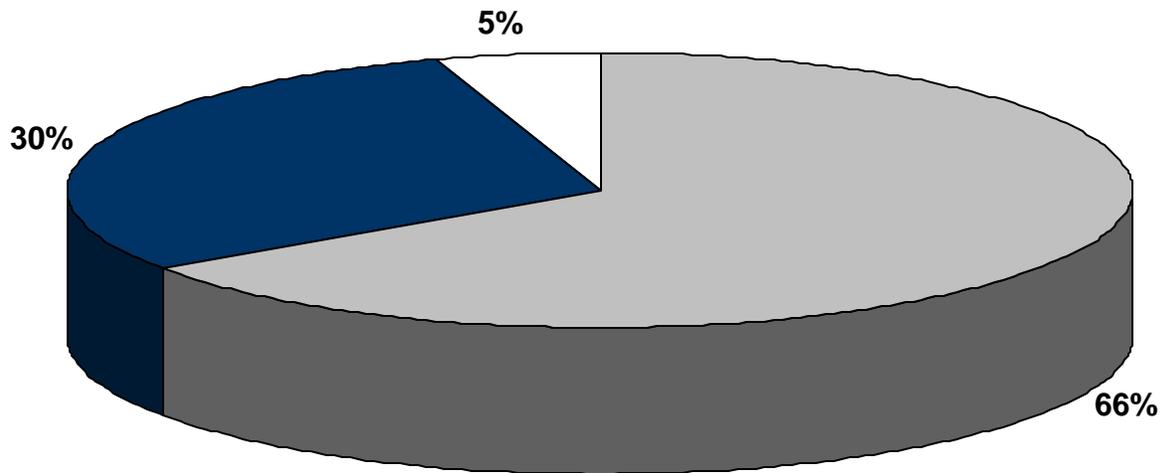
**Figure 3. Legal Impairment Among Fatally Injured Drivers
1997-1998**



*At the time of the report, the criminal BAC limit was 0.08% in 15 American states and 0.10% in 33 states. Over 60% of American states now have a criminal BAC limit of 0.08%.

Source: *Road Safety Forum: Beyond 2001* (CD ROM). Ottawa: Transport Canada, 2001.

Figure 4. Public Support in Canada for Lowering the BAC Limit to 0.05%



■ Support/Strongly Support ■ Oppose/Strongly Oppose □ Unsure

Respondents were asked to “[p]lease tell us whether you strongly support, support, oppose or strongly oppose the idea of lowering the blood alcohol content from .08 to .05 for a criminal charge.”

Source: SES Canada Research Incorporated. *National Survey on Drinking and Driving Issues*. Toronto: MADD Canada, 2001.

Table 1. Relative Risk of Fatal Single-Vehicle Crash for Males at Various BACs

	0.020%-0.049%	0.050%-0.079%	0.080%-0.099%	0.100%-0.149%
Age 16-20	4.64	17.32	51.87	240.89
Age 21-34	2.75	6.53	13.43	36.89
Age 35+	2.57	5.79	11.38	29.30

The study used a baseline relative risk of 1.00 for drivers with BACs of 0.00% and of the same age and sex as the respective study groups. That is, 16-20 year-old males were compared to 16-20 year-old males with 0.00% BAC, whose relative risk was taken to be 1.00.

Source: Zador PL, Krawchuk SA, Voas RB. Alcohol-Related Relative Risk of Driver Fatalities and Driver Involvement in Fatal Crashes in Relation to Driver Age and Gender: An Update Using 1996 Data. *J Stud Alcohol* 2000;61:387-95.

Table 2. Decreases in Alcohol-Related Crashes After 0.08% BAC Legislation

STATE	MEASURE	PERCENT DECREASE
California	Fatally Injured Drivers with BACs over 0.10%	4%
Oregon	Fatally Injured Drivers who had been Drinking	9%
	Fatally Injured Drivers with BACs over 0.10%	11%
	Police-Reported Driver Alcohol Involvement In Fatal Crashes	13%
	Overall Estimated Alcohol Involvement In Fatal Crashes	11%
Utah	Police-Reported Driver Alcohol Involvement In Fatal Crashes	30%
Vermont	Fatally Injured Drivers who had been Drinking	36%
	Fatally Injured Drivers with BACs over 0.10%	31%
	Overall Estimated Alcohol Involvement In Fatal Crashes	40%

Source: National Center for Statistics and Analysis, Mathematical Analysis Division. *A Preliminary Assessment of the Impact of Lowering the Illegal BAC Per Se Limit to 0.08 in Five States*. Washington: National Highway Traffic Safety Administration, 1994.

**Table 3. Relative Risk for Young and Older Male Drivers
At “Low” and “Moderate” BACs**

	Fatal Single- Vehicle Crash	All Fatal Crashes
Age 16-20 (0.020%-0.049% BAC)	4.64	3.44
Age 21-34 (0.050%-0.079% BAC)	6.53	3.76
Age 35+ (0.050%-0.079% BAC)	5.79	3.70

Source: Zador PL, Krawchuk SA, Voas RB. Alcohol-Related Relative Risk of Driver Fatalities and Driver Involvement in Fatal Crashes in Relation to Driver Age and Gender: An Update Using 1996 Data. *J Stud Alcohol* 2000;61:387-95.

Table 4. BAC for Males in Relation to Time, Weight and Standard Canadian Drinks

	2 hours		3 hours	
	180 lbs	200 lbs	180 lbs	200 lbs
2 standard drinks	0.0158%	0.0112%	0.0008%	0.0000%
3 standard drinks	0.0387%	0.0319%	0.0237%	0.0169%
4 standard drinks	0.0617%	0.0525%	0.0467%	0.0375%
5 standard drinks	0.0846%	0.0731%	0.0696%	0.0581%
6 standard drinks	0.1075%	0.0937%	0.0925%	0.0787%
7 standard drinks	0.1304%	0.1144%	0.1154%	0.0994%

Table 5. BAC for Females in Relation to Time, Weight and Standard Canadian Drinks

	2 hours		3 hours	
	130 lbs	140 lbs	130 lbs	140 lbs
2 standard drinks	0.0451%	0.0398%	0.0301%	0.0248%
3 standard drinks	0.0827%	0.0746%	0.0677%	0.0596%
4 standard drinks	0.1202%	0.1095%	0.1052%	0.0945%
5 standard drinks	0.1578%	0.1444%	0.1428%	0.1294%
6 standard drinks	0.1953%	0.1793%	0.1803%	0.1643%

These charts are based on Canadian standard drinks, which are generally accepted to contain 13.46 grams of alcohol. Moreover, they adopt, with one exception, certain assumptions about human physiology that the National Highway Traffic Safety Association (NHTSA) uses in calculating BACs. *Computing a BAC Estimate*. Washington: National Highway Traffic Safety Administration, 1994. Rather than using NHTSA's average metabolism rate for a moderate drinker (a 0.017% decrease in BAC per hour), we used a lower or conservative metabolism rate (0.015%), which appears to be more widely accepted in Canada. Fisher HR, Simpson RI, Kapur BM. Calculation of Blood Alcohol Concentration (BAC) by Sex, Weight, Number of Drinks and Time. *Can J Pub Health* 1987;**78**:300-4.

References

- 1 *Criminal Law Amendment Act, 1968-69*, S.C. 17 & 18 Eliz. II, c. 38, s. 16.
- 2 Stewart K. *On DWI Laws in Other Countries*. Washington: National Highway Traffic Safety Administration, 2000: Table 1.
- 3 Mann RE, Macdonald S, Stoduto G, et al. *Assessing the Potential Impact of Lowering the Legal Blood Alcohol Limit to 50 mg% in Canada*. Ottawa: Transport Canada, 1998: Table 6.
- 4 *ICAP Reports #11: Blood Alcohol Concentration Limits Worldwide*. May 2002. Online: <www.icap.org/publications/report11.html> (last accessed: 19 June 2002).
- 5 House of Commons Standing Committee on Justice and Human Rights. *Toward Eliminating Impaired Driving*. Ottawa: Publications Service, 1999.
- 6 Traffic Injury Research Foundation. *STRID 2001 Monitoring Report: Progress in 1999 and 2000*. Ottawa: Canadian Council of Motor Transport Administrators/Transport Canada, 2001.
- 7 Traffic Injury Research Foundation. *STRID 2001 Monitoring Report: Progress in 1998 and 1999*. Ottawa: Canadian Council of Motor Transport Administrators/Transport Canada, 2000.
- 8 *Homicide Offences, Number and Rate*. Online: Statistics Canada Homepage <www.statcan.ca/english/Pdgb/State/Justice/legal12a.htm> (last accessed: 14 September 2001).
- 9 Brookbank C, Kingsley B. *Adult Criminal Court Statistics, 1997-98*. Ottawa: Canadian Centre for Justice Statistics, 1998.
- 10 Single E, Robson L, Xie X, et al. *The Costs of Substance Abuse in Canada*. Ottawa: Canadian Centre on Substance Abuse, 1996.
- 11 Simpson HM, Beirness DJ, Mayhew DR. *National Opinion Poll on Drinking and Driving*. Ottawa: Traffic Injury Research Foundation, 1999.
- 12 *The Goldfarb Report 2001*. Toronto: Goldfarb Consultants, 2001.
- 13 Beirness DJ, Simpson HM, Mayhew DR, et al. *The Road Safety Monitor. Drinking and Driving*. Ottawa: Traffic Injury Research Foundation, 2001.
- 14 *Constitution Act, 1867* (U.K.), 30 & 31 Vict., c. 3, reprinted in R.S.C. 1985, App. II, No. 5, ss. 91 and 92.
- 15 R.S.O. 1990, c. H.8.
- 16 R.S.C. 1985, c. C-46.
- 17 Quoted in: *Combating Drink Driving: Next Steps. A Consultation Paper Response by the Institute of Alcohol Studies*. St. Ives: Institute of Alcohol Studies, 1998.
- 18 Moskowitz H, Fiorentino D. *A Review of the Literature on the Effects of Low Doses of Alcohol on Driving-Related Skills*. Washington: National Highway Traffic Safety Administration, 2000.
- 19 *Alcohol, Vision & Driving*. Falls Church, Virginia: American Automobile Association, 1984.
- 20 National Institute on Alcohol Abuse and Alcoholism. Alcohol-Related Impairment. *Alcohol Alert* 1994;**25**:1.
- 21 *Drinking and Driving Fact Sheet*. St. Ives: Institute of Alcohol Studies, 2000.

-
- 22 Anglin L, Caverson R, Fennell R, *et al.* *A Study of Impaired Drivers Stopped by Police in Sudbury, Ontario*. Toronto: Addiction Research Foundation/Sudbury Regional Police, 1997.
 - 23 Beirness DJ. *Alcohol and Fatal Road Accidents in Canada*. Ottawa: Traffic Injury Research Foundation, 1985.
 - 24 Haworth NL, Triggs TJ, Grey EM. *Driver Fatigue: Concepts, measurement and crash countermeasures (Executive Summary)*. Canberra: Federal Office of Road Safety, 1988.
 - 25 *Fatigue and driver alertness (Factsheet 24)*. Wellington, New Zealand: Land Transport Safety Authority, 2000.
 - 26 NCSDR/NHTSA Expert Panel on Driver Fatigue and Sleepiness. *Drowsy Driving and Automobile Crashes*. Washington: National Highway Traffic Safety Administration, 1997.
 - 27 Haworth N, Rechitzner G. *Description of Fatal Crashes Involving Various Causal Variables*. Canberra: Federal Office of Road Safety, 1993.
 - 28 Fell D, Black B. Driver Fatigue in the City. *Proceedings of the Second International Conference on Fatigue and Transportation*. Freemantle, Western Australia: 1996.
 - 29 Hartley LR, Mabbott MA. *Fatigue-Related Crashes: A Summary of Characteristics and Prevalence*. Western Australia: Institute for Research in Safety and Transport, Murdoch University, 1998.
 - 30 Linnoila M, Erwin CW, Ramm D, *et al.* Effects of Age and Alcohol on Psychomotor Performance of Men. *J Stud Alcohol* 1980;**41**:488-95.
 - 31 Smiley A, LeBlanc AE, French IW, *et al.* The combined effect of alcohol and common psychoactive drugs: 11 Field studies with an instrumented automobile. In: Israelstam S, Lambert S, eds. *Proceedings of the Sixth International Conference on Alcohol, Drugs and Traffic Safety*; 1974 Sep 8-13; Toronto, Canada. Toronto: Addiction Research Foundation, 1975:433-48.
 - 32 Laurell H. Effects of small doses of alcohol on driver performance in emergency traffic situations. In: Johnston I, ed. *Seventh International Conference on Alcohol, Drugs and Traffic Safety. Proceedings*; 1977 Jan 23-28; Melbourne, Australia. Canberra: Australian Government Publication Service, 1979.
 - 33 Cormier EF. *Position Paper on BAC and Driving*. Winnipeg: Addictions Foundation of Manitoba/Citizens Against Impaired Driving, 1995.
 - 34 Barzelay ME. *Scientific Automobile Accident Reconstruction, Vol. 1*. New York: Matthew Bender, 1986.
 - 35 Transportation Research Board. *Zero alcohol and other options - Committee on Benefits and Costs of Alternative Federal Blood Alcohol Concentration Standards for Commercial Vehicle Operators*. Washington: National Research Council, 1987.
 - 36 Moskowitz H, Burns M, Fiorentino D, *et al.* *Driver Characteristics and Impairment at Various BACs*. Washington: National Highway Traffic Safety Administration, 2000.
 - 37 Borkenstein RF, Crowther RF, Shumate RP, *et al.* *The Role of the Drinking Driver in Traffic Accidents*. Bloomington: Indiana University Department of Police Administration, 1964.
 - 38 Perrine MW, Waller JA, Harris LS. *Alcohol and highway safety: behavioural and medical aspects*. Washington: Department of Transportation, 1971.
 - 39 McLean AJ, Holubowycz OT, Sandow BL. *Alcohol and Crashes: Identification of Relevant Factors in this Association*. Adelaide: Federal Office of Road Safety, 1980.

-
- 40 Zador PL. Alcohol-Related Relative Risk of Fatal Driver Injuries in Relation to Driver Age and Sex. *J Stud Alcohol* 1991;**52**:302-310.
- 41 Zador PL, Krawchuk SA, Voas RB. Alcohol-Related Relative Risk of Driver Fatalities and Driver Involvement in Fatal Crashes in Relation to Driver Age and Gender: An Update Using 1996 Data. *J Stud Alcohol* 2000;**61**:387-95.
- 42 Jonah B, Yuen L, Au-Yeung E, *et al.* Front-line Police Officers' Practices, Perceptions and Attitudes About the Enforcement of Impaired Driving Laws in Canada. *Accid Anal Prev* 1999;**31**:421-43.
- 43 Simpson HM. *The Repeat Offender: Future Directions for Impaired Driving Programs and Policies*. Ottawa: Traffic Injury Research Foundation, 1993.
- 44 Beirness DJ, Simpson HM. *Study of the Profile of High-Risk Drivers*. Ottawa: Transport Canada, 1997.
- 45 *The Hard Core Drinking Driver*. Ottawa: Traffic Injury Research Foundation, 1996.
- 46 Mayhew DR, Simpson HM. *Youth and Road Crashes: Reducing the Risks from Inexperience, Immaturity and Alcohol*. Ottawa: Traffic Injury Research Foundation, 1999.
- 47 Simpson HM, Mayhew DR. *Reducing the Risks for New Drivers: A Graduated Licensing System for British Columbia*. Victoria, Canada: Ministry of the Attorney General, Motor Vehicle Branch, 1992.
- 48 Mayhew DR, Donelson AC, Beirness DJ, *et al.* Youth, Alcohol and Relative Risk of Crash Involvement. *Accid Anal Prev* 1986;**18**:273-87.
- 49 Snyder MB. *Driving Under the Influence: A Report to Congress on Alcohol Limits*. Washington: National Highway Traffic Safety Administration, 1992.
- 50 Highway Loss Data Institute. *DUI/DWI Laws as of March 2002*. Arlington, VA: Insurance Institute for Highway Safety, 2002.
- 51 *.08 BAC – Federal Agency Activity Update*. Washington: National Highway Traffic Safety Administration, 2000.
- 52 National Center for Statistics and Analysis, Mathematical Analysis Division. *A Preliminary Assessment of the Impact of Lowering the Illegal BAC Per Se Limit to 0.08 in Five States*. Washington: National Highway Traffic Safety Administration, 1994.
- 53 Apsler R, Char AR, Harding WM, *et al.* *The Effects of 0.08 BAC Laws*. Washington: National Highway Traffic Safety Administration, 1999.
- 54 Foss RD, Stewart JR, Reinfurt DW. *Evaluation of the Effects of North Carolina's 0.08% BAC Law*. Washington: National Highway Traffic Safety Administration, 1998.
- 55 *Highway Safety: Effectiveness of State .08 Blood Alcohol Laws*. Washington: General Accounting Office, 1999.
- 56 American Beverage Institute. *New GAO Study on the Effectiveness of .08 Laws*. Online: American Beverage Institute Homepage <www.abionline.org/gao.htm> (last accessed: 14 September 2001).
- 57 Burka M. GAO Report Finds .08-BAC Law is not a Silver Bullet. *Restaurants USA* September 1999. Online: National Restaurant Association Homepage <www.restaurant.org/rusa/1999/september/9909p12.htm> (last accessed: 14 September 2001).

-
- 58 National Licensed Beverage Association. *Legislative and Regulatory Position Paper: 08 Blood Alcohol Concentration Standards*. Online: National Licensed Beverage Association Homepage <www.nlba.org/pospap08blood.htm> (last accessed: 14 September 2001).
- 59 Hingson R, Heeren T, Winter M. Effects of recent 0.08% legal blood alcohol limits on fatal crash involvement. *Inj Prev* 2000;**6**:109-114.
- 60 Hingson R, Heeren T, Winter M. Lowering state legal blood alcohol limits to 0.08%: the effects on fatal motor vehicle crashes. *Am J Pub Health* 1996;**86**:1297-99.
- 61 An Evaluation of the .08 Per Se Law in Illinois Finds 13.7 Percent Fewer Fatal Crashes with Positive BACs. NHTSA *Traffic Tech* 2000;**232**:1.
- 62 Voas RB, Tippetts AS, Fell J. The relationship of alcohol safety laws to drinking drivers in fatal crashes. *Accid Anal Prev* 2000;**32**:483-92.
- 63 Shults RA, Elder RW, Sleet DA, *et al*. Reviews of Evidence Regarding Interventions to Reduce Alcohol-Impaired Driving. *Am J Prev Med* 2001;**21**(4) (suppl. 1):66-88.
- 64 Hingson R, Heeren T, Winter M. Lower Legal Blood Alcohol Limits for Young Drivers. *Pub Health Reports* 1994;**109**:738-44.
- 65 *Saving Teenage Lives: The Case for Graduated Driver Licensing*. Washington: National Highway Traffic Safety Administration, 1998.
- 66 Lacey JH, Jones RK, Wiliszkowski CH. *Zero Tolerance Laws for Youth: Four States' Experience*. Washington: National Highway Traffic Safety Administration, 2000.
- 67 Mann RE, Stoduto G, Anglin L, *et al*. Graduated Licensing in Ontario: Impact of the 0 BAL Provision on Adolescents' Drinking-Driving. In: Mercier-Guyon C, ed. *Proceedings of the 14th International Conference on Alcohol, Drugs and Traffic Safety, T'97*; 1997 Sep 21-26; Annecy, France. Annecy: Centre d'études et de recherche en médecine du trafic, 1997:1055-60.
- 68 Boase PD, Tasca L. *Graduated Licensing System Evaluation: Interim Report '98*. Downsview, Ontario: Ministry of Transportation, 1998.
- 69 Simpson HM, Mayhew DR, Beirness DJ. *Recommendations for Improving the Impact of Federal Impaired Driving Laws*. Ottawa: Traffic Injury Research Foundation, 1999.
- 70 British Columbia, *Motor-vehicle Amendment Act, 1977 (No. 4)*, S.B.C. 1977, c. 77.
- 71 Ontario, *Highway Traffic Amendment Act, 1981 (No. 3)*, S.O. 1981, c. 72.
- 72 New Brunswick, *An Act to Amend the Motor Vehicle Act*, S.N.B. 1985, c. 34, s. 36.
- 73 Prince Edward Island, *Highway Traffic Act*, R.S.P.E.I. 1988, c. H-5, s. 277.1.
- 74 Manitoba, *The Highway Traffic Act*, S.M. 1985-86, c. 3, C.C.S.M. c. H60, s. 265.
- 75 Newfoundland and Labrador, *Highway Traffic Act*, R.S.N. 1990, c. H-3, s. 60.1.
- 76 British Columbia, *Motor Vehicle Act*, R.S.B.C. 1996, c. 318, s. 215.
- 77 Vingilis E, Bleggen H, Lei H, *et al*. An Evaluation of the Deterrent Impact of Ontario's 12-Hour Licence Suspension Law. *Accid Anal Prev* 1988;**20**:9-17.

-
- 78 Traffic Injury Research Foundation. *Drinking and Driving in Ontario, Statistical Yearbook 1991*. Toronto: Drinking/Driving Countermeasures Office, Ministry of the Attorney General, 1992.
- 79 Prince Edward Island, *An Act to Amend the Highway Traffic Act*, S.P.E.I. 1992, c. 32 (in force 14 August 1993).
- 80 Newfoundland and Labrador, *An Act to Amend the Highway Traffic Act*, S.N. 1994, c. 18.
- 81 Mothers Against Drunk Driving (MADD) Canada. *Taking Back our Roads: A strategy to eliminate impaired driving in Canada*. Online: MADD Canada website <<http://www.madd.ca/library/tbor/tbor.pdf>> (last accessed: 25 March 2002).
- 82 Department of the Environment, Transport and the Regions. *Tomorrow's roads: safer for everyone. The Government's road safety strategy and casualty reduction targets for 2010*. Online: DETL Homepage, <www.roads.dtlr.gov.uk/roadsafety/strategy/tomorrow/> (last accessed: 25 March 2002)
- 83 Harper K. Drink-driving cave-in to alcohol lobby. *Guardian*. 2000 Mar 27. Online: Guardian Unlimited Homepage <www.guardian.co.uk/Archive/Article/0,4273,3978901,00.html> (last accessed: 14 September 2001).
- 84 Mann RE, Macdonald S, Stoduto G, *et al.* The effects of introducing or lowering legal per se blood alcohol limits for driving: an international review. *Accid Anal Prev* 2001;**33**:569-83.
- 85 Noordzij PC. Decline in Drinking and Driving in the Netherlands. In: *The Nature of and the Reasons for the Worldwide Decline in Drinking and Driving. Transportation Research Circular Number 422*. Washington: National Academy Press, 1994:44-49.
- 86 Mercier-Guyon C. Lowering the BAC Limit to 0.05: Results of the French Experience. Presented to: *Transportation Research Board 77th Annual Meeting*, 1998 Jan 11-15; Washington, DC.
- 87 Norström T, Laurell H. Effects of lowering the legal BAC-limit in Sweden. In: Mercier-Guyon C, ed. *Proceedings of the 14th International Conference on Alcohol, Drugs and Traffic Safety – T'97*; 1997 Sep 21-26; Annecy, France. Annecy: Centre d'études et de recherche en médecine du trafic, 1997:87-94.
- 88 Borschos B. An Evaluation of the Swedish Drunken Driving Legislation Implemented on February 1, 1994. In: Laurell H, Schlyter F, eds. *Proceedings of the 15th International Conference on Alcohol, Drugs and Traffic Safety – T'2000*; 2000 May 22-26; Stockholm, Sweden. Available online from: <www.vv.se/traf_sak/t2000/index2.htm>.
- 89 Bartl G, Esberger R. Effects of lowering the legal BAC-limit in Austria. In: Laurell H, Schlyter F, eds. *Proceedings of the 15th International Conference on Alcohol, Drugs and Traffic Safety – T'2000*; 2000 May 22-26; Stockholm, Sweden. Available online from: <www.vv.se/traf_sak/t2000/index2.htm>.
- 90 Henstridge J, Homel R, Mackay P. *The Long-Term Effects of Random Breath Testing in Four Australian States: A Time Series Analysis*. Canberra: Federal Office of Road Safety, 1997.
- 91 Kloeden CN, McLean AJ. *Late Night Drink Driving in Adelaide Two Years After the Introduction of the .05 Limit*. Adelaide: NHMRC Road Accident Research Unit, 1994.
- 92 McLean AJ, Kloeden CN, McColl RA, *et al.* Reduction in the Legal Blood Alcohol Limit from 0.08 to 0.05: Effects on Drink Driving and Alcohol-Related Crashes in Adelaide. In: Kloeden CN, McLean AJ, eds. *Proceedings of the 13th International Conference on Alcohol, Drugs and Traffic Safety -- T'95*; 1995 Aug 13-18 Adelaide, Australia. Adelaide: NHRMC Road Accident Research Unit, University of Adelaide, 1995:373-77.

-
- 93 Brooks C, Zaal D. Effects of a Reduced Alcohol Limit for Driving. In: Utzelmann HD, Berghaus G, Kroj D, eds. *Proceedings of the 12th International Conference on Alcohol, Drugs and Traffic Safety, T'92*; 1992 Sep 28-Oct 2; Cologne, Germany. Cologne: Verlag TÜV Rheinland, 1992:1277-88.
- 94 Vollrath M, Krueger H-P. Long term changes in driving under the influence of alcohol and attitudes concerning DUI. In: Laurell H, Schlyter F, eds. *Proceedings of the 15th International Conference on Alcohol, Drugs and Traffic Safety – T'2000*; 2000 May 22-26; Stockholm, Sweden. Available online from: <www.vv.se/traf_sak/t2000/index2.htm>.
- 95 *Review of Drink Driving Legislation*. Hong Kong: Transport Bureau, 1998.
- 96 Bernhoft IM. Effect of lowering the alcohol limit in Denmark. In: Laurell H, Schlyter F, eds. *Proceedings of the 15th International Conference on Alcohol, Drugs and Traffic Safety – T'2000*; 2000 May 22-26; Stockholm, Sweden. Available online from: <www.vv.se/traf_sak/t2000/index2.htm>.
- 97 Loxley W, Homel R, Berger D, et al. Drinkers and Their Driving: Compliance with Drinking-Driver Legislation in Four Australian States. *J Stud Alcohol* 1992;**53**:420-26.
- 98 *Motor Vehicle Traffic Collision Statistics, 1999*. Ottawa: Transport Canada, 2000.
- 99 European Commission. Still too much drinking and driving in the EU (News Release IP/01/70). 2001 Jan 18.
- 100 *Police enforcement strategies to reduce traffic casualties in Europe*. Brussels: European Transport Safety Council, 1999.
- 101 *Report 14 of the Council on Scientific Affairs*. American Medical Association, 1997.
- 102 Howat P, Sleet D, Smith I. Alcohol and driving: is the 0.05% blood alcohol concentration limit justified? *Drug Alcohol Rev* 1991;**10**:151-66.
- 103 Beirness DJ. Lowering the BAC Limit: A Canadian Perspective. In: Laurell H, Schlyter F, eds. *Proceedings of the 15th International Conference on Alcohol, Drugs and Traffic Safety – T'2000*; 2000 May 22-26; Stockholm, Sweden. Available online from: <www.vv.se/traf_sak/t2000/index2.htm>.
- 104 National Licensed Beverage Association. NLBA grassroots action stops .08 amendment (news release). 1999 Sep 28.
- 105 American Beverage Institute. *The .08 debate: what's the harm?* Washington, DC: American Beverage Institute, 1997.
- 106 Canada Safety Council. *Presentation to the House of Commons Standing Committee on Justice and Human Rights*. 1999 Mar 2.
- 107 *BAC Debate*. Washington, DC: American Beverage Institute, 2002.
- 108 Peters E. Demon Rum Returns – The Neo-Prohibitionist Crusade (column). *National Motorists Association*. 2001 Jul 27.
- 109 Morrison S. Promoting Responsible Consumption. *On Tap* 1999;**13**:1.
- 110 *Computing a BAC Estimate*. Washington: National Highway Traffic Safety Administration, 1994.
- 111 *Public Perceptions of Road Safety in Canada*. Ottawa: Compas Incorporated Multi-Audience Research, 1997.
- 112 Simpson HM, Mayhew DR, Beirness DJ. *Dealing with the Hard Core Drinking Driver*. Ottawa: Traffic Injury Research Foundation, 1996.

-
- 113 Beirness DJ, Mayhew DR, Simpson HM. *DWI Repeat Offenders: A Review and Synthesis of the Literature*. Ottawa: Health Canada, 1997.
- 114 Sweedler BM. *Strategies for Dealing with the Persistent Drinking Driver*. Washington: National Transportation Safety Board, 1997.
- 115 Chamberlain E, Solomon R. The tooth fairy, Santa Claus, and the hard core drinking driver. *Inj Prev* 2001;**7**:272-75.
- 116 *Statistical Report on the Health of Canadians, 1996-1997*. Ottawa: Statistics Canada, 1999.
- 117 Gliksman L, Adlaf E, Demers A, et al. *Canadian Campus Survey 1998*. Toronto: Centre for Addiction and Mental Health, 2000.
- 118 Therien E. One for the road [editorial]. *Globe and Mail*. 2001 Jan 18.
- 119 Hutt KR. *Setting Limits, Saving Lives*. Washington: National Highway Traffic Safety Administration, 2000.
- 120 Eisenberg D. *Evaluating the Effectiveness of a 0.08% BAC Limit and Other Policies Related to Drunk Driving*. Stanford: Institute for Economic Policy Research, 2001.
- 121 Sauvé J. Impaired Driving in Canada – 1998. *Juristat* 1999;**19(11)**:1.
- 122 Tremblay S. Impaired Driving in Canada – 1996. *Juristat* 1997;**17(12)**:1.
- 123 *Criminal Code*, R.S.C. 1985, c. C-46, s. 254(2).
- 124 Ferguson SA, Wells JK, Lund AK. *The Role of Passive Alcohol Sensors in Detecting Alcohol-Impaired Drivers at Sobriety Checkpoints*. Arlington, VA: Insurance Institute for Highway Safety, 1993.
- 125 *Criminal Code*, R.S.C. 1985, c. C-46, s. 254(3).
- 126 *Canada's Road Safety Targets to 2010*. Ottawa: Transport Canada, 2001.
- 127 *World Drink Trends, 1999 Edition*. Online: ALCOWEB Homepage, <http://www.alcowed.com/english/gen_Info/alcohol_health_society/eco_aspects/consumption/world/world.html> (last accessed: 20 April 2001).
- 128 *Road Safety Vision 2001*. Ottawa: Transport Canada, 2001.