

DECLINE IN DRINKING AND DRIVING CRASHES, FATALITIES AND INJURIES IN CANADA

Herbert M. Simpson, Douglas J. Beirness, and Daniel R. Mayhew Traffic Injury Research Foundation, Ottawa, Ontario Canada

ABSTRACT

This paper documents the most prominent trends in drinking and driving that have occurred in Canada over the past two decades and considers some of the major factors that may have contributed to these changes.

Several indicators were used to assess trends in drinking and driving, including measures of the behaviour itself - determined from roadside surveys -- as well as measures of the consequences of drinking and driving, such as the frequency and quantity of alcohol found among drivers killed in road crashes.

Overall, the evidence suggests that there has been a significant decrease in the magnitude of the drinking and driving problem in Canada over the past decade. Numerous activities such as new legislation, increased enforcement of impaired driving laws, greater numbers of awareness and education campaigns and community-based programs all occurred simultaneously during the 1980's making it difficult to determine which factors were responsible for the observed decrease.

INTRODUCTION

In North America, concern over drinking and driving periodically waxed and waned for several decades (Douglas 1982). The vacillation between concern and complacency was interrupted in the 1980s -- in many ways, this decade has been a watershed for continuous concern, commitment, and action to prevent driving after drinking and thereby reduce the frequency and severity of alcohol-related crashes (Simpson and Mayhew 1991).

In Canada, early in the 1980s, following their counterparts in the United States, citizens' groups, formed by victims of drunken drivers, (e.g., Mothers Against Drunk Driving [MADD], Remove Intoxicated Drivers [RID]), ushered in an unparalleled period of concern. Governments responded with new, tougher laws, stricter enforcement programs, and stiffer penalties for offenders. Education and awareness programs, including mass media campaigns, proliferated. Treatment and rehabilitation re-emerged as an integral component of a comprehensive approach to the problem and new technological innovations, such as ignition interlocks, emerged.

In Canada, the response to the drinking-driving problem seemed strongest from 1983 through 1987 (Beirness et al. 1993). For example, in December 1985, amendments to the Criminal Code of Canada proclaimed new, more serious offences: the new offences of impaired driving causing bodily harm, and impaired driving causing death, carried maximum of 10 and 14 years in prison respectively. As well, mandatory court-ordered driving prohibitions were introduced. Many provinces supplemented these provisions in the Criminal Code with greatly increased periods of driver licences suspension, especially for second and subsequent impaired driving offences. Indeed, a mandatory suspension for a minimum of one year became the norm for a first offence.

This unprecedented level of countermeasure activity directed at drinking-driving naturally raises questions as to whether or not it has been associated with change in the magnitude and/or characteristics of the problem. This paper addresses these issues -- its purpose is to document, describe, and discuss the most significant trends in drinking and driving in Canada during the 1970's and '80s to determine whether what happened in the 1980s was somehow unique. In so doing, we focus on two fundamental aspects of drinking-driving: (1) the behaviour itself (i.e., driving after consuming alcohol -- especially driving with an illegal blood alcohol concentration); and (2) the major outcomes or consequences of the behaviour (i.e., involvement in traffic crashes and impaired driving charges).

It is also the purpose of this paper to examine changes in the characteristics of the problem over time. It is important to determine whether the changes have been more pronounced for specific segments of the population or only for certain indicators of the problem. It is possible that such analyses will facilitate the identification of areas where significant improvement has occurred as well as areas that are in need of further attention.

Finally, we consider some of the major factors that may have contributed to the changes in the drinking-driving problem over time (e.g., new laws, countermeasure campaigns, economic conditions).

DEFINITIONS, MEASUREMENT AND DATA SOURCES

This section briefly examines some of the key methodological issues pertinent to an examination of "trends in drinking and driving." As well, sources of data used in this paper are identified and described as is their adequacy for assessing trends in drinking-driving.

Defining and Measuring the Problem

The magnitude of the problem and, by extension, changes in it over time can be measured in terms of the behaviour itself or its outcomes. This paper examines trends both in drinking-driving behaviour as well as in the consequences of that behaviour.

Measures of the Behaviour. Information on alcohol use obtained from drivers using the road provides the most direct and objective data on the incidence of driving after drinking. This type of roadside survey involves stopping drivers at predetermined locations, usually during nighttime hours (typically on the weekend) and requesting them to provide voluntarily a sample of breath for analysis of alcohol content. The principal advantage of this approach is that it provides reliable data about the incidence of drinking-driving and information about drinking-drivers who avoid detection and other adverse consequences of their behaviour.

There are, however, limitations to roadside surveys. Because of the restricted times during which these surveys are conducted, the results cannot necessarily be generalized to other times of the day, week, or year. As well, drivers must provide breath samples voluntarily, thereby introducing a degree of bias from drivers who refuse to participate. Refusal rates typically vary between 4% and 7%, depending on the time of night, survey location, and gender of the driver. Whereas some researchers have argued that drivers who have consumed alcohol are more likely than non-drinking drivers to refuse to provide a breath sample, experience in surveys conducted in Ohio (Foss and Perrine 1989) and Minnesota (Foss, Voas, Beirness and Wolfe 1991) indicates that drivers who refuse to participate do so for a variety of reasons, most of which are not related to recent alcohol consumption. Hence, provided that non-response rates remain low, the degree of bias introduced by those who refuse to participate in the survey should not compromise the overall validity and utility of the information gathered (Warren and Simpson 1980).

Several roadside surveys have been conducted in various jurisdictions across Canada beginning in 1974 with a National Roadside Survey, undertaken by Transport Canada (Smith, Wolynetz and Wiggins 1976). Since then, surveys have been conducted periodically in Saskatchewan, Ontario, and Quebec. The similarity of the survey methods permits comparisons of the findings and these data are examined in this paper to document the *incidence* of drinking-driving behaviour during late night hours to determine if any consistent and notable changes have occurred in the past decade.

Outcome Measures. This paper makes use of data from three principal sources to determine changes in the magnitude and characteristics of the consequences of drinking and driving: the TIRF Fatality Database; Ontario Master Accident File; and the Canadian Centre for Justice Statistics. These are described below.

- The Fatality Database. The completeness and reliability of data on alcohol use among crash-involved drivers depend on the severity of the crash and the severity of injuries sustained by the drivers. The more severe the crash, the more likely drivers are to be tested for the presence of alcohol (Simpson and Vingilis 1992). In Canada, *fatally injured drivers* are routinely tested for the presence and amount of alcohol. At present, however, the frequency of testing for alcohol among less severely injured drivers is not known. Thus, alcohol use among crash-involved drivers is *routinely and reliably* determined for only one subgroup of drivers -- i.e., those who are fatally injured.

Since 1973, the Traffic Injury Research Foundation of Canada (TIRF) has collected and maintained a database containing the results of tests for the presence and amount of alcohol performed on fatally injured drivers in seven provinces. (The seven provinces are: British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, New Brunswick, and Prince Edward Island). In 1987, the Fatality Database was expanded to include all 10 provinces and the two territories. Rates of testing for alcohol vary somewhat among jurisdictions but on average, about 80% of drivers of highway vehicles who died within 6 hours of the crash are tested for the presence of alcohol each year. Because the basic unit of analysis is the *fatally injured driver*, not drivers involved in fatal crashes, the data cannot be used to address questions about the number of people killed in alcohol-related crashes. Nevertheless, given high rates of testing, statistics based on these data provide accurate and valid estimates of alcohol use among all driver fatalities.

Information on the presence and amount of alcohol in fatally injured drivers since 1973 in seven provinces is used in this paper as one of the primary indices of the alcohol fatal-crash problem in Canada. Trends in the problem are examined using a variety of indicators derived from the fatality database.

Other information contained in this database, such as the age and gender of the driver are used to examine specific trends in the characteristics of the problem.

- **Ontario Master Accident File.** Although crashes involving *nonfatal* injuries are much more numerous than those resulting in death and, therefore, comprise a potentially more important segment of the alcohol crash problem, the rate of testing for alcohol among injured drivers is considerably less than it is among fatally injured drivers. As a consequence, the information available on this aspect of the problem is less reliable. For drivers who are not tested for alcohol, it is necessary to rely on the judgments of investigating police officers concerning the use of alcohol. In the province of Ontario, police accident report forms require the investigating officer to indicate a "driver condition" code that implies the amount of alcohol consumed or the degree of the effects of alcohol -- i.e., *had been drinking, ability impaired, or apparently normal*. These data provide at least some indication of the extent of alcohol involvement in casualty crashes.

Unfortunately, reliance on police officers' judgments of driver alcohol use are far from ideal. Several experimental studies have demonstrated that medical practitioners and trained police officers often fail to detect the presence of alcohol even in subjects with high BACs (Beatty 1984; Langenbucher and Nathan 1983; Pagano and Taylor 1979). Studies on injured drivers reporting to hospital have also shown that alcohol use by injured drivers often fails to come to the attention of the police (Rockerbie 1979; Warren et al. 1981). These findings support long-held beliefs among experts that figures based on police-reported data *underestimate* alcohol involvement in casualty crashes.

Having identified the limitations of police-reported information on alcohol involvement in casualty crashes, it must nevertheless be acknowledged that no other source provides any better data on alcohol use by drivers involved in casualty crashes. In fact, the *primary* indication of alcohol use among the great majority of crash-involved drivers is the reported judgment of investigating officers as coded in provincial accident databases. If these data can be accepted at least as a reliable index of *changes* in the problem, they can be used to examine trends in the use of alcohol by drivers involved in casualty crashes.

In this context, Mercer (1985) has argued for the *reliability* of police-reported data. He contends that while police may underreport alcohol involvement in casualty crashes, they do so consistently. Mercer considers police-reported data a valid measure of alcohol-related casualty crashes, even if one cannot estimate the use of alcohol.

Accordingly, this paper makes use of police-reported data but limits it to the province of Ontario where reliable practices have been in place for several years. Historical records on police reported alcohol involvement in motor vehicle crashes are available from 1980 through 1991 in Ontario. They are used in this paper to describe more recent trends in alcohol use among drivers involved in casualty crashes.

- **Charges for impaired driving offences.** The Canadian Centre for Justice Statistics (CCJS) at Statistics Canada compiles data from police detachments across Canada on the number of persons charged with an impaired driving offence. These data reportedly comprise a count of the "most serious charge" laid. As reported by CCJS, the "number of persons charged does not represent an unduplicated count of individuals charged in a year." Thus, persons charged on more than one occasion will be counted every time they are charged by the police with an impaired driving offence. Impaired driving offences include: driving while impaired, having a BAC in excess of 80 mg%, and failing or refusing to provide a breath sample -- for the years 1974-1985 -- and, for 1986 through 1991, the additional offences of impaired operation of a motor vehicle, vessel, or aircraft, (including impaired operation causing death and causing bodily harm), and failing or refusing to provide a breath or blood sample.

Questions raised previously about the reliability and validity of police-reported data on alcohol use among crash-involved drivers seem minor when compared to issues concerning the meaning of enforcement statistics. Rates of detecting, let alone charging, drivers with an impaired driving offence are widely acknowledged to be very low; police may charge only one out of every 500 to 2,000 drivers on the road who are impaired. Changes in enforcement statistics, whether measured as actual numbers or population rates, do not necessarily reflect changes in the incidence of impaired driving. Variations in the level of enforcement and differences in the charging practices of individual police forces across Canada may be but two possible explanations for changes in the number of persons charged.

Despite these limitations, data on the number of persons charged with an impaired driving offence are considered in this paper as another index of the consequences or outcome of impaired driving behaviour.

RESULTS

The first part of this section examines general trends in drinking-driving in Canada as reflected by data from each of the major sources described previously. The second part of the section looks at changes in the characteristics of the problem over time.

General Trends

Measures of the Behaviour. Surveys of alcohol use among drivers on the road during late night hours provide an indication of the incidence of drinking-driving behaviour. Such surveys have been conducted periodically in various jurisdictions across Canada since 1974 (Smith, Wolynetz and Wiggins 1976). The first National Roadside Survey found approximately 20% of drivers had a positive BAC -- nearly 9% had positive BACs, below 50 mg%; 5.4% had BACs between 50-80 mg% and 6.2% had a BAC in excess of the legal limit.

Since then, several roadside surveys have been conducted in various provinces, with Saskatchewan, Ontario, and Quebec having been surveyed most often. All three were surveyed in 1974, as part of the National Roadside Survey; Saskatchewan and Quebec were surveyed a second time in 1981. Most recently, Quebec and Ontario were surveyed in 1986 and Saskatchewan in 1987 (Lawson et al 1982; Stewart and Lawson 1987). The methods used in all three surveys were sufficiently similar to permit comparisons and to make inferences concerning trends.

TABLE 1 Percent of Drivers in Roadside Surveys According to BAC

	BAC	
	50-80 mg%	Over 80 mg%
Saskatchewan		
1974	5.6	5.6
1981	2.7*	3.3
1987	2.1*	3.6
Ontario		
1974	5.6	6.3
1986	1.9*	4.6
Quebec		
1974	5.3	5.3
1981	3.1*	5.9
1986	3.9	3.6

#Saskatchewan was included in the Prairie aggregate in 1974.
 * BAC range reported in 61-80 mg%.

Table 1 presents the percentage of drivers in each survey according to BAC group. Note, also, that the limits of the moderate BAC category vary from 50-80 mg% to 61-80 mg% depending on the province and year. Until such time as results based on equivalent categories become available, it is difficult to determine the extent of changes in driving with a moderate BAC.

It is, however, apparent that all three provinces showed a substantially lower percentage of impaired drivers in 1986 than in 1974. Indeed, there was a 36% decrease in the incidence of impaired driving in Saskatchewan, a 27% decrease in Ontario and a 32% decrease in Quebec. These results show that the prevalence of impaired driving was lower in the 1980s than in the 70s. The next section examines whether these changes were reflected in the incidence of alcohol-related crashes.

Outcome Measures. This section examines trends in various measures of alcohol-related crashes as well as trends in charges for impaired driving.

● **Driver fatalities.** One of the most frequently used measures of the magnitude of the drinking-driving problem is the percent of fatally injured drivers who tested positive for alcohol. These data are presented in Figure 1 for the years 1973 through 1991.

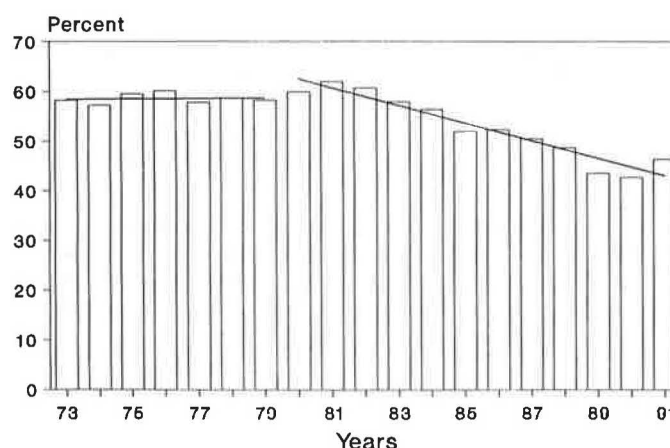


FIGURE 1 Trends in percent of driver fatalities testing positive for alcohol.

As can be seen, from 1973 through 1980, little change was evident -- drinking drivers accounted for between 57% and 62% of all-fatally injured drivers tested for alcohol. Since 1981, however, this percentage has dropped steadily, reaching its lowest point, at 43%, in 1990. Visual inspection of the data suggest that the changes occurring during the 1980s were indeed different from those that occurred during the 1970s. To test this, the series was divided into two parts (i.e., pre and post 1980) and subjected to a trend analysis -- essentially a regression discontinuity or simple time series design (Judd and Kenny 1981) in which the dependent or outcome variable (i.e., percent of driver fatalities testing positive for alcohol) is predicted from time (i.e., year), a dummy variable representing the cut-point in the series (i.e., pre and post 1980) and the interaction between time and the cut-point. A significant interaction term indicates that the regression lines for the series before and after the cut-point are not parallel -- i.e., their slopes differ significantly.

When this approach is applied to these data on the percent of driver fatalities who tested positive for alcohol, the interaction term between time and the cut-point is highly significant ($p < .001$). This finding indicates that the trend during the 1970s is different from that during the 1980s. During the 1970s, there was virtually no change in the percent of fatally injured drinking drivers. By contrast, the 1980s were characterized by a significant and consistent decline in the incidence of fatally injured drinking drivers.

Another commonly used indicator of the drinking-driving problem is the percentage of all fatally injured drivers who had a BAC in excess of 80 mg%, given that this level legally defines impaired driving in Canada. Figure 2 presents this indicator for each year from 1973 to 1991. From 1973 through 1980, approximately 50% of driver fatalities had a BAC over 80 mg% -- the percentage varied from 46% to 49%. However, since 1981, this consistency has disappeared -- the percent of fatally injured drivers with BACs over 80 mg% has declined progressively, reaching its lowest level (35%) in 1990. The regression lines clearly highlight the difference in trends evident during the 1970s and 1980s -- the interaction was highly significant ($p < .001$).

Another measure of the drinking-driving problem is the ratio of the number of drinking drivers to the number of non-drinking drivers. Although this measure, called the Problem Index, conveys much the same information as the percentages described above, it does so parsimoniously and has considerable communication advantages.

The ratio of drinking to non-drinking driver fatalities permits a more direct assessment of the extent to which the number of drinking driver fatalities has changed, relative to the number of non-drinking driver fatalities. This ratio (multiplied by 100) has been called the Problem Index.

Figure 3 plots the Problem Index from 1973 to 1991. The value of 100 represents the point at which the number of drinking and non-drinking driver fatalities would be equal. Values above the line indicate that the number of fatally injured drinking drivers exceeded the number who were not drinking. In this regard, during the 1970s the number of drinking driver fatalities greatly exceeded that of non-drinking drivers and the Problem Index remained largely unaltered. But the Index began to decline after 1981 and, in 1988, for the first time in 15 years, the Problem Index fell below 100 -- the number of drinking driver fatalities in that year was lower than the number of non-drinking driver fatalities.

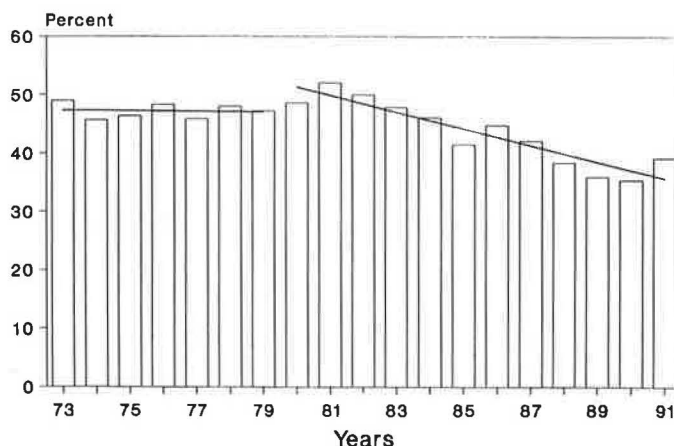


FIGURE 2 Trends in percent of fatally injured drivers with BACs over 80 mg%.

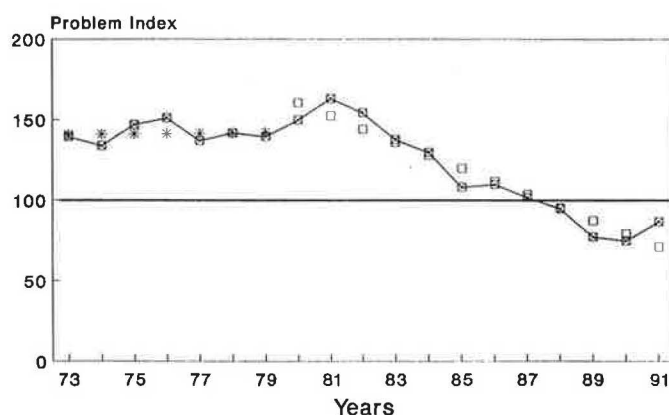


FIGURE 3 Trends in the Problem Index: ratio of the number of fatally injured drinking to non-drinking drivers.

The trend lines for the Problem Index are entirely consistent with this description -- virtually no change was evident in the 1970s but a significant and consistent decrease in the drinking-driving problem occurred during the 1980s.

As a further means of assessing the nature of these changes, monthly values of the Problem Index were determined from 1973 through 1991. These data are plotted in Figure 4 and identified as the "actual" values. The series shows a pronounced seasonal pattern -- the Problem Index is always lower in the winter months than in the summer. Also shown in the figure is the time series representing the predicted values of the Problem Index using 1980 as the intervention point. As can be seen, the actual time series in 1980 departs quite radically from what is predicted on the basis of past experience. A clear departure from the predicted levels of the Problem Index is evident beginning in the mid 1980s.

● **Drivers involved in injury collisions.** As indicated previously, collisions that result in injury are much more numerous than those that involve one or more deaths. Unfortunately, historical data for the 1970s are unavailable so only trends during the 1980s can be examined. As was the case with fatalities, while the number of non-drinking drivers involved in injury crashes has been increasing, the number of drivers reported by the police to have been drinking (at the time of the crash) has declined by 44% in 12 years.

This means that a measure such as the Problem Index should be used to track the trends and Figure 5 plots the ratio of drinking drivers to non-drinking drivers involved in injury crashes. As can be seen by the fact that the Problem Index is well below 100, the number of drinking drivers involved in injury crashes has always been less than the number of non-drinking drivers (the reverse of the situation for fatal crashes). Perhaps more noteworthy is the consistent and visible decline in the index during the 1980s -- signifying a decrease in the drinking driving problem.

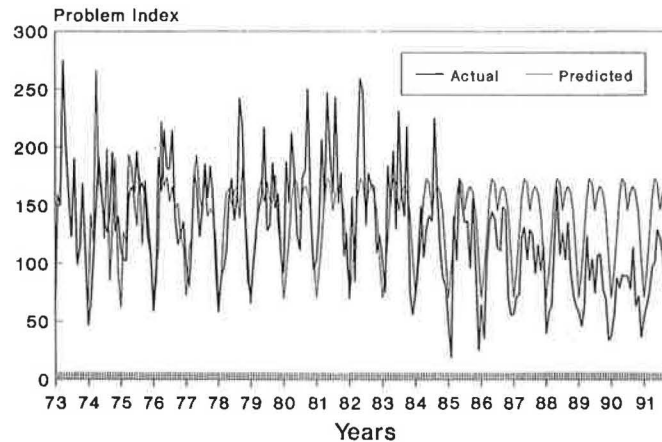
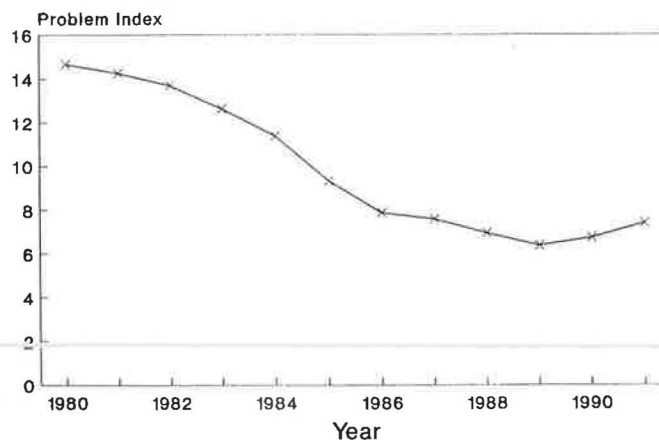


FIGURE 4 Actual and predicted values of the problem index.



Ontario, 1980-1991

FIGURE 5 Problem Index for drivers involved in injury collisions.

● **Impaired driving charges.** The annual number of persons charged with a drinking-driving offence in Canada from 1973 through 1991 is shown (by the bars) in Figure 6. From 1973 to 1991, there was actually an increase in the number of persons charged, reaching a high rate of 162,048 in 1981. During the rest of the 1980s, however, the number of persons charged dropped progressively -- in 1991 the number of persons charged reached its lowest level (111,307) since 1974.

However, when the number of charges are standardized against the number of licensed drivers (rate) a somewhat different picture emerges. The rate of charges was relatively constant throughout the 1970s but it declined rapidly and significantly during the 1980s, presenting a pattern that is quite consistent with what was shown previously for alcohol related crashes.

Summary. It is apparent that there has been a general improvement in the drinking-driving problem in Canada. The percentage of fatally injured drinking drivers as well as those with BACs in excess of 80 mg% has decreased. As well, the ratio of drinking to non-drinking driver fatalities has also decreased. These changes appear to be restricted and unique to the 1980s. During the 1970s, virtually no change in any of these indicators was evident. But in the 1980s consistent and systematic decreases in the problem occurred.

Moreover, by 1988, for the first time in the recorded history of the drinking-driving problem in Canada, the number of drinking driver fatalities fell below the number of non-drinking driver fatalities. As well, fewer drinking drivers are becoming involved in injury collisions and fewer are being charged with a drinking-driving offence.

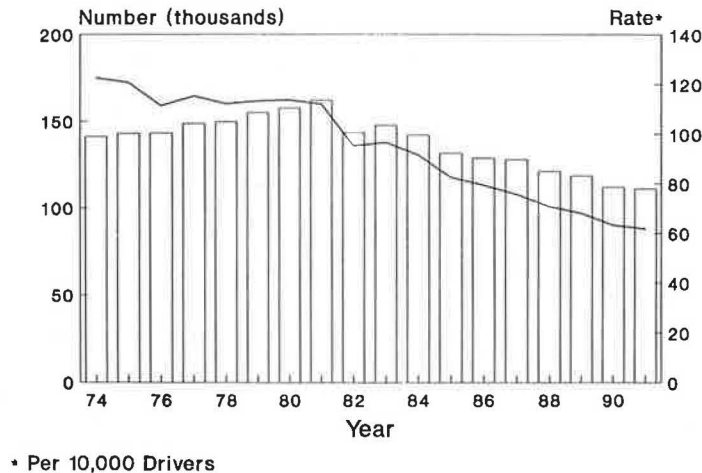


FIGURE 6 Number and Rate* of charges for impaired driving.

Consistent with these trends, roadside survey results also indicate that the incidence of driving while impaired (BAC over 80 mg%) has decreased.

Specific Trends in Drinking-Driving

As shown in the previous section, a variety of indicators suggest that decreases in the overall magnitude of the drinking-driving problem did occur during the 1980s in Canada. The present section examines changes in the characteristics of the problem to determine whether the general trends are descriptive of various subgroups of drivers or whether certain subgroups or types of crashes have shown differential changes.

To facilitate comparisons of the trends between and among the various subgroups, one measure of the problem (the Problem Index) will be used throughout because it presents a considerable amount of information, parsimoniously.

Sex of Driver. Figure 7 shows the Problem Index for fatally injured male and female drivers from 1973 through 1991. The most obvious difference is that the index for males is much higher than it is for females. Indeed, among fatally injured male drivers, the number who were drinking has always exceeded the number who were sober except in 1989 and 1990. The reverse is true for females; there are always more sober driver fatalities than those who have been drinking.

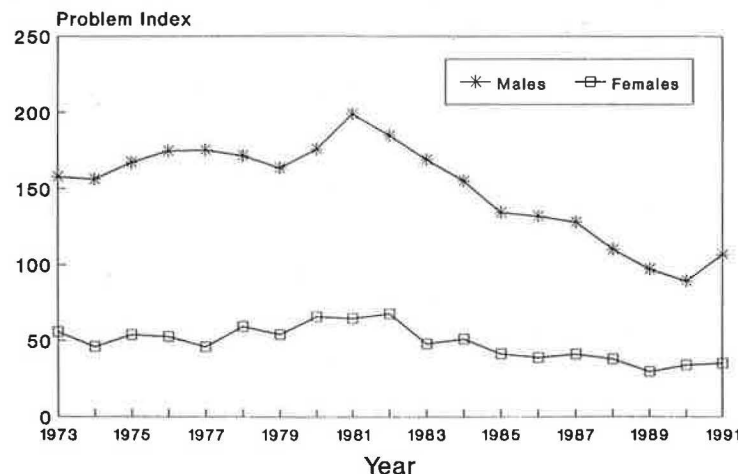


FIGURE 7 Problem Index for fatally injured drivers according to gender.

Changes in the drinking driving problem are evident for both groups. Among both males and females, the Problem Index showed little change during the 1970s, increasing somewhat in the early 1980s. Since then it has declined quite consistently showing an ever decreasing proportion of drinking driver fatalities.

It is to be noted again that the Problem Index does not convey the whole story. For example, it does not indicate the absolute magnitude of the problem involving the groups being compared. It does not reveal that in 1991 the number of fatality injured male drivers who were drinking was about 10 times greater than the number of female drivers who were drinking.

Age. The Problem Index for various age groups is shown in Figure 8. There are clear differences among the groups. First, the magnitude of the problem varies as a function of age, since the Problem Index is generally highest among 16-25 year olds, followed by 26-45 year olds, 46-55 year olds, and is lowest among drivers over the age of 55. Indeed, historically among drivers over the age of 45, the Problem Index has usually been below 100 -- i.e., among the two oldest age groups shown in the figure, the proportion of sober drivers has exceeded that of drinking drivers. And, the overall trend among these two groups has been downward, toward an ever diminishing proportion of drinking drivers.

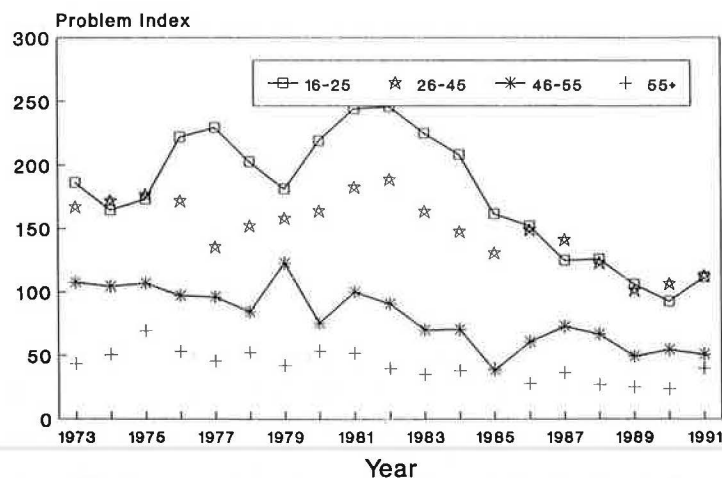


FIGURE 8 Problem Index for fatally injured drivers according to age.

Among the two youngest groups (16-25 and 26-45) the Problem Index has traditionally exceeded 100 -- there has always been more drinking drivers than sober ones in these age groups. Neither groups showed any downward change in the 1970s but early in the 1980s the drinking driving problem began to decline consistent among these groups. Indeed, by 1989, the index had approached 100 in both groups for the first time in 16 years.

Summary. The general trends described earlier appear to be characteristic of various subgroups of drinking drivers as well.

DISCUSSION AND CONCLUSIONS

Overall, most indicators suggest that the magnitude of the drinking-driving problem decreased during the 1980s in Canada and that this decline represented a significant departure from the trend in the 1970s. The changes in drinking-driving were both dramatic and significant.

The central question, of course, is why these changes occurred -- what countermeasure(s) accounted for the decrease in the drinking-driving problem. It should be recognized at the outset that attribution of change to a single factor is most unlikely, for several reasons.

First, significant changes such as new legislation, increased enforcement of impaired driving laws, the community level never occur in isolation. Indeed, the initiatives mentioned in the previous sentence, which are but a few of those targeted at drinking-driving the 1980s, occurred concurrently. Disaggregating the impact of a specific measure, therefore, is challenging to say the least. Second, the context in which initiatives occur is a dynamic one -- the amount of the initiative being applied, as well as the intensity and form of other initiatives, is seldom consistent or uniformly

applied. Third, while there appears to be a distinct change from the 1970s to the 1980s, within the 1980s there are no abrupt or catastrophic changes that could be time-linked to some specific initiative -- the changes were more gradual. Thus, the introduction or launch of a particular countermeasure will not be easily detected in the data. Hence, the very nature of most countermeasure activities actually defies the expectation of an abrupt impact.

Notwithstanding the difficulties inherent in determining why change occurred, it is necessary to underscore how important it is to know why. Indeed, it could be argued that identifying the principal contributing factors is more than important; it is essential! At the very least, it is necessary to know which tactics should continue to be applied if change is to be sustained as well as which should be eliminated if they have no impact on the problem. Regrettably, as Hauer (1985) has stated about many countermeasures -- we do much but learn little in the doing. This most certainly applies to the drinking-driving field. *Much was done in Canada in the 1980s and this activity appears to have been associated with positive gains but we have learned very little about which of the many measures contributed to the change.*

Thus, while it is possible to identify factors (e.g., programs, community-based initiatives, etc.) that may have contributed to the changes witnessed in the 1980s, it is not possible to assert which of them actually had an impact and which of them did not. There is a greater purpose to emphasizing this fact than simply to lament its existence. It is to signal that *extreme caution must be exercised in accepting unqualified claims about the effectiveness of various initiatives in changing the drinking-driving situation in Canada. Most of these claims are simply unfounded, since the impact of specific initiatives cannot be discerned from the data.*

And the list of potential contributing factors is quite extensive indeed, including the emergence of groups of organized victims of impaired drivers -- such as Mothers Against Drunk Driving (MADD), Remove Intoxicated Drivers (RID), People to Reduce Impaired Driving Everywhere (PRIDE), Citizens Against Impaired Driving (CAID), and People Against Impaired Driving (PAID) -- that served to bring the issue of drinking and driving to the forefront of public and political concern.

If nothing else, citizen activist groups, not only made legislators and the public attend to the issue of impaired driving, they helped change the way society viewed the problem. Impaired driving could no longer be considered a "folk crime" -- it was a serious, criminal offence.

Associated with the emergence of victim groups and the growing interest of health agencies in the problem came a recognition of the role of community-based, "grass-roots," initiatives. Numerous communities across the nation established committees of concerned citizens to deal with impaired driving at the local level.

Significant legislative and regulatory changes also occurred during the 1980s. In Canada, in 1984, the Department of Justice announced changes in the provisions of the Criminal Code dealing with impaired driving offences. The amendments broadened impaired driving to include impaired operation of any motor vehicle. Minimum penalties for a conviction were increased and impaired driving causing death and impaired driving causing injury became offences punishable by up to 14 years in prison. These changes took effect in December, 1985. Many individual provinces also responded by increasing the period of license suspension for an impaired driving conviction. Temporary license suspensions for driving with a BAC between 50 and 80 mg% also became commonplace in many provinces.

During the 1980s, enforcement also increased. The use of police checkpoints became increasingly prevalent in Canada. Many provinces, together with local police forces, instituted random checkpoint programs, usually involving the use of portable alcohol screening devices. Initially, these were largely restricted to the year-end holiday season but such enforcement activities have proliferated and now occur throughout the year.

Increased police enforcement did not produce a corresponding increase in the number of persons charged with impaired driving. Arresting more impaired drivers was not necessarily the primary objective of police checkpoints. High profile enforcement "blitzes," involving numerous teams of police officers, did undoubtedly serve to increase the probability of detection. But, perhaps more significantly, such efforts also served to increase the public's *perception* of the probability of arrest. Believing there is a reasonable chance of being stopped for driving after drinking may be a powerful deterrent of drinking-driving behaviour. By reinforcing this belief, police checkpoints may be preventing driving after drinking.

The intensity and scope of activities undertaken to reduce drinking and driving during the 1980s was also reflected in a proliferation of public education and information programs. Governments, groups brought the anti-drinking and driving message to the media advertising and awareness programs. The number of magazine and newspaper stories on drinking and driving increased dramatically during the 1980s. Radio and TV spots became frequent; billboards displaying anti-drinking and driving messages emerged; newspapers and magazines carried feature articles about drinking and driving as well as advertisements; bumper and window stickers appeared on cars; and, pamphlets and booklets full of facts and information about drinking and driving were produced and widely distributed.

Public awareness of these anti-drinking and driving messages became widespread. In a nation-wide survey conducted in 1984, 73% of respondents indicated that they had read, seen or heard an advertisement dealing with the

subject of drinking and driving (Goldfarb Consultants 1984). Several years later, the National Survey on Drinking and Driving 1988 reported that 93% of Canadians aged 16 to 69 could recall having seen or heard advertisements related to drinking and driving (Health and Welfare Canada 1989).

No single factor can be cited as being primarily responsible for the change in the drinking-driving problem that occurred during the early 1980s. It is most likely that all the above-mentioned factors played a role in changing both public awareness about the problem and drinking-driving behaviour. Countermeasure programs -- including media campaigns, community-based programs, legislative changes, and increased enforcement -- combined to produce an unprecedented level of anti drinking-driving activities.

But it would be inappropriate and decidedly unscientific to leave the assessment there. While it might be comforting to speculate that the observed changes in the magnitude of the problem were somehow induced by the combined impact of all the drinking and driving initiatives, it is also possible the changes were unrelated to them.

To illustrate how plausible this might be, we compared the incidence of alcohol among fatally injured drivers in Canada to that in the U.S. from 1980 to 1991. To ensure that the same states were included in the time series and that these states had alcohol testing rates of 80% or above, we limited the analysis to 12 states. The ratio of drinking to non-drinking driver fatalities -- the Problem Index was calculated for each year and the results are shown in Figure 9, which also presents the same data for Canada.

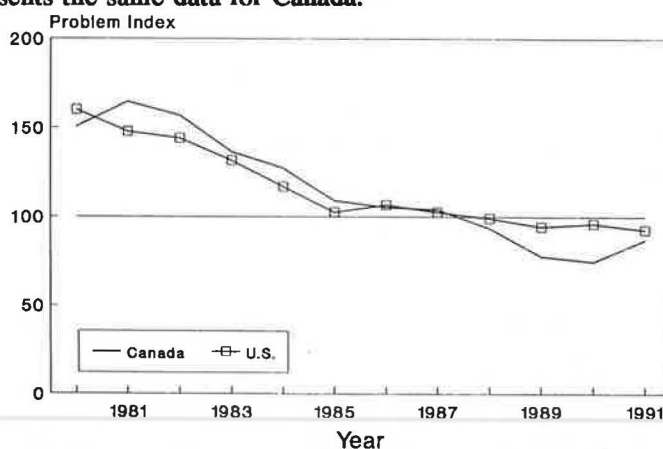


FIGURE 9 Problem Index for Canada and the United States.

As can be seen, the results are remarkably similar. On the one hand, it could be argued that such similarity is to be expected, given that the problem received similar attention in both countries. On the other hand, there were strikingly different approaches taken in the two countries as well. For example, the drinking age increased to 21 in all states but remained at 18 or 19 in all Canadian provinces.

It is, therefore, possible that more "global" forces -- such as economic conditions, shifting demographics and trends in alcohol consumption -- were affecting the drinking and driving problem.

In general, when unemployment is high, traffic fatalities fall, and vice versa (e.g., Hedlund 1985; Mercer 1987). In this context, it is important to consider that during 1980-81, Canada experienced a period of economic strength which was followed by a severe economic recession in 1982. Unemployment rates peaked in 1982. Trends in traffic fatalities shifted accordingly. In 1982, there were more than 1,100 fewer traffic fatalities in Canada than in 1981. When examined over a longer period, during the 5-year period 1977-81, an average of 5,478 persons died in road crashes each year in Canada, compared to an average of only 4,187 per year during the period 1982-1986 -- a decrease of 24%. The correlation between the percentage of persons unemployed and the number of traffic fatalities each year is strong and negative ($r = -.65$), indicating that as the percentage of persons unemployed increases, traffic fatalities in Canada decrease. Although other factors are undoubtedly involved, the influence of economic trends on traffic safety must be considered.

Because drivers of different ages are unequally represented among drivers involved in traffic crashes, shifting demographics must also be considered as a factor in trends in traffic crashes. For example, young drivers age 16-24 are overrepresented in collisions. This age group comprises about one-quarter of the driving-age population in Canada but accounts for 31% of all driver fatalities and 34% of all impaired driver fatalities (i.e., BAC over 80 mg%). Changes in the age distribution of the population could affect the number of traffic fatalities as well (Mayhew et al 1986).

In this regard, persons aged 15-24 years have gradually declined as a percentage of the driving-age population in Canada from 1970 to 1991. Decreased representation of drivers in high risk age groups, combined with increased numbers of lower-risk age groups (e.g. 25-44), should have a beneficial effect on traffic safety. Indeed, the correlation between the proportion of the population aged 15-24 years and the number of traffic crashes is both strong and positive ($r = .76$), indicating that as the proportion of 15-24 year-olds in the population rises, so too does the number of traffic fatalities -- and vice-versa.

The extent to which factors such as demographic shifts in the population and economic fluctuations have contributed to the changes in the drinking driving problem is unclear but their influence cannot be ignored, underscoring once more the need to accept with considerable caution claims about the success of specific programs in changing the problem.

Finally, changing patterns of alcohol consumption may have had an impact on the extent of the drinking-driving problem. From 1970 to 1983, per adult consumption in Canada increased steadily to a peak of 10.6 litres of absolute alcohol. Thereafter, average annual consumption of alcohol declined steadily to its present level (1991) of 9.16 litres. Of greater importance, there is a strong positive correlation ($r = .91$) between per capita consumption and the percent of fatally injured drivers who were drinking. While it might be tempting to conclude that this represents a clear casual linkage it must be recalled that many other factors described above show a strong relationship with the incidence of alcohol-related crashes.

The final conclusions are quite simple. (1) The magnitude of the drinking-driving problem in Canada decreased significantly during the 1980s. (2) This decrease appears to be unique to the 1980s, since no similar changes were evident in the previous decade. (3) It has not yet been determined why this unprecedented decline occurred.

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