

# **YOUNG DRIVERS**



# Reasons for the Reduction in Young Alcohol-impaired Drivers

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## Abstract

This study investigated why drinking and driving in the United States decreased almost twice as much for drivers under age 21 as for drivers 21 and older from 1982 to 1998. The study documented the changes in youth drinking and driving, and in youth drinking, and compared the changes across states and regions. It analyzed the effects of the National Minimum Drinking Age and state Zero Tolerance laws, of programs directed at youth drinking and driving, and of factors not directed specifically at youth. It compared influences and trends in the United States with those in Canada. The study recommends how to reduce youth drinking and driving even further.

## Introduction

Youth drinking and driving in the United States decreased spectacularly in the past 20 years. The best measure comes from fatal crash involvements: the number of drinking drivers under the age of 21 in fatal crashes dropped 61 percent, from 4,398 in 1982 to 1,704 in 1998 (Figure 1). While 43 percent of young drivers in fatal crashes had a positive BAC in 1982, only 21 percent did in 1998. In comparison, the number of drinking drivers aged 21 and above dropped only 34 percent during this time (Figure 2).

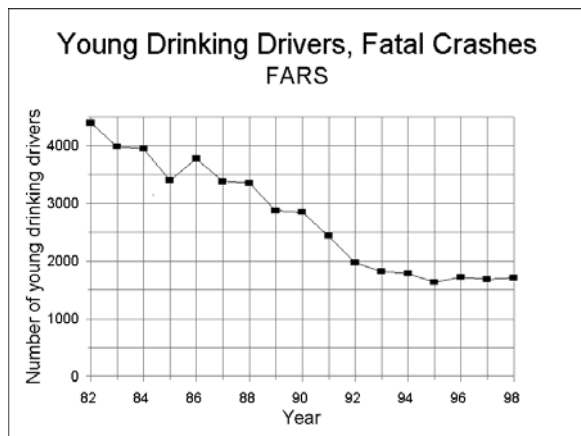


Figure 1: Young drinking drivers

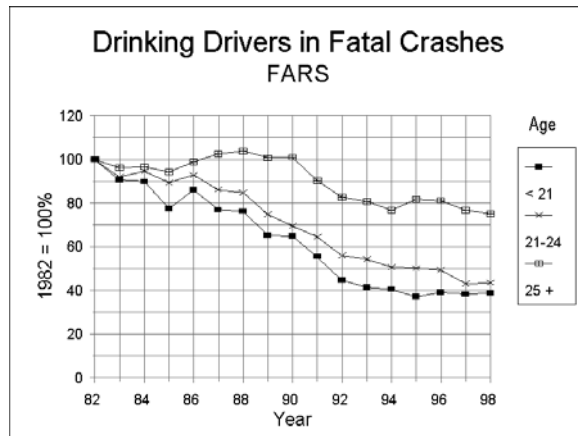


Figure 2: Percent change by age, 1982-1998

## **Methods**

The study analyzed United States traffic crash data from NHTSA's Fatality Analysis Reporting System (FARS) to disaggregate the changes by geographic area, driver age, and year. It analyzed survey data and research on youth drinking behavior to examine how drinking changes affect drinking and driving. It synthesized existing research on the effects of economic factors, youth demographics, laws and programs directed at youth, and measures to control adult drinking and driving. It compared influences and results in the United States and Canada using data from the Traffic Injury Research Foundation (TIRF) Fatality Database. Complete citations are given in the full study report (1).

## **Results**

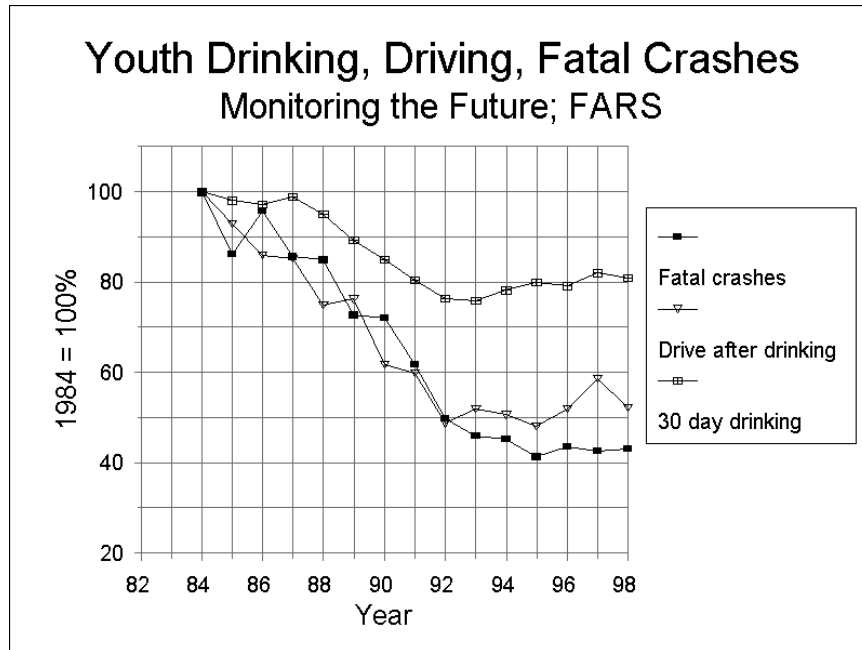
### **Youth Drinking and Driving -- National Trends**

Nationally, youth drinking and driving as measured by fatal crash involvements and by self-reported drinking and driving behavior decreased substantially from 1982 to 1998. Most of the decrease took place between 1982 and 1992. Young drivers of all ages up to 21 reduced their drinking and driving by similar amounts. A small portion of the decrease in youth fatal crash involvements is due to a decrease in the number of young persons in the population.

### **Youth Drinking and Driving -- Regional and State Trends**

Youth drinking driver fatal crash involvements decreased substantially in all regions of the country and in most states. Drinking driver involvements per population decreased by more than 50 percent in 45 states. Many states followed the national pattern of a substantial drop from 1982 through the early 1990s, with little subsequent change. In 1998, youth drinking driver fatal crash involvements were about 5 per 100,000 population (or even lower) in the 10 best states and about 15 in the five worst states.

**Figure 3: Youth 30-day drinking, driving after drinking, and drinking drivers in fatal crashes**



**Youth Drinking**

Youth drinking also decreased from 1982 to 1998, but not as much as youth drinking and driving. Evidence from Monitoring the Future (2) and other surveys (3) shows a consistent drop in self-reported drinking by both high school and college students under 21. This decrease occurred fairly uniformly across all regions of the country. However, most youth still drink; a majority drink at least monthly; a substantial minority binge drink regularly. Since about 1993 youth drinking has increased gradually, but youth drinking driver involvements in fatal crashes have remained approximately constant.

Figure 3 illustrates these trends using data from 1984 to 1998. It shows a 19 percent drop in self-reported drinking from 1984 to 1998 (the top line, from Monitoring the Future) compared to a 57 percent drop in drinking driver involvements in fatal crashes (the bottom line, from FARS). The middle line shows self-reported driving after drinking, also from Monitoring the Future, which first included this information in 1984. This trend tracks fatal crash involvements quite closely through 1995 and provides additional evidence that youth drinking and driving has dropped considerably more than youth drinking.

The decline in drinking thus accounts for some, but by no means all, of the decline in drinking and driving. Youth have separated their drinking from their driving more in 1998 than they did in 1982, and more than have drivers over 21. Drinking and driving has become less socially acceptable among youth, as measured by youth attitudes and by the use and acceptance of designated drivers (4).

### **Minimum Legal Drinking Age Laws**

Thirty-six states raised their minimum legal drinking age (MLDA) to 21 between 1983 and 1987 (the other 14 states had age 21 laws in effect before 1983) so that by 1988 MLDA was in effect in all states. MLDA 21 laws clearly reduced youth drinking and driving (5, 6, 7). The laws reduced youth drinking by reducing alcohol availability and by establishing the threat of punishment for alcohol use. But MLDA 21 laws do not work particularly well in practice, as youth still can obtain alcohol relatively easily and underage drinkers are highly unlikely to be detected and punished. MLDA 21 laws also may have encouraged youth to separate their drinking from their driving. The observations that youth drinking and driving decreased substantially more than youth drinking, and that youth drinking and driving after drinking both decreased in states that had MLDA 21 laws throughout the 1980s, suggest that MLDA 21 laws were not the only influence on youth drinking and driving during this period.

### **Zero Tolerance Laws**

A Zero Tolerance law sets a maximum BAC of 0.02 or less for youth and suspends or revokes an offender's driver license. All states adopted Zero Tolerance laws covering all drivers under 21 between 1991 and 1998. Zero Tolerance laws also have reduced youth drinking and driving (7, 8). They likely did so for two reasons: by deterring youth through the fear of losing their driver license if they drive after drinking and also by reinforcing the broad community disapproval of youth driving after drinking.

### **Youth Programs**

States and communities conducted extensive youth drinking and driving programs in the past two decades (9, 10). These programs seek to motivate youth not to drink and drive through positive means: by education on crash and injury risks posed by drinking and driving and the effects of alcohol use and abuse, by providing positive role models that discourage alcohol use, by establishing youth norms that do not include alcohol, and by encouraging youth activities that do not involve or lead to alcohol use. Other organizations concerned with traffic safety -- insurance companies, automobile manufacturers, MADD, and many others -- did the same through public education and specific program activities.

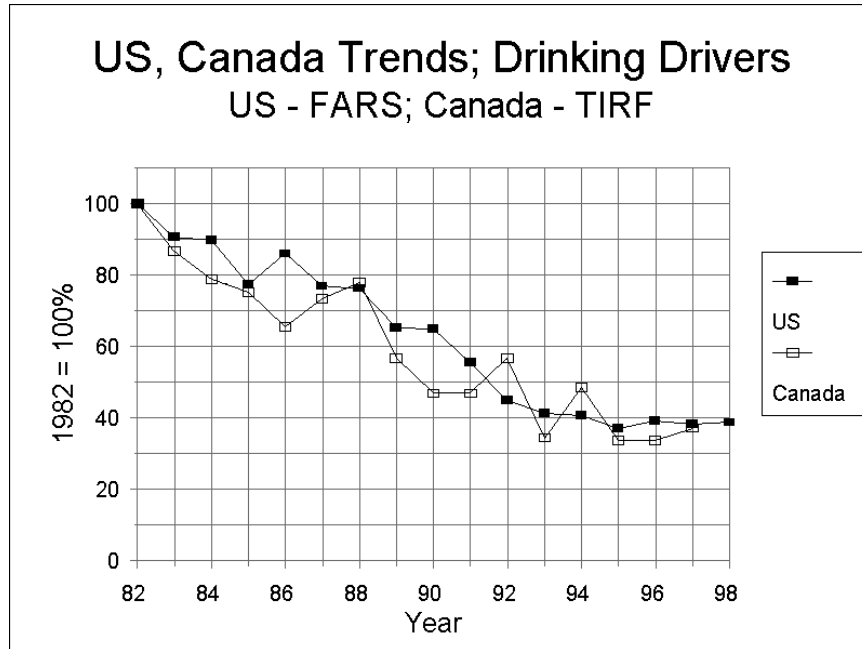
There is little direct evidence of the effects produced by these activities. Very few have been evaluated to determine their effects on youth knowledge, attitudes, behavior, traffic violations, or crashes. A few well-organized and well-funded community programs have reduced youth drinking and driving after drinking (11, 12). Some school programs have affected students' knowledge and attitudes and may have affected their behavior. There is no direct proof that most of the many youth traffic safety program activities not involving laws and enforcement had any direct effect on youth drinking and driving. But there also is no proof that they did not. The accumulation of information, education, skills, role models, and the like provided by these programs may have been a crucial influence in the youth attitude, behavior, and crash changes that have occurred.

### **Drinking and Driving Measures Not Directed at Youth**

In general, states that reduced overall drinking and driving the most from 1982 to 1998 also reduced youth drinking and driving the most. This suggests that states that took effective measures to reduce overall drinking and driving also saw the effect of these measures on youth

drinking and driving. In addition, the travel, employment, and unemployment trends that influenced overall drinking and driving likely also affected youth drinking and driving.

**Figure 4: US and Canadian trends, percentage change from 1982**



### **The Canadian Experience**

Canadian reductions in youth drinking and driving, measured both by fatal crash data and by surveys, followed virtually the same pattern as in the United States (Figure 4). The Canadian reduction was not due to laws directed at youth: the drinking age did not change during this time, and zero tolerance laws were implemented after the reduction had occurred. This means that the changes must have resulted from some combination of the difficult-to-assess educational and motivational programs and from other factors outside of traffic safety. This suggests that a substantial portion of the reduction in the United States also resulted from these same causes.

### **Discussion**

Three influences on youth drinking and driving are well-documented and well-understood: population changes, legal drinking age increases, and Zero Tolerance laws. However, these three by themselves account for only a portion of the observed decrease in youth drinking and driving. Influences from other factors -- youth programs, other drunk driving measures, and factors completely apart from driving or drinking -- can only be inferred.

Something has worked spectacularly well in reducing youth drinking and driving. Some causes are known; some are not. The most prudent strategy to retain and increase these gains would be to improve MLDA 21 and Zero Tolerance law enforcement, continue the programs directed at youth, and strengthen measures against all drinking and driving.

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# **Zero Alcohol Tolerance Among Young Drivers: Yes, But...**

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## **Keywords**

Alcohol, youth, accessibility

## **Summary**

This text presents the results of a program conducted in the Montérégie in the last 5 years to reduce the sale of alcohol to youths under 18 years of age. (Montérégie is a region in southwestern Quebec with a surface area of 11,072 square kilometres and a population of 1,324,799 inhabitants living in about 200 municipalities.) After a constant decline in the alcohol sales level since 1997, a significant increase was recorded in summer 2001. These results raise questions and lead us to redefine directions, taking into account the context of consumption.

## **Introduction**

Alcohol is the cause of numerous social and health problems, notably road accidents. In Quebec, specific measures such as "Zero Alcohol Tolerance" have been developed to reduce mortality and morbidity among young drivers. These measures proved to be effective among car drivers aged 20 years and under, but to maximize their effects, they must be implemented in a larger perspective of multiple strategies aimed at reducing impaired driving under the influence of alcohol (1,2).

The proportion of young Quebecers aged 15 to 24 years who drink alcohol was higher in 1998 (87%) than in surveys from 1992-93 (83%) and 1987 (84%). In this age group, the subgroup of 15- to 17-year-olds was the only one to show a constant increase in the proportion of actual drinkers. Indeed, the proportion reached 80% in 1998, compared to 75% in 1992-93 and 68% in 1987 (3).

In the Montérégie, research performed in 1998 on a sample of more than 2,700 students from secondary 1, 3 and 5 in about 45 schools revealed that 89% of secondary 5 students said they consumed alcohol in the last 12 months preceding the survey. About 3 drinkers out of 10 reported that they drank more than once a month. The data also showed that 39% of drinkers were often drunk or were drunk each time that they drank. The secondary 5 students were aged 13.5 years, on average, when they had their first alcoholic drink (4).

Despite clear legal steps banning the sale of alcohol to youths under 18 years of age, many studies have shown that youngsters can easily obtain alcohol in stores (5,6). Furthermore, the literature indicates that age at first consumption and first easy access to alcohol are important predictive factors for the level of alcohol consumption later in life (7-9).

Thus, among the measures supported by the World Health Organization to prevent alcohol-related problems, the strategy of reducing accessibility to alcohol constitutes one of the cornerstones of action to be considered (10). The objective of the present project thus consists of decreasing the level of alcohol sales to youths under age 18 years in the Montérégie. The different stages of intervention are : survey performance, diffusion of the results, sensitization of partners, law enforcement, and intersectorial dialogue.

## **Methodology**

### **Survey performance**

For the survey, the driver, accompanied by 2 adolescents, a boy and a girl, parks his car close to the store to be visited, but out of view of the retailer. The investigator ensures that the girl and boy alternate an equal number of store visits. One of them enters the store, takes a beer from the refrigerator and moves towards the cash register. If the store clerk refuses and asks for proof of age, the youth presents his or her identity card. On the other hand, if the store clerk accepts to sell beer to him or her, the youth pretends to have forgotten his or her money or to not have enough money. In no case does the youth leave the store with alcohol in his or her possession. He or she reports to the investigator, who records the information on the data collection sheet, along with the outcome of the purchase attempt and other details.

### **Sampling**

In 1997, a simple randomized sample of 500 stores (convenience stores, grocery stores, and Société des alcools du Québec (SAQ) outlets) was drawn from the Montérégie telephone directory. As the sample size decreased over the years, a new stratified sample of 525 stores (265 convenience stores, 220 grocery stores and 40 SAQ outlets) was chosen in 2000 from the most up-to-date lists of stores obtained from the Régie des alcools, des courses et des jeux as well as from the SAQ.

### **Data collection**

To assess the degree of compliance with the law, a data compilation form adapted from a measuring tool developed by the Canadian Cancer Society for surveys on tobacco sales was used. The variables studied were: type of store, behaviour of the store clerk during the purchase attempt (accepting or refusing to sell alcohol), age and sex of the young buyer, sex and estimated age of the seller, the presence or absence of a poster/notice in the store prohibiting the sale of alcohol to minors, date and time of the attempted purchase, and the sub-district where the store was located.

### **Analysis**

A comparative survey was conducted to chart the evolution of alcohol sales with time according to the type of store. The level of sales and data on the behaviour of store owners were weighted in a way that made the sample representative of the distribution of stores in the Montérégie. Different statistical analyses were used: chi square, stratification, logistic regression, T-tests. It

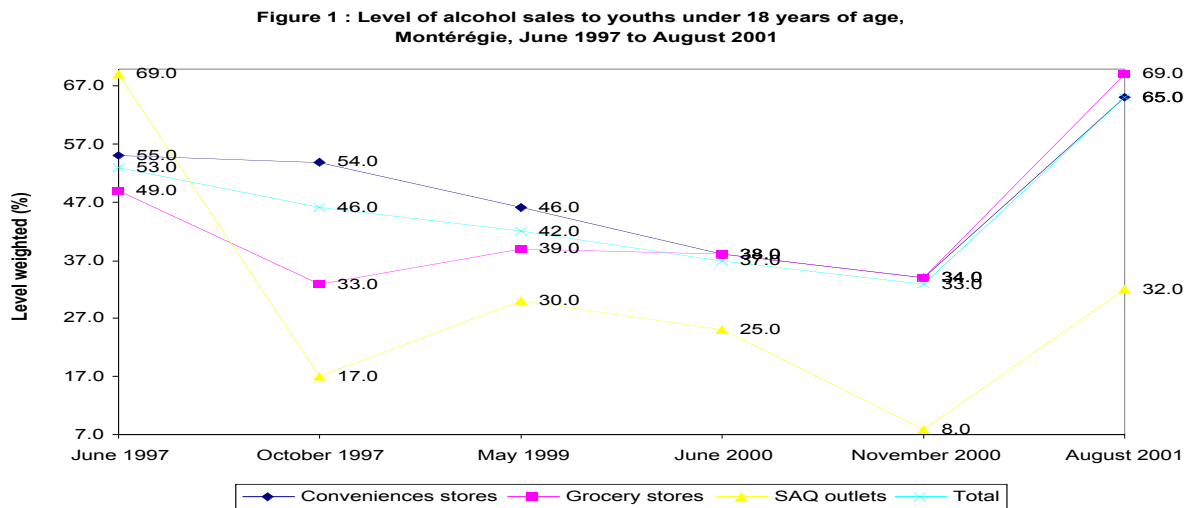
should be noted that the level of alcohol sales did not represent sales as such since these transactions were never finalized. It means the acceptance by the store clerk to sell alcohol to a minor.

## Results

The percentage of stores which sold alcohol to minors fell from 53% in June 1997 to 33% in November 2000, that is to say, a significant decrease of 38% in 4 years. In August 2001, the level of illegal sales to persons under 18 years of age peaked at 65%, even exceeding the level observed in the first survey. This increase is statistically significant compared with the survey of November 2000 as well as of June 1997 (Figure 2).

The same tendency is seen if we limit the analysis to convenience stores; even if the sample size is smaller, all the differences are significant. Thus, the level of alcohol sales to minors, according to the type of store, fell from 55% in June 1997 to 34% in November 2000 and climbed to 65% last August. Similarly, in grocery stores, the level of alcohol sales reached 69% in the last survey, a significant increase compared to June 1997 (49%) and November 2000 (34%).

In SAQ outlets, we noted a significant decrease in sales figures between the surveys of June 1997 and November 2000, with the level dropping from 69% in June 1997 to 8% in November 2000, and then rising to 32% in August 2001.



When considering the course of 6 surveys, certain variables may explain the sale of alcohol to minors: the presence of a poster or notice, type of store, age and sex of the young volunteer, age of the sales clerk.

## **Poster**

For the first 3 surveys, we observed that the absence or presence of a poster announcing the ban on alcohol sales to youths is the best predictor of alcohol sales. Thus, the absence of a poster increases 4- to 7-fold the relative risk (RR) of a legal infraction compared to the situation where the poster is present. This difference is less evident during the surveys of June and November 2000.

## **Type of store**

The type of store is responsible for a large proportion of alcohol sales, especially in the last 2 surveys. Indeed, the probability that a store will accept to sell beer to a youth under age 18 years is 4 to 8 times higher in convenience stores and in grocery stores than in SAQ sales outlets, whatever the evolution of alcohol sales to minors since 1997.

## **Age and sex of the young buyer**

We found that it was easier for young girls to buy alcohol. The RR of illegal sales to female youths is 2 to 5 times higher, particularly when the girls are 15 years of age. Furthermore, in June 2000, the risk of illegal sales of alcohol to girls aged 16 years was 11 times higher than to boys of the same age.

## **Age of the store clerk**

In the last 3 surveys where the data on age estimates of sales clerks are available, we find a significant association between the level of alcohol sales and the age of sales clerks. Thus, in general, sales clerks aged 24 years or younger sell 2 times more often to other youths than older sales clerks, and this in a consistent manner.

## **Other variables**

The analysis of other variables, such as date of the survey, time when the young volunteer attempted to buy alcohol, and the sub-district where the stores are located, did not permit the identification of significant results.

## **Discussion**

Analysis of the evolution of the global level of illegal alcohol sales showed a significant fall between the first survey of June 1997 and each successive survey, the most substantial decrease being that of the SAQ, from which the sales of alcohol declined from 69% in June 1997 to 8% in November 2000. However, the last survey conducted in August 2001 indicated an increase in the level of sales for all stores combined and for each category of store. We noted higher than starting levels, except for the SAQ where sales were also increased but to a lesser extent.

None of the variables studied during analysis of the evolution of sales percentages systematically explains the sudden increase in alcohol sales observed in August 2001. Hypotheses have been proposed to make these results clearer, but they cannot be validated at this stage. We think that the survey period (August), which corresponds to the summer vacations, may have contributed to the sales increase. This was the first time that a survey of stores had been conducted during that period of the year; the other surveys were usually performed in May/June or October/November.

It is possible that the picture of alcohol sales, such as was observed in August 2001, was affected by certain variables associated with the stores: the important presence of more occasional

summer staffing, that is to say, new employees aged 18 to 24 years, vacations of the owners or managers with a parallel relaxation of surveillance and reminder of the law, higher clientele volume with correspondingly less vigilance of sales clerks to ask for proof of age.

Other efforts must be made to reinforce application of the law as 2 stores out of 3 sold alcohol to youngsters last August compared to 1 out of 3 in November 2000. Other surveys should be performed for comparative purposes and specific actions between surveys should be adapted.

We cannot ignore the fact that stores are not the only sources of supply of alcoholic products among youth. The latter can procure alcohol from other persons older than 21 years of age: father, mother, friends, brothers, sisters, work associates, strangers (5). In parallel, we observed a greater accessibility to alcohol since the commercial turns (longer store hours, larger number of sales outlets, financial incentives, etc.) taken by the state corporation, which is responsible for the control of alcohol of the Quebec population.

In light of the present situation, it is plausible to think that social tolerance prevails concerning accessibility to alcohol as much among youth as in the general population. However, measures against driving with functions impaired by alcohol are increasingly severe and target mostly the behaviour of drivers. Does this way of doing things not raise questions about the coherence of public politics in relation to the creation of environments favourable to making proper health choices? In this sense, the reinforcement of laws banning alcohol sales to minors and the implementation of programs impacting social norms in regard to alcohol are actions that should be included in the host of effective measures aimed at the problem of road accidents as much as at social and health problems.

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# Age of Drinking Onset Predicts Young Adults' Self-Reported Drink-Driving

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## Keywords

Alcohol, Drinking Onset, Drink-Driving, Adolescents, Young Adults

## Abstract

This study examined the age of onset of regular drinking as a predictor of self-reported drink-driving behavior in young adulthood, using longitudinal adolescent and young adult survey data. There was a strong relationship between drinking onset age and young adult drink-driving level: those with drinking onset under age 14 were more likely to report more severe levels of young adult drink-driving. These findings offer sound, longitudinal evidence of the relationship between early drinking onset and young adult drink-driving level and underscore the need for early prevention efforts.

## Introduction

Injury, primarily from motor vehicle crashes, continues to be the leading cause of death in adolescents and young adults in the US (1). Roughly 40% of crashes are alcohol-related, and in the year 2000, those crashes increased 4% after a previous period of decline (2). A greater understanding of this behavior is needed in order to develop appropriate prevention strategies.

A growing body of literature has addressed the effect of early drinking on subsequent alcohol-related behavior. In particular, age at the onset of drinking has been examined as a predictor of various young adult alcohol-related behaviors. Earlier onset of alcohol use has been associated with young adult problem drinking (3-6), self-reported involvement in drink-driving (DD) (7), and self-reported DD crash (7). These studies relied upon recall during adulthood to determine the drinking onset age.

Shope et al. have characterized young adult drinkers by four levels of self-reported DD: drinkers who did not drink-drive; drinkers who drove after two drinks or less; drinkers who drove after three or more drinks; and those who drank in the car (8). The proportions of drivers who self-reported cigarette use, drug use, and deviant behavior, and had serious offenses and alcohol offenses on their driving records, were highest for those with the most severe level of DD (drank in the car while driving). Binge drinking frequency was also highest for those who drank in the car. All six behaviors increased consistently with each DD level from non-DD to drank in the car while driving. That study utilized cross-sectional survey data and did not examine adolescent predictors of the young adult DD levels.

This paper presents findings from analyses examining the age of drinking onset as a predictor of these young adult DD levels. The age of drinking onset was determined longitudinally using adolescent questionnaire data. Few studies have utilized longitudinal adolescent data to determine drinking onset age. Two longitudinal studies have, however, yielded results similar to the cross-sectional studies and found that earlier onset of alcohol use was associated with young adult alcohol abuse or dependence (9), problem drinking (10), serious driving offenses and crashes (10), and frequency of self-reported young adult DD behavior (10). The present study builds on this growing literature.

## **Methods**

### **Procedure**

Young adults who had previously participated in a longitudinal study to evaluate a school-based alcohol misuse prevention program, and who had a driver's license in the state of Michigan completed a telephone survey (N = 4,230) in 1997 or 1998, approximately six years following their high school graduation. All telephone survey participants had previously completed at least one of six adolescent questionnaires administered from 5<sup>th</sup> grade through 12<sup>th</sup> grade.

### **Sample**

A subset of telephone survey subjects had complete DD items and also had enough adolescent questionnaires so that the investigators could identify the earliest age at which subjects drank three or more drinks per year (n = 1,701). The analyses reported in this paper were conducted for that subset of subjects.

At the time of the telephone survey, the subset of subjects averaged 24.2 years old (SD = 0.8). The subset was 53.1% female and 84.8% white; 71.4% had attended at least some college and 72.7% had never been married. Chi-square analyses based on several telephone survey items (gender, age, race, marital status, education level, and DD level), showed no significant differences between those included and excluded from these analyses.

### **Measures**

The main outcome measure was young adult DD level. The telephone survey contained one item regarding current drinking ("How often do you have a drink containing alcohol?") and four items on DD behavior in the past 12 months ("...how many times did you drive within an hour of drinking?"; "...how many times did you drive within an hour after drinking 1 or 2 beers or other alcoholic beverages?"; "...how many times did you drive within an hour after drinking 3 or more beers or other alcoholic beverages?"; "...how many times did you drink in the car while you were driving?"). Subjects reporting any current drinking frequency greater than "never" were considered to be young adult drinkers and were asked the questions about DD. Based on their responses to the items above, subjects were assigned to only one of the young adult DD levels (their most extreme response): non-drinker, drinker who did not DD, drinker who drove after 2 drinks or less, drinker who drove after 3 or more drinks, and those who drank in the car.

Adolescent drinking onset was determined from adolescent survey responses. In each survey, students reported the number of times they consumed beer, wine, and/or liquor. They were instructed to count only occasions when they had more than a taste or sip of alcohol (a beer, a glass of wine, a glass of liquor, or a drink with alcohol in it). Consumption of an alcoholic drink

on at least three occasions within the past year was considered to be more than experimental use and was categorized as drinking. The students' ages at each of the questionnaires were used to assign them to one of three adolescent drinking onset categories: non-drinker, drinking onset 14 years of age or older, and drinking onset under age 14.

Several demographic items from the young adult telephone survey were examined, including gender, race (white, black, other), education level (no high school degree, high school/tech/trade school degree, some college, undergraduate college degree, some post-graduate education completed/post-graduate degree), and marital status (married, formerly married – separated/divorced/widowed, never married).

### Statistical Analysis

All analyses were completed using SAS Release 8.2 (11). Chi-square analyses with Cochran-Mantel-Haenszel tests for ordinal variables were performed to examine the relationship between adolescent drinking onset category and young adult DD level, and between both of those measures and the demographic items.

### Results

The percentage of subjects by adolescent drinking onset and young adult demographic group is presented in Table 1. There were significant relationships between adolescent drinking onset and gender (chi square = 5.71, df = 1, p = 0.0169), race (chi square = 75.08, df = 2, p < 0.0001), and education level (chi square = 54.41, df = 4, p < 0.0001). The relationship between adolescent drinking onset group and marital status was not significant (chi square = 2.11, df = 2, p = 0.3470). Men, white subjects, and those who had not attended college (no high school degree, high school/tech-trade school degree) had begun drinking under age 14 disproportionately more than would be expected, given their distribution in the total sample.

**Table 1: Percentage of Young Adults by Adolescent Drinking Onset and Demographic Group**

	Non-Drinker	Drinker ≥14	Drinker <14	Total
Male*	49.4	39.4	50.5	46.4
Female	50.6	60.6	49.5	53.6
White*	62.2	83.8	89.7	84.9
Black	7.3	7.2	3.9	5.4
Other	30.5	9.0	6.4	9.7
Married	28.9	23.0	24.6	24.5
Formerly married	2.4	2.2	3.6	2.9
Never married	68.7	74.8	71.8	72.6
No HS degree*	0.0	2.5	6.9	4.6
HS/tech degree	12.0	23.2	26.4	23.8
Some college	41.0	36.1	37.8	37.5
College degree	36.1	30.6	24.2	27.7
Post-grad educ/degree	10.8	7.6	4.7	6.4

\* Statistically significant: gender (p = 0.0169), race (p < 0.0001), education level (p < 0.0001)

There were also significant relationships between young adult DD level and gender (chi square = 51.51, df = 1, p < 0.0001), race (chi square = 39.51, df = 2, p < 0.0001), and marital status (chi square = 102.77, df = 2, p < 0.0001). The relationship between young adult DD level and education level was not significant (chi square = 5.18, df = 4, p = 0.2688). Male, white, black, and never married subjects were in the ‘drank in car while driving’ level disproportionately more than would be expected, given their distribution in the total sample. The distributions of the young adult DD levels by demographic group are presented in Table 2.

**Table 2: Percentage of Young Adults by DD Level and Demographic Group**

	Non-Drinker	Drinker/ non-DD	Drove after ≤2 Drinks	Drove after 3+ Drinks	Drank in Car	Total
Male*	41.9	38.6	41.9	60.3	72.0	46.4
Female	58.1	61.4	58.1	39.7	28.0	53.6
White*	70.2	86.0	87.9	90.6	88.1	84.9
Black	9.0	4.7	5.2	3.1	6.8	5.4
Other	20.8	9.3	6.9	6.3	5.1	9.7
Married*	39.6	31.8	20.3	12.5	5.9	24.5
Formerly married	2.8	4.3	1.5	3.1	2.5	2.9
Never married	57.6	63.9	78.2	84.4	91.5	72.6
No HS degree	6.7	5.3	2.6	4.7	5.1	4.6
HS/tech degree	21.9	28.4	18.2	24.7	28.8	23.8
Some college	45.2	35.0	34.0	37.8	42.4	37.5
College degree	19.8	26.0	35.1	29.4	19.5	27.7
Post-grad educ/degree	6.4	5.3	10.1	3.4	4.2	6.4

\* Statistically significant: gender, race, marital status (p < 0.0001)

The result of primary interest in these analyses is the distribution of subjects within the adolescent drinking onset categories and young adult DD levels, as presented in Table 3. Chi-square analysis revealed a strong relationship (chi square = 134.36, df = 1, p < 0.0001) between adolescent drinking onset and the young adult DD level: those with early drinking onset were more likely to report more severe levels of DD. The majority of the young adult subjects (1417; 83.3%) reported current drinking and were therefore eligible for one of the four young adult DD levels. Among the young adult drinkers, 906 (63.9%) reported some level of driving after drinking. The majority of subjects in the more severe DD levels began drinking before age 14: 74.6% of those who drank in the car while driving and 60.6% of those who drove after three or more drinks. Subjects who began drinking under the age of 14 represented just over half of the total sample and nearly three-quarters of those who drank while driving.

**Table 3: Number of Subjects by Adolescent Drinking Onset and Young Adult DD Levels\***

YOUNG ADULT DD LEVEL:	Non-Drinker	Drinker/ non-DD	Drove after ≤2 Drinks	Drove after 3+ Drinks	Drank in Car	Total
ADOLESCENT DRINKING ONSET:						
Non-drinker	99	36	24	5	2	166
Drinker ≥14	88	207	160	121	28	604
Drinker <14	97	268	284	194	88	931
Total	284	511	468	320	118	1701

\* Statistically significant: p < 0.0001

## **Discussion**

Based on previous findings regarding age at drinking onset and young adult behavior (3-10), it was anticipated that in the current study, young adult DD level would be related to adolescent drinking onset age and that young adult DD level would be more severe with a younger adolescent drinking onset age. As expected, a strong relationship was found between young adult DD level and age at the onset of drinking. And, with more severe levels of young adult DD, the age at drinking onset was younger. Subjects who began drinking before the age of 14 were disproportionately over-represented in all three DD levels representing driving after drinking (drove after  $\leq 2$  drinks, drove after 3+ drinks, drank in car while driving) and were under-represented among non-drinkers and drinkers who did not drink-drive. Not only were subjects who began drinking before age 14 more likely to drive after drinking, they were also more likely to do so at a level (i.e. drove after 3+ drinks, drinking in the car while driving) that puts them and others at great risk of harm.

The sample used in these analyses, while not drawn to be representative, may well reflect the behaviors of the general population. The adolescent drinking prevalence, for example, was comparable to the rates of lifetime alcohol use reported by twelfth graders in the 1991 and 1992 Monitoring the Future Study (12), the years that the subjects in this study graduated from high school.

While the association of early onset of drinking and young adult DD is strong, early drinking could be an indicator of other factors. The strong relationships between the demographic categories and drinking onset group, and young adult DD levels suggest that further exploration of the characteristics of those in the younger drinking onset and more severe DD groups is needed. Of particular interest are the groups with subjects who began drinking before age 14 or drank while driving in greater proportion than their sample distributions: men, white subjects, and those who had not attended college for drinking onset before age 14; and, male, white, black, and never married subjects for drinking while driving. The other high-risk behaviors found to be associated with the more severe DD levels in previous work (8) render these young adults essential subjects of future research study. Prevention programs targeted to groups such as those above may help to delay drinking onset or to decrease young adult drinking while driving.

These findings offer sound, longitudinal evidence of the relationship between the early onset of drinking and an extremely harmful alcohol-related behavior in young adulthood. Regardless of how drinking is defined (first use or regular drinking) or how onset age is determined (longitudinally or recall) there is mounting evidence that those who begin drinking early continue to do so and engage in harmful alcohol-related behaviors as young adults. Prevention efforts are essential to delay the onset of drinking. Efforts should begin early and target the factors associated with early drinking, as well as the alcohol use behavior itself.

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# **The Impact of 9/11 Border Security on Youthful Cross-Border Drinking**

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## **Abstract**

Background/Introduction :Mexican border towns have for many years been attractive locales for young Americans to get drunk and;let off steam; because of the lower drinking age and inexpensive drinks south of the border. The extent of this cross-border binging is generally unrecognized. On a typical weekend night, as many as 7,000 youths aged 24 and younger, cross the border at San Diego to patronize Tijuana bars. Community enforcement programs directed at discouraging such cross-border drinking have shown some impact on the number of crossers. However, the impact of the increased security resulting from the events of 9/11 had a much greater impact.

## **Objectives**

This paper describes the impact of the new security measures and measures their impact on the number of crossers and the bars they patronize.

## **Methods**

Data on the number and BACs of youths returning from Mexico after a night of drinking in Tijuana was gathered through a survey of crossers from July 1997 to January 2002. Time series analysis was used to evaluate changes beginning in September 2001.

## **Results**

In October, following the events of 9/11, the total number of youths crossing the border to drink declined by 64%, whereas the number returning to the United States with an illegal BAC of .08 or higher declined by 80%. By December, however, the reduction in total pedestrian crossers had declined from 64% to 34%, and the number of drivers with BACs of .08 or higher had declined from 80% to 50%.

## **Discussion**

This paper describes the changes that took place in the clientele of the Mexican bars that catered to youthful Americans, the impact of those youthful drinkers on border security as reported by INS, Customs Service, Border Patrol, and General Services Administration officers, and the concerns of the youthful crossers with the delays at the border and the risks of drinking outside the country following 9/11. The lessons from this naturally occurring experiment are discussed.

**Conclusion**

The initial increase in security discouraged crossing by underage drinkers, but the effect is wearing off.

# **Persistent Unsafe Driving after Drinking or Driving after Using Cannabis among Young Adults**

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## **Keywords**

Driving, alcohol, cannabis, young adults

## **Abstract**

Early identification of drivers who persist in unsafe driving after drinking alcohol and/or using cannabis may be helpful in the development of strategies to prevent these behaviours. In this study young adults who persisted with these behaviours were compared with those who did not, with a view to identifying factors during adolescence that differed between these two groups, and that could be useful in the development of prevention strategies. The results suggest that different person-based strategies may be necessary to deter the development of persistence in each of these behaviours.

## **Introduction**

Over recent decades there has been a decrease in alcohol-involved motor vehicle traffic crashes. More recently there has been an increasing awareness that a relatively large proportion of the remaining problem can be attributed to a relatively small group of drivers who persistently engage in high-risk drink driving behaviour (1). Research has typically focused on individuals who have been convicted of repeat drink-drive offences or crash involved drinking drivers. For example, in New Zealand, from fatal crash data Bailey (1995) identified "hard core offenders" (2) as those with blood alcohol levels over 150mg/100 ml of blood and/or a prior conviction for drinking and driving, dangerous driving, or driving while disqualified. In a review and synthesis of the literature on DWI (driving while intoxicated) repeat offenders, Beirness et al. (1997) (3) concluded that the DWI repeat offenders were a demographically diverse group that tended to exhibit a variety of antisocial behaviours such as aggression, and hostility, and have poor driving and criminal records. The most distinguishing factor, however, was considered to be their drinking behaviour. The DWI offender was likely to drink frequently, consume greater quantities of alcohol per occasion, to have experienced alcohol-related problems, and have met the criteria for a diagnosis of alcohol-dependence (3).

After alcohol, cannabis is the psychoactive substance most frequently found in the blood of motorists involved in traffic crashes but the contribution of cannabis as a causal factor is equivocal. From a review of analytical studies it was concluded that there was no evidence that cannabis alone increased the risk of culpability for traffic crash fatalities or serious injuries but it

was possible that, with or without alcohol, it may lead to an increased risk of crashes causing less serious injury and vehicle damage. Also, it was concluded that the combined effect of cannabis and alcohol on the risk of traffic fatalities and injuries, relative to the risk of alcohol alone, was unclear (4).

Over the past few decades a range of intervention strategies have been implemented to deter repeated drinking and driving. Since the 1980s these strategies have contributed to a substantial reduction in the prevalence of drinking and driving. There is some evidence, however, that it may have been the more law abiding “social” drinkers who took heed of this message and that the drinking drivers that remain are a high risk group who are resistant to educational and emotive messages, and for whom traditional penalties such as fines, licence suspensions have little deterrent effect (3). There is also evidence of alcohol abuse or dependence among the persistent drinking-driver. This finding indicates early identification of at-risk individuals may be helpful to prevent this behaviour from becoming a persistent problem (5, 6). While the characteristics of the repeat DWI offender are well documented, relatively little is known about the characteristics of those who have the potential to become the persistent drinking driver. (7) The aim of the present study was to compare young adults who reported persistent driving after drinking alcohol or persistent driving after using cannabis, with the others who did not do this, and from this identify adolescent risk factors that could be targeted to try and prevent the development of these behaviours.

## **Method**

The study population was the Dunedin Multidisciplinary Health and Development Study cohort (DMHDS). The DMHDS is a longitudinal study of the health, development, attitudes and behaviour of a cohort of 1037 young people born at the only obstetric hospital in Dunedin, New Zealand between April 1, 1972 and March 31, 1973. Members of this cohort have been assessed at two yearly intervals from age 3 to 15 years, and again at 18, 21 and 26 years. The DMHDS is characterised by high follow-up rates (approximately 95% at ages 21 and 26 years) and the wide variety of studies, including road traffic behaviour, that have been included at each assessment, details of which are provided elsewhere (8-10).

For this study, at ages 21 and 26 years, in a personal face-to face interview using a structured questionnaire, information was sought on driving in the previous 30 days when they: 1) thought that perhaps they had too much to drink to be able to drive safely and, 2) had driven within two hours of using marijuana (cannabis). Those who had engaged in either of these behaviours at both ages were classified as “persistent”, and were compared with the remainder. The data for the explanatory variables had been obtained in a variety of other studies that are part of the DMHDS. Demographic data were obtained in interviews at ages 18, 21 and 26 (11). Mental health was assessed at ages 18 and 21, using a modified version of the Diagnostic Interview Schedule (12-14). Antisocial behaviour was indicated using the official police conviction records (excluding drunk driving and criminally negligent driving) (15) traffic convictions which included all driving and other traffic violations (16) and juvenile arrests, which were "police contacts" between the ages of 10 and 16 years. Aggressive behaviour was a subset of items from a self-report delinquency scale (17) Personality was assessed at age 18, using a modified version of the Multidimensional Personality Questionnaire (MPQ) (18) For this study, three higher order

factors were used: constraint, negative emotionality, and positive emotionality. Data on early driving experiences, driver licensing (19) and motorcycle use (20) were obtained at ages 15 and 18, and self-reported traffic crash involvement from age 13 to 26 years (21, 22).

Unadjusted odds ratios were calculated for each of the outcomes in relation to the potential explanatory variables, using logistic regression. Given the large number of explanatory variables, only those associated with the outcome at  $p < 0.01$  were retained for the multivariate analysis.

## Results

Of the 992 and 980 study members who participated in the age 21 and 26 assessments respectively, 933 (474 males and 459 females) completed both interviews on road safety issues and are included in the present study. Very few females engaged in unsafe drinking and driving so the analyses were restricted to males.

**Table 1: Unadjusted odds ratios from logistic regression models comparing males who persisted in unsafe driving after drinking with the others**

Explanatory measures(age in year)	Unadjusted Odds Ratio	95% confidence interval	p-value
<b>Demographic Characteristics</b>			
School qualifications	1.7	0.4 – 7.4	0.504
University qualifications	0.2	0.0 - 1.7	0.151
Employed at age 26	2.1	0.3 - 16.5	0.464
A parent at age 21	1.3	0.4 - 4.2	0.610
<b>Personality</b>			
Low Constraint	0.9	0.3 - 2.9	0.899
Low positive emotionality	1.7	0.6 - 4.7	0.314
High negative emotionality	0.4	0.1 - 1.7	0.213
<b>Mental Health Measures</b>			
High substance use (18)	2.5	0.9 - 6.9	0.066
Alcohol dependence (21)	3.7	1.3 -10.2	0.014
Cannabis dependence (21)	1.9	0.6 - 5.9	0.285
Depression (21)	0.5	0.1 - 3.9	0.512
<b>Anti-social behaviour</b>			
Juvenile Arrest (<16)	1.8	0.6 - 5.2	0.294
Aggressive Behaviour (18)	3.5	1.3 - 9.3	0.012
Police Conviction (18)	1.3	0.4 - 4.8	0.659
Traffic Conviction (16-21)	1.0	0.3 - 3.7	0.960
Alcohol traffic conviction (16-21)	0.6	0.1 - 5.0	0.675
<b>Early driving related behaviours</b>			
Able to drive a car (15)	2.0	0.6 - 6.3	0.239
Car licence (15-16)	0.8	0.2 - 3.5	0.724
Ride a motorcycle (15)	1.2	0.4 - 3.3	0.736
Motorcycle licence (18)	1.4	0.4 - 4.5	0.541
Traffic Crash (18-26)	1.2	0.3 - 5.2	0.844

The unadjusted results (Table 1) show that the persistent unsafe drink drivers were more likely than the others to be alcohol dependent, and aggressive. The adjusted results (not presented) were very similar. The unadjusted results (Table 2) show the persistent cannabis using drivers were more likely to report low constraint, negative emotionality, high substance use, alcohol dependence, cannabis dependence, juvenile arrest, non traffic related conviction, a traffic conviction, aggressive behaviour, early car use, motorcycle licence, and a traffic crash.

**Table 2: Unadjusted odds ratios from logistic regression models comparing males who persisted in driving after using cannabis compared with the others**

<b>Explanatory measures (age in years)</b>	<b>Unadjusted Odds Ratio</b>	<b>95% confidence interval</b>	<b>p-value</b>
<b>Demographic Characteristics</b>			
School qualifications	0.6	0.3 - 1.0	0.052
University qualifications	0.4	0.2 - 0.9	0.021
Employed at age 26	1.4	0.6 - 3.4	0.466
A parent at age 21	1.7	0.9 - 3.1	0.076
<b>Personality Measures</b>			
Low Constraint	3.4	2.0 - 5.8	<0.001
High negative emotionality	2.1	1.2 - 3.7	0.008
Low positive emotionality	1.4	0.8 - 2.4	0.299
<b>Mental Health Measures</b>			
High substance use (18)	3.3	1.9 - 5.5	<0.001
Alcohol dependence (21)	2.9	1.6 - 5.5	<0.001
Cannabis dependence (21)	12.9	7.1 - 23.6	<0.001
Depression (21)	0.9	0.4 - 2.2	0.868
<b>Anti-social behaviour</b>			
Juvenile Arrest (<16)	2.1	1.2 - 3.8	0.010
Police Conviction (18)	5.1	2.8 - 9.5	<0.001
Aggressive Behaviour (18)	3.3	1.9 - 5.7	<0.001
Traffic Conviction (16-21)	3.9	2.2 - 6.9	<0.001
Alcohol traffic conviction (16-21)	4.4	2.2 - 9.0	<0.001
<b>Early driving related behaviours</b>			
Able to drive a car (15)	2.2	1.2 - 4.2	0.011
Car licence (15-16)	0.7	0.3 - 1.7	0.432
Ride a motorcycle (15)	1.7	1.0 - 3.0	0.058
Motorcycle licence (18)	2.9	1.6 - 5.3	0.001
Traffic Crash (18-26)	2.7	1.4 - 5.4	0.004

The results from the multivariate logistic regression showed that persistent driving after using cannabis was significantly associated with low constraint (OR 2.4, 95% CI 1.2-4.8, p=0.019) police conviction (OR 3.1, 95% CI 1.4-6.8, p=0.005), traffic conviction (OR 2.4, 95% CI 1.1-5.2, p=0.028), and cannabis dependence at age 21 (OR 8.7, 95% CI 4.2-18.0, p<0.001).

### **Discussion**

The results from this study clearly show that the characteristics of the males who drove after drinking too much were very different from those who persisted in driving after using cannabis. Given the unequivocal evidence for the role of alcohol in traffic crashes, the persistent unsafe drinking drivers must be considered at the greatest risk of being involved in a traffic crash. However, despite the wide range of factors examined in this study, only aggressive behaviour at age 18 and alcohol dependence at age 21, were significantly associated with this outcome. Although not statistically significant, high substance use at age 18 was also associated with this outcome and may provide an early indication of future persistent drink-driving behaviour.

The young males who persisted in driving after using cannabis differed from the others on a wide range of factors. However, cannabis use is illegal in New Zealand, and some of these factors were quite likely related to this with low constraint being the only cannabis-independent significant factor. Low constraint is characterised by impulsive, incautious behaviour and has been shown previously to be a significant predictor of crashes among the males in this cohort (22). However, the role of cannabis as a causal factor in traffic crashes is equivocal and a recent study of young adult crashes found increased risk of at-fault crashes associated with increased cannabis use, but it was considered that this reflected the characteristics of young people who used cannabis, rather than the effects of cannabis on driver performance (23). The results from the present study provide support for this conclusion.

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