

A Case-Control Study of Driving While Impaired Offenders

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ABSTRACT

A case control approach was used to identify variables associated with driving while impaired (DWI). Data utilized for this study were obtained from interviews with individuals in a representative sample of 9,943 Canadians. Individuals convicted for DWI were matched with control subjects (i.e. no DWI convictions) by gender, age, province of residence, education, income, and recent drinking behaviour. During the matching process, 39 current abstainers were found among the DWI offenders and were treated as a separate group for statistical purposes. Three groups were studied and compared: 78 DWI cases, 78 matched controls, and 39 DWI current abstainers.

Chi-square and ANOVA statistics were used to detect significant differences among these three groups for 84 variables from the following categories: (a) attitudes, knowledge and behaviour related to drinking and driving, (b) driving behaviour, (c) drinking behaviour and drug use, (d) social issues and, (e) attitudes towards different policy approaches to reducing drinking and driving. DWI cases were significantly different from control subjects for only 12 variables. A high proportion of differences found between these two groups related to attitudes regarding drinking and driving behaviour. For example, DWI cases were more likely than controls to believe that some people drive better after drinking, that it takes more alcohol to be legally impaired, and that there is an excuse for DWI. DWI cases were more likely to drink due to sadness or loneliness, and reported higher cannabis use over previous years. Little evidence was found to support the hypothesis that DWI offenders are less likely to perceive deterrents to DWI. However, evidence does support the notion that many DWI offenders do not believe that they have a drinking problem. Implications of the findings are discussed.

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A Case-Control Study of Driving While Impaired (DWI) Offenders Introduction: The Role of Confounders for DWI

Drinking and driving research has clearly shown that driving while impaired (DWI) offenders are more likely than others to be male, young, from low socioeconomic backgrounds and excessive drinkers. Research also suggests that social issues, attitudes, driving behaviour and drug use may be important factors explaining the etiology of DWI. However, the degree to which these factors independently contribute to explaining DWI is poorly understood because few studies have controlled for potential confounders. A confounder is a variable that wholly or partially accounts for or masks an association with a third variable.

Age and gender, are obvious confounders. Research is conclusive that males are much more likely to be convicted for DWI (Gurnack, 1983; Wilson & Jonah, 1983; Berger & Snortum, 1986; Bradstock et al., 1987). Recent research indicates that people between the ages of 20 and 35 are over-represented in terms of DWI convictions compared with licensed drivers (Donelson, 1985; Mercer, 1986; Bradstock et al., 1987), although the average DWI offender is approximately 37 years old (Whitehead, 1975; Maisto et al., 1979).

The variables of socioeconomic status, education and geographic jurisdiction have been shown to be related to DWI and may also be confounders. Individuals of lower socioeconomic status and lower education are more likely to be convicted of DWI (Hyman, 1968; Clayton, 1980; Donovan et. al., 1985; Macdonald, 1989). Researchers have also suggested that people residing in urban areas are more likely to be arrested for DWI because enforcement is more concentrated (Whitehead, 1975; Maisto, et al., 1979). However, the precise role of differential police enforcement practices across different geographic regions is largely unknown. Hyman (1968) found no evidence of differential enforcement practices against minorities or in different jurisdictions. Although considerable variations in the rate of DWI exist among different jurisdictions, the reasons for these variations is not clearly understood.

Consumption of alcohol is obviously a necessary cause of DWI. Research is conclusive that higher consumers of alcohol, especially alcoholics, are most likely to drive while impaired (Wilson & Jonah, 1983; Argeriou et al., 1986; Selzer & Barton, 1977). Since alcohol consumption is clearly a cause of DWI, an important subsequent question is the assessment of which other characteristics are associated with DWI over and above the contribution of alcohol consumption towards causing DWI. Numerous studies exist where the characteristics of DWI offenders are compared to groups such as licensed drivers. But these studies rarely control for possible confounders. Unless confounders are controlled, differences between groups could likely reflect differences in major confounders, such as age, gender or socio-economic status, rather than DWI.

The major research objective of this study is to assess which variables are related to DWI when the contribution of alcohol consumption and the aforementioned sociodemographic variables are removed. To address this question a case-control study was used where individuals convicted of driving while impaired were compared to those without such convictions (controls). The case-control approach is particularly useful because the control subjects are matched to the DWI cases for confounding variables. Confounding variables introduce differences between cases and controls which may not reflect differences in variables of primary interest.

Review of the Literature

Groups of factors that may contribute to DWI can be summarized by the following categories; (A) attitudes, knowledge and behaviour related to drinking and driving; (B) driving behaviour; (C) drinking behaviour and drug use; (D) social issues; (E) attitudes towards different policy approaches to reduce drinking and driving. In the following sections previous research results are described corresponding to each category.

(A) Attitudes, Knowledge and Behaviours Related to Drinking and Driving

Studies in this category refer to three areas: (a) degree of moral condemnation of drinking and driving, (b) attitudes and knowledge about laws for drinking and driving, and (c) actual strategies to avoid drinking and driving.

Grasmick and Green (1980) have suggested moral commitment, perceived threat of legal punishment and threat of social disapproval likely constitute an exhaustive set of factors that inhibit illegal behaviour. Empirical studies have indicated that these factors do play a role in drinking and driving, but other factors are also important. DWI offenders likely have more negative attitudes towards laws or legal authorities in general

(Macdonald & Pederson, 1990; Norstrom, 1978, Wilson & Jonah, 1983). It seems reasonable to expect that DWI offenders have less disapproval than others of drinking and driving, and some empirical evidence supports this conclusion (Clayton, 1986).

Deterrence theory is premised on the assumption that criminal behaviour is largely governed by the perceived severity, certainty and swiftness of punishment. Accordingly, those most likely to drink and drive might perceive the severity and certainty of punishment as being less threatening than non drinking drivers. No research has been found to support this assertion. Increasing the likelihood of detection has been thought to be an important control measure by researchers and prevention experts (Israelstan & Lambert, 1976; Whitehead & Simpkins, 1983); however in situations where increased enforcement practices for detecting drinking drivers were implemented, typically only short term reductions in the incidence of drinking and driving were noted (Ross, 1982). In a recent United States survey of 1,000 drivers, degree of knowledge about the legal consequences and perceived risk of arrest had no significant relationship with drinking and driving behaviour (Berger & Snortum, 1986). Basch et al., (1987) found that 18 to 22 years old tended to ignore or were unaware of the dangers associated with DWI.

The strategies drinkers employ to avoid drinking and driving might be helpful for the development of prevention programs. For example, are drinkers without arrests more likely to take taxis home or stay overnight with guests after drinking? Unfortunately, little research has been conducted to assess strategies used to avoid DWI. Alternatively, the incidence of DWI might be partially attributable to offenders being unaware of how much alcohol they can consume to be legally impaired. An Australian study showed that DWI offenders were more likely to over estimate the amount of alcohol required for impairment (Browning & Wilde, 1975).

(B) Driving Behaviour

There is some empirical evidence that DWI offenders share the same constellation of traits that enhance driving risk without alcohol involvement (Mercer, 1986; Zylman, 1976; Zelhart, 1975; Donovan, 1985). A number of authors found that traffic violation and accident records of DWI offenders were worse than licensed drivers. However, others have suggested that the relationship between poor driving records and DWI may disappear when controlling for age and gender, and partial alcohol related incidents (Macdonald & Pederson, 1988).

Since driving is a necessary condition of DWI, perhaps distance driven per year discriminates DWI offenders from others. Some have found that the average distance driven tends to be greater for DWI offenders than licensed drivers (Vingilis et al., 1986;

Williams et al., 1986). Similarly, how people drive when sober may have a bearing on how they drive while impaired. Driving expressiveness is a term that refers to expressing one's feelings while driving, and could be reflected by losing one's temper while driving or finding driving exciting. In one study of a male alcoholic population, driving expressiveness was related to DWI arrests (Macdonald & Pederson, 1988).

(C) Drinking Behaviour and Drug Use

As previously discussed, as alcohol consumption of individuals increases, so does their likelihood of being arrested for DWI. Other factors related to drinking and drug use may be important as well. These include frequency of drinking, amount per occasion, reasons for drinking, strategies to reduce drinking, and other types of drug usage.

In terms of frequency of drinking, evidence is mixed with respect to whether increased or decreased frequency of drinking is positively associated with DWI. While some studies have found that increased frequency of drinking to be positively associated with DWI (Duncan & Vogel-Sprott, 1974; Wilson & Jonah, 1983); others have found decreased frequency of drinking to be positively associated with DWI (Hurst, 1974; Macdonald & Pederson, 1990). These unequivocal results are likely attributable to the populations investigated. In the general population, more frequent drinkers may be more likely to be DWI offenders but within a group of alcoholics, less frequent drinkers may be more likely to be DWI offenders. In terms of the number of drinks consumed per occasion the majority of evidence indicates that people who consume more per occasion or binge drink are more likely to be DWI offenders (Argeriou et al., 1986; Selzer et al., 1977; Macdonald & Pederson, 1990). DWI offenders also appear to be more likely to abuse other substances (Barnes & Welte, 1988).

(D) Social Issues

Social networks might play an important role in the prevention and incidence of drinking and driving. Social supports could help to prevent DWI by designating an unimpaired driver or by encouraging an impaired person to make alternative arrangements to avoid DWI. The fact that single people are more likely to be arrested for DWI may be partially explained by a lack of social supports who might provide alternative transportation. The influence of social support might also be understood from a deterrence perspective. Some individuals may be less likely to drive after drinking because of a perceived possibility that family and friends will disapprove of such behaviour.

Alternatively, heavy drinking companions may help to create and maintain subcultural norms where drinking and driving is accepted. Some evidence exists which

suggests that drinking peers may increase the likelihood of DWI (Mookherjee, 1984). In another study, high school students who participated in social activities were more likely to drink and drive (Williams et al., 1986). On a global level, a study of 452 Alberta residents indicated that about 85% would intervene to prevent someone from drinking and driving (Adebayo, 1988). Furthermore, in another study, 97 of 247 high school students indicated that they had prevented someone from drinking and driving (Hernandez & Rabow, 1987).

(E) Attitudes Towards Different Policy Approaches

Studies have been conducted to determine preferred policy approaches by lay people and specialists, but little research has been conducted to assess differences between DWI offenders and others in preferred policy approaches. Kivikink et al., (1986) found that 47% of Ontario adults felt there were some short term changes in their drinking and driving following a media campaign against DWI. In a study of 212 MADD Chapters in Oregon, showed a recent shift of the populace towards favouring a more criminal justice orientation to the problem (Ungerleider & Block, 1987).

Methods

Description of Sample

Data was collected during February and March, 1988, under the supervision of Statistics Canada and commissioned by Health and Welfare, Canada. The sample was drawn from the Canadian population of all persons 16 to 69 years of age, residing in a household with a telephone service. A stratified multi-stage modified random sample of these households was conducted in eight provinces using the Waksberg Method. In the provinces of Ontario and Newfoundland, telephone numbers were stratified and systematically selected from residential working banks using the ENWB technique. Approximately 1,000 households were selected from each province.

When contacted one household resident was randomly selected for an interview. The interview schedule, which included 324 items, was designed to identify attitudes, behaviour and knowledge about issues related to driving while impaired. It includes sections on driving experiences, alcohol consumption, drinking and driving behaviour, opinions about driving while impaired and awareness of programs against drinking and driving, including media campaigns.

A total of 9,953 interviews were completed representing a response rate of 85.6%. The sample provided representation of the population in terms of key sociodemographic characteristics (see Appendix 1). The sample was over-represented in terms of females, married people, lower income earners, and older people. This is not a severe methodological limitation since the primary purpose of this study is exploration of the etiology of drinking and driving rather than estimating population parameters.

The Case Control Approach

In this study, a case-control design was utilized where people with DWI offenses (cases) were paired to those without offenses (controls). Controls were matched to cases on the basis of their age, gender, socioeconomic status, education, geographic residence and consumption of alcohol. Matching has certain advantages over statistically controlling for variables. It ensures that each case corresponds to a control subject for every confounding variable. Thus, possible interaction effects among confounders are controlled as well. As the number of variables to be matched increases, matching provides the only guarantee that groups will be comparable (Schlesselman, 1982). Using statistical procedures to control for confounders, it is possible that some variables may not be adequately statistically controlled due to small sample sizes in certain cells of the control group. This problem could occur with alcohol consumption where there may be few high consumers of alcohol. The case-control procedure is straight forward, easy to comprehend, conservative and highly valid. Naturally, by using the matching process, many relationships between predictor variables and the outcome variable that were significant without matching would disappear. Therefore, variables that are significant with matching are more likely to be actual causes of DWI.

Selection of Cases and Controls

In the sample of 9,943, 117 individuals admitted to an arrest for driving while impaired (DWI) in the prior three years (i.e., the cases). An attempt was made to match each DWI case with a control (without a DWI arrest) in terms of province, gender, education, income, age, and recent drinking behaviour. Ordinal measures of income and education were used in the study. Income categories ranged from 1=less than \$5,000 to 8= \$60,000 or more. Recent drinking was measured in terms of total number of standard drinks (i.e., 1 beer = 5 oz. wine = 1 ½ oz. spirits) in the week preceding completion of the questionnaire. A match was considered successful when the DWI case and the control were:

- (a) identical in terms of province and gender;
- (b) within \pm one ordinal category in terms of income and education;
- (c) within \pm 5 drinks in terms of weekly consumption of alcohol;
- (d) within \pm 5 years of age.

During initial matching it was discovered that for 39 of the 117 DWI were current abstainers. Matching these DWI cases with controls who were current abstainers seemed inappropriate because the DWI cases were former drinkers, and it was not possible to identify controls with similar drinking histories. At the same time, matching with current drinkers also seemed inappropriate because it was unknown how much individual cases drank before their arrests. It was decided, therefore, to treat these cases as a separate group from the cases and controls. For analytical purposes, this group was used to answer interesting questions such as whether DWI abstainers were distinguishable from DWI cases and controls for factors other than alcohol consumption.

Complete control matches were identified for 53 of the 78 DWI cases (67.9%). For the remaining 25 cases, controls were found with the smallest deviations from the criterion. In the majority of these pairs (15 or 60%) only one deviation from the acceptable range was needed. However, in nine cases the closest available match deviated on two criterion variables. In one case three deviations were required. Deviations occurred most frequently for the recent drinking variable (11), income (12), and education (7). For two matches it was necessary to obtain controls from neighbouring provinces. For every case an exact match for a control subject was made for age and gender, which were thought to be the most important confounders.

Scales

Prior to the analysis, three scales were formed by combining items related to specific constructs. The scale representing strategies to reduce drinking was composed of items representing various strategies people might use to reduce drinking. The scale was comprised of 8 dichotomous variables summarized in Appendix 2A. The driving expressiveness scale included 6 statements about expressive behaviour while driving such as, "I swear out loud at other drivers" (see Appendix 2B for all statements). Response categories for each item ranged from 1 (often) to 4 (never). Eight items were added together to form the reasons for drinking scale (see Appendix 2C). This scale includes common reasons for drinking such as "Drinking makes me feel happy" and "I drink when I am sad, lonely or depressed". Apart from the three scales the only other major data manipulation involved the development of a method to measure binge drinking. Binge

drinking was represented by the ratio between the total number of drinks per week and the number of drinking days in the same week. Higher ratios are indicative of binge drinking.

Results

The independent variables were categorized into 7 groups: (A) attitudes, knowledge and behaviour regarding drinking and driving; (B) driving behaviour; (C) drinking behaviour and drug use; (D) social issues; (E) attitudes toward different policy approaches to reducing drinking and driving.

Chi-square and ANOVA were used to assess differences among the three groups for 84 variables. Results from these analyses are provided in Table One. In column 2, the overall significance of F or χ^2 is provided. Where statistically significant differences were identified, further comparisons were made among each of the three possible pairs of groups. Contrasting procedures, using LSDMOD were completed for ANOVA, while 3 separate 2x2 tables were analyzed using chi-square for categorical variables. Probability values associated with these comparisons are provided in columns 3 to 5. In the last column, a description specifying the direction of significant relationships is provided.

Comparisons of group attitudes regarding drinking and driving behaviour are provided in Section A of Table 1. DWI cases and controls were distinguished for three of four variables: DWI cases were more likely to agree that some people drive better after drinking; less likely to agree there is no excuse for driving while impaired and were more likely to provide a higher estimate of the number of drinks required for impairment over a two hour period. Interestingly, the estimate provided by the DWI group of the amount of alcohol required for impairment was also significantly higher than the estimate of the DWI abstinent category. The DWI abstinent group was more likely to stop drinking early as a method to avoid driving impaired.

Few differences were found in terms of attitudes and knowledge regarding DWI laws and probabilities of apprehension. The DWI abstainers perceived a greater likelihood of being caught by police when driving drunk than did control subjects.

Statistically significant differences between DWI cases and controls were detected for only three of the 13 variables reported related to driving (see section B of Table 1). Surprisingly, the control group was more likely to report having sworn at other drivers. DWI cases and DWI abstinent were more likely than controls to have received a ticket and licence suspension in the last three years. Unfortunately, suspensions due to DWI conviction could not be partial led out of the analysis.

Comparisons of measures of reported drinking behaviour and drug use were also made among the three groups (see section C). The DWI cases were distinguished from the control subjects for only two drinking characteristics. The DWI cases were both more likely to have been drinking because they were sad and lonely, and to have tried to reduce alcohol consumption last year. The abstainers also tended to report being sad and lonely as a reason for drinking. It is not surprising that the third group was significantly different from both cases and controls for variables like frequency of drinking last year and type of drinker last week. Some important differences exist between the DWI cases and abstainers. The abstainers were more likely to consider themselves to be problem drinkers and were more likely to have sought help. The abstainers were also less likely to have used marijuana or hashish over the previous year. The DWI cases were more likely than controls to have used marijuana or hashish in the last year.

Respondents were also asked numerous questions about the social context of drinking (see section D). The results indicate that the abstinent group was more likely than either the DWI cases or controls to have avoided friends who drink a lot. DWI offenders, in contrast, were more likely to have been with a person in the past year who was drunk but still wanted to drive.

Finally, differences regarding attitudes to different approaches to reducing drinking and driving are summarized in Section E. The DWI cases were more likely to disagree that more road blocks are needed. The DWI cases and DWI abstinent groups were both more likely than those without convictions to disagree with greater enforcement of existing laws.

Discussion

Social desirability is a potential problem in studies that use self-reported data on drinking and driving. Some people may not admit to being arrested for impaired driving because it is not socially desirable. However, it is unlikely that people would admit to a DWI offence that never occurred. Therefore, the possibility exists that known DWI cases were matched with subjects who had DWI convictions. This would introduce only a conservative bias in the interpretation of results.

Since the study was a secondary analysis, one limitation is that the authors had no control over the items included in the interviews. Other variables, suggested by some as causes of DWI, would have been included if the study was conducted from the beginning. For example, negative attitudes towards the law, negative life events, and psychological variables such as impulsiveness and aggressiveness would have been included. However,

the variables used in this study are a good representation of a wide range of variables regarded as predictors for DWI.

Comparisons between DWI cases and controls produced only 12 statistically significant comparisons out of more than 83 tests. One would expect to find four differences due to chance alone. However, the relative absence of statistically significant findings is itself an important discovery given the design of this study. Since most known DWI predictors were controlled on a case-by-case basis, the results confirm that few predictors of DWI exist beyond those controlled for in the design of the study (i.e., consumption of alcohol, gender, age, etc.).

Many of the variables that significantly differentiated DWI cases from controls were related to attitudes and knowledge regarding to drinking and driving. For example, findings were consistent with Clayton's (1986) suggestions that DWI offenders have less disapproval of DWI. DWI offenders were less likely to agree that there is no excuse for DWI and that greater police DWI enforcement practices are needed. Furthermore, DWI cases were more likely than controls to think that some people drive better after drinking and to estimate that larger quantities of alcohol are required to produce impairment. This latter finding is consistent with Browning and Wilde's (1975) conclusions. These findings have implications for the development of prevention and rehabilitation programs. Such programs could focus on changing these attitudes and increasing knowledge about DWI.

The failure to find a significant difference between DWI cases and controls for aspects related to deterrence (i.e. perceived severity, and certainty of punishment) is consistent with the findings of Berger & Snortum (1986). Another finding of interest is that DWI cases and controls did not report any differences in terms of strategies they use to avoid drinking and driving. The findings have implications for the development of treatment programs to deal with DWI offenders.

The existence of a large group of DWI offenders that subsequently stopped drinking is encouraging. It is possible that DWI conviction was a contributing factor for their changed drinking behaviour. The abstinent group was more likely to think of themselves as problem drinkers. Even the control subjects were more likely to have tried to reduce their drinking than DWI cases. Upon examining the results as a whole, it appears that the DWI cases are less likely than the other two groups to think they have a problem and are consequently less likely to attempt to change their drinking habits; this despite the fact that all groups have similar drinking habits and DWI offenders show signs of having drinking related problems such as drinking when sad or depressed. A possible implication of this result is that counter measure programs for DWI offenders should to encourage offenders

to acknowledge that they do have a problem and that their drinking habits may need to be changed

Another notable finding of this study is that it appears that DWI offenders may be more likely to be involved in a "subculture" where drinking and driving is accepted. DWI offenders were more likely to have been with someone drunk who wanted to drive. As suggested by Mookherju (1987) it may be that DWI offenders are more likely to associate with people who drink and drive.

Future research should be directed towards investigating the causes of DWI by controlling for the confounding variables discussed in this paper. In particular, attitudes towards drinking and driving, and drinking behaviour should be studied in further depth. Also, processes that occur before people think they have a problem with alcohol should also be explored.