Research Project - 11/87
The General Prevention of Drinking and Driving

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SUMMARY OF METHODS AND RESULTS

This study was funded by the Criminology Research Council, the NSW Drug and Alcohol Directorate, ANOP Social Research, and the Departments of Transport in NSW and Victoria. It was combined with a survey run concurrently by Wendy Loxley at the National Centre for Research into the Prevention of Drug Abuse in Western Australia. The survey instrument used was adapted from one developed by Snortum, Hauge & Berger (1986) for use in the U.S. and Norway, and Dale Berger and John Snortum were direct collaborators in the present project. Part of the original plan was that extensive international comparisons would be made. However, the untimely death of Professor Snortum in November 1988 has removed the key person who could have given effect to that intention, so comparisons have been limited to Australia, the U.S., and Norway.

The overall purpose of the research was to explore the *general preventive effects* of drink-drive law. *General prevention* is a term popularized by the eminent Norwegian jurist Johannes Andenaes, and refers to the processes whereby a law changes the behavior of the target population through such factors as the fear of punishment, the creation of moral inhibitions concerning the proscribed behavior, and the formation of new habits (Andenaes, 1974). The concept of general prevention incorporates the notion of *general deterrence,* which may be defined as the "omission of an act as a response to the perceived risk and fear of punishment for contrary behavior" (Gibbs, 1975, p. 2). However, general prevention is a broader concept than general deterrence, which is often also referred to as "simple deterrence" to emphasize that it is restricted to behavior change as a response to the fear of legal punishments (Ross, 1982). Formalizing and enforcing a law may legitimize a moral value, educate the community in its importance, reinforce personal commitments, increase the number of positive role models, build peer pressure for compliance and generally change the social or even physical environment in a number of ways (Snortum, Hauge & Berger, 1986).

The research developed the work of Homel (1986) on general deterrence, and extended the international research of Snortum, Berger and their colleagues to Australia. One of the major aims of the research by Snortum, Hauge and Berger (1986) was to explore differences between Norway and the U.S. in compliance due to factors other than fear of legal punishments, with a view to making more plausible the argument that in Norway drink-drive law has had a gradual, educative and habit-forming effect, even if a sudden simple deterrent effect cannot (historically) be demonstrated. Since Australia has a relatively high rate of alcohol consumption but also appears to have one of the most successful drink-drive countermeasures in random breath testing (RBT), the extension of the international research to Australia added a new dimension to our understanding of the impact of drink-drive law in Australia.

Method

The Australian survey, completed in June 1988 by ANOP, included face-to-face interviews with 1,505 drivers over the age of 17, 1,133 of whom drank at least once per year. The survey was carried out in rural and metropolitan areas of NSW (333), Victoria (339), Queensland (333), and Western Australia (499). At the time of the study neither Queensland nor WA had RBT, although both had had vigorous "random stopping programs". Victoria was the first state in Australia to introduce RBT and had

long claimed major "educative" effects of RBT. NSW introduced RBT in 1982, and experienced a sudden, massive, and sustained drop in alcohol-related road deaths and injuries which appeared to have translated into attitude change (Homel, Carseldine & Kearns, 1988). A prediction of the study, which was confirmed, was that NSW respondents would report higher levels of compliance, be more deterred, and be more condemning of drink-driving behaviour.

The interview schedule sought information in four areas: (a) *behavior* - usual alcohol consumption, details of alcohol consumed and travel arrangements on the last occasion on which alcohol was consumed away from home, etc; (b) *exposure to and perceptions of formal and informal sanctions* - perceptions of the risk of apprehension, moral beliefs about drinking and driving, perceived pressure from friends, etc; (c) *knowledge* - penalties and regulations, understanding of the relationship between alcohol consumption and blood alcohol concentration (BAC); (d) *population descriptors* - age, sex, etc.

The interviews used a device for estimating a respondent's BAC at the end of a drinking session, based on what is known about the average effects of a certain number of drinks on BAC level for a respondent of given weight. This method has only been used once before in Australia, by Sloane and Huebner (1980), but it allows a more accurate estimate of the true incidence of drink-driving violations.

In the U.S., random-digit dialling telephone methods were used in April 1986 to obtain a representative national sample of 1,800 drivers. The Norwegian survey was conducted face-to-face with a national sample of 1,012 drivers in 1983.

Selected Results

* Striking differences in social norms, attitudes, and behaviors surrounding drinking and driving were found in the three countries. Norway appeared to have progressed farthest toward general prevention, whereas Australia relied more on general deterrence, reflecting the impact of RBT in the most populous states. Both general deterrence and general prevention appeared relatively weak in the U.S.

* Self-reported violations were considerably higher in Australia and the U.S. than in Norway, with 28% of Australians, 24% of Americans, and only 2% of Norwegians reporting that they drove after four or more drinks in the past year. On a general drinking occasion, the Norwegians were about as likely as Australians and more likely than Americans to report that they drank to levels of intoxication (30%, 35%, and 20% respectively). Thus explanations of the Norwegians compliance with drink-driving laws must be sought elsewhere.

* Australians reported more often than drivers in the other two countries that they traveled by motor vehicle to a drinking occasion in the last two weeks: Australia - 62%, Americans - 43%, and Norwegians - 29%. This illustrates the structural pressures to drink and drive in Australia and the relative lack of planning to use other methods of transport.

* Norwegians and Australians had a better knowledge of the law than Americans. Australians were less cynical than Americans about the operation of the law, and reported more often than Americans that fear of arrest is the main reason for exercising control (39% vs.15%).

* Australians had a stronger moral commitment to drink-driving laws than Americans, but not as strong as Norwegians. 78% of Australians, 71% of Americans, and a

massive 98% of Norwegians reported that they believe it is morally wrong to drive after 4 or more drinks.

* A similar pattern was found for perceptions of social controls. An encouraging 35% of Australians, compared with only 16% of Americans, reported that almost all groups designate a sober driver to drive home, but the proportion for Norway was 75%.

* Comparing states of Australia, the analysis suggested that regardless of state, many Australian drivers attempt to comply with drink-driving laws. Using derived MBAEs (maximum blood alcohol estimates for the last drinking occasion away from home), the amount people drank was influenced by their choice of driving role. People who normally drank less tended to adopt the driving role, although this effect was stronger for men than women. In general drivers reported drinking less that nondrivers and were also those who usually consumed les alcohol.

* The above findings were true of people with different levels of normal consumption. An important result was that many drinkers who normally drank very heavily moderated their consumption on the last occasion on which they drank away from home, although a majority of the heavier drinkers elected not to drive. This tends to confirm the deterrent impact of RBT on heavy drinkers reported by Homel (1988).

* The impact of RBT on beliefs and behaviors is graphically illustrated by a comparison of WA and NSW drivers under the age of 25. NSW young drivers were less likely to report drinking and driving; for example, when going somewhere to drink, 94% of NSW young drivers, compared with 76% of West Australians, reported arranging at least sometimes for someone else to drive.

* Of immense theoretical and practical importance, nearly two thirds (65%) of NSW young drivers reported that when with friends they used police breath testing as an excuse to limit their drinking, compared with only one third (33%) of WA young drivers. This is consistent with Homel's (1988) analysis which showed that RBT had a major effect in NSW by providing many drinkers with an acceptable excuse for limiting their consumption.

* Given this result, it is not surprising that more young drivers in NSW than WA believed that their friends would disapprove of driving after drinking four cans of beer in an hour (69% vs. 42%), and that NSW young drivers were more in favor of RBT (98% vs. 82%).

* The overall evidence for the far greater intensity of police enforcement of drink-driving laws in NSW compared with WA was overwhelming. 58% of NSW young drivers had been pulled over for breath testing, compared with 18% in WA, and only half as many as in WA believed that there was anything they could do to reduce their chances of being stopped and tested (20% vs. 43%).

* The patterns for young people in WA and NSW were similar for drivers of all ages across all states, although not always as clearly revealed. There is clear evidence that the intensive enforcement of RBT in NSW had succeeded in changing the social environment in NSW, and that beliefs about drinking and driving were beginning to change as a result of the enforcement and publicity of the law.

Further Reading

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Policy Implications

* The comparisons between the U.S., Australia and Norway illustrate that the two English speaking countries have a long way to go to match Norwegian levels of compliance with drink-driving laws. This is despite the fact that on the relatively rare occasions when Norwegians drink away from home they are more likely to get drunk. The histories of the respective countries, and the results of the surveys, suggest that progress can be made not so much in promoting policies of temperance as in changing attitudes about drinking and driving. The Australian evidence suggests that such a change has begun, promoted chiefly by the intense enforcement of RBT in states like NSW. A practical implication is that intense and even handed enforcement of RBT should go hand in hand with publicity and education campaigns about drinking and driving.

* The evidence for the effects on attitudes and behaviors of breath testing programs which fall short of true RBT, such as those employed in Queensland and WA in the late 1980's, is that they simply fail to achieve their intended effects. The survey data clearly confirm that random stopping programs which do not involve breath testing all drivers pulled over, and which are not strongly publicised, are a substantial failure as a deterrent. Although all states now have RBT laws, it is not clear that in the former "random stopping states" RBT is being enforced in an optimum manner. For example, in some parts of WA only half the drivers pulled over are tested. All states should now adopt the techniques of enforcement pioneered so successfully in NSW.

* It has been commonly believed that those groups which drink and drive the most are the most difficult to deter. The evidence from the present study, consistent with Homel's previous work on RBT in NSW, is that young drivers and heavy drinkers are extremely responsive to RBT. This suggests that special enforcement strategies and publicity campaigns aimed specifically at high risk groups may not be necessary.

* The analyses of maximum blood alcohol levels attained on the last drinking occasion away from home showed that drinkers who planned not to drive to or from the event drank much more than normal. This suggests that Skipper schemes promoted by the alcohol industry (where a group of drinkers selects a sober person to drive home) may achieve the objective of reducing drinking and driving, but may also increase overall alcohol consumption levels. Although the road accident risk is lessened, other health and safety objectives may not be achieved by these schemes.

* "Rescuers" in the analysis (those who drove home but had not driven to the venue) had higher BAC levels than those who planned to drive home. This suggests that publicity and education should encourage pre-planning of who is to drive home, while also encouraging reasonable moderation in the whole group.

* There is strong evidence that drinkers who are likely to drive need help to limit their consumption of alcohol. These people may have insufficient information about standard drink sizes or beverage strength to know how much alcohol they are really consuming. This finding supports current moves to introduce standard glass sizes in all states and to label beverage containers clearly in terms of the number of standard drinks contained within them. Education about standard drinks should provide many drinkers with the information they need to comply with a law they clearly approve of.

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Drinkers and Their Driving: Compliance with Drinking-Driving Legislation in Four Australian States

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ABSTRACT. This study replicates work in Norway and the United States in investigating the extent to which Australian drivers attempt to comply with drinking-driving legislation. In a four-state survey of 1,133 drinkers, it was found that people were aware of the need to control their alcohol input before driving, and derived estimates of blood alcohol after a recent away-from-home drinking occasion demonstrated that the amount people drank was influenced by whether or not they were driving. Drivers reported drinking less than nondrivers and were also those who usually consumed less alcohol. These findings were also true of people with different levels of normal consumption. Although these results are encouraging, it is suggested that there is need for further modification of sanctions, and that the community needs more information about the alcohol content of drinks and drink sizes if people are to moderate effectively their drinking before driving. (*J. Stud. Alcohol* 53: 420-426, 1992)

A RECURRING THEME in the drinking-driving literature is the drinking driver as a problem drinker or alcoholic (Homel, 1989). Yet, in discussing the "myths" of drinking-driving prevention, Vingilis (1987) refers to this approach as an oversimplification of a complicated phenomenon and suggests that the drinking-driving problem may be more one of drinking problem-drivers than of problem drinking-drivers.

As much as this distinction may broaden the debate, it still focuses on driving after drinking as a problem, with the attention drawn to offending. Another approach is to look at compliance with legislation and investigate the situations in which people who both drink and drive are able to modify their behavior in order to remain within the law. Such an approach was taken by Snortum and Berger (1989) in a recent analysis of compliance in the United States and has been adopted for this study.

Focusing on the drinker is a recognition that Australia is a country where alcohol is intricately entwined in almost every leisure, and many business, activities, and where one of the worst epithets that can be leveled at an individual is that of "wowser"[1] (Horne, 1971). At the same time, sprawling cities, vast hinterlands and poor public transport combine to make car ownership not simply desirable but almost essential, so that a majority of people travel by car to and from their leisure and recreational pursuits. Small wonder, then, that driving after drinking appears to be ubiquitous behavior.

The general deterrence and general prevention of drinking and driving have been investigated in the United States by Snortum and Berger (1989). Noting that H.L. Ross had argued that harsh legislative procedures had only a minimal and, as he put it, "evanescent" effect on drinking-driving fatalities, Snortum and Berger suggested that Ross' reliance on simple deterrence theory, which uses fear of apprehension as the major variable, might be inadequate to assess fully the efficacy of legal provisions such as harsher penalties or increasing the certainty of apprehension. In paraphrasing Andenaes (1977), they suggest that law also serves an educative and moralizing function "that fosters a change in moral outlook and promotes habitual law-abiding behavior" (Snortum and Berger, 1989, p. 306). A reduction in road fatalities attributable to attitude changes would be long-term and might not follow new legislation immediately.

To explore this possibility, Snortum and Berger (1989) surveyed drivers in the United States in 1983 and again in 1986, with a range of attitudinal, knowledge and behavioral self-report questions. They found increasing restraint and control by drivers over the 3-year period, as well as a reduction in alcohol-related road fatalities over the period. Snortum and Berger (1989) concluded that tightening up drinking-driving legislation over this time, if it did not cause these changes, at least acted as a catalyst.

Drivers in four Australian states (New South Wales, Victoria, Queensland and Western Australia) were surveyed in 1988 using a questionnaire similar to that em-

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ployed in the American study. In a partial replication of the Snortum and Berger study cited above, some of these data are presented in this report. Most of the reported Australian data focuses on restraint and control, using direct or self-report measures, and estimates of maximum blood alcohol for the last occasion on which the driver consumed alcohol away from home, as well as similar estimates of usual consumption. In the present article, state data are grouped to allow for large cell sizes; state differences will, however, be a focus of later reports.

Method

The prevention/deterrence survey was conducted in June 1988. There were 1,504 respondents: 333 from New South Wales, 339 from Victoria, 333 from Queensland and 499 from Western Australia. Respondents were selected from large metropolitan and regional centers such that 60% of the sample came from urban, and 40% from rural, centers. There were equal numbers of men and women, and all respondents were over the age of 17 and had drivers' licenses. Only 1% had been disqualified from driving.

Respondents were selected by a stratified probability sampling frame with a cluster size of two. Three callbacks were allowed at each house. The same market research organization conducted the interviewing in each of the four states, so that interviewing consistency across states was assured. Respondents were interviewed at home during evenings and on weekends. Response rates were in the region of 80%.

The questionnaire sought information in four areas, examples of which are given:

1. *Behavior:* Usual alcohol consumption and preferred beverage; details of alcohol consumed and travel arrangements on last occasion on which alcohol was consumed away from home; self-reported drinking-driving behavior and arrangements to separate drinking from driving; experiences of police breath testing and convictions for drinking and driving; friends' experiences of testing and being charged.
2. *Exposure to and perceptions of formal and informal sanctions:* Perception of the risks of apprehension or accident; moral values about drinking and driving; opinions of breath testing; attitudes toward regulations and legal enforcement.
3. *Knowledge:* Penalties and regulations; understanding of the relationship between alcohol consumption and blood alcohol concentration.
4. *Demographics:* Age, sex, education; employment status; occupation; marital status; and post code.

The answers to questions relating to usual consumption, or consumption on the last occasion on which alcohol was consumed away from home, and the respondent's weight were combined to calculate a Maximum Blood Alcohol Estimate (MBAE) for drinkers, using the formula:

$$\text{MBAE} = 1.37 \times \frac{\text{No. of standard drinks}}{\text{Weight in kg.}}$$

The formula is derived from that used in Snortum and Berger (1989) (with an adjustment for weight in kilograms rather than in pounds) who state that it reproduces the BAC estimates provided by the National Highway Traffic Safety Aministration (1982). It is not a measure of actual blood alcohol concentration (BAC), but an estimate based on recollection of alcohol consumption and is a maximum estimate because it assumes that all drinks were consumed in 1 hour. MBAE was used for the present analysis, rather than derived blood alcohol concentration, because it enabled comparisons to be made with usual alcohol consumption, for which no length of session data were available.[2]

The descriptive data have been weighted to allow for differences in population among the four states. An analysis of variance of MBAE with gender, driver role and state as factors showed no effect of state either as a main effect or in any interaction, so there is no further consideration of state differences in this report.

Results

Respondents were categorized as drinkers or abstainers, with the latter being those who said they never drank alcohol, or who reported drinking alcohol less than once a year. These were omitted from the analysis, leaving a drinker sample of $N = 1,133$.

For the tables, figures and text that follow, some "shorthand" terms have been adopted as follows: last occasion—the last occasion on which respondents consumed alcohol away from their own homes, whether or not they were driving; driver—those who drove home from the last occasion; nondriver—those who returned home from the last occasion by any means other than driving a motor vehicle.

Self-reported behavior

Respondents were asked a series of questions about their drinking and driving behavior (Table 1). In summary, a majority claimed not to have driven while intoxicated and/or to have taken some steps to reduce drinking while driving, or to have found another driver. A large majority felt it was wrong to drive when over the legal BAC and believed their friends and/or relatives would disapprove of this. A substantial minority used the excuse of roadside breath test to resist group pressure to drink.

TABLE 1. Frequencies of responses to self-report questions—all drinkers, in percent (n = 1,133)

Have not driven "while slightly intoxicated" during previous year	68
Never drink before driving	29
Always drink less before driving	69
Usually/sometimes drink less before driving	15
Always arrange another driver when drinking	49
Usually/sometimes arrange another driver when drinking	23
Feel able to handle 4 or more drinks in an hour before driving	27
Believe it is not morally acceptable to drive after 4 drinks in an hour	80
Believe friends would disapprove of driving after 4 drinks in an hour	65
Believe relatives would disapprove of driving after 4 drinks in an hour	85
Use roadside breath testing as excuse to limit drinking when with friends	43

Note: Percentages are weighted to adjust for the effect of nonproportional sampling in the four states.

Derived measures

Table 2 shows mean MBAE for the last away-from-home drinking occasion for drivers or nondrivers, and for women and men. Usual MBAEs were calculated from reported usual quantity of the favorite beverage (beer, wine or spirits) consumed in a single session and compared across drivers and nondrivers, and women and men. Restraint refers to the difference between an individual's usual consumption and his or her consumption on the last occasion. This is a conservative measure of restraint because people's estimate of usual consumption will include some occasions on which they are driving and might therefore drink less than occasions on which they are not driving.

TABLE 2. Mean MBAE for last away-from-home drinking occasion, usual consumption and drinking restraint by gender and driving role

	N^a	MBAE	df	F
Last occasion				
Men	506	0.10		
Women	423	0.07	1/925	41.27‡
Driver	444	0.06		
Nondriver	485	0.11	1/925	104.34‡
Usual consumption				
Men	602	0.08		
Women	523	0.06	1/1121	32.91‡
Driver	444	0.06		
Nondriver	681	0.07	1/1121	18.43‡
Restraint (usual consumption minus last occasion)				
Men	506	− 0.02		
Women	423	− 0.01	1/925	5.85*
Driver	444	0.00		
Nondriver	485	− 0.03	1/925	37.83‡

*$p < .05$. ‡$p < .005$.

[a]There were 929 in the total sample for the last occasion—this represents all of the drinkers minus those who did not have a last occasion within the last 12 months, those who did not drink on the last occasion and those who refused to give a body weight. Usual sample contains all the drinkers except eight who refused to give their body weight.

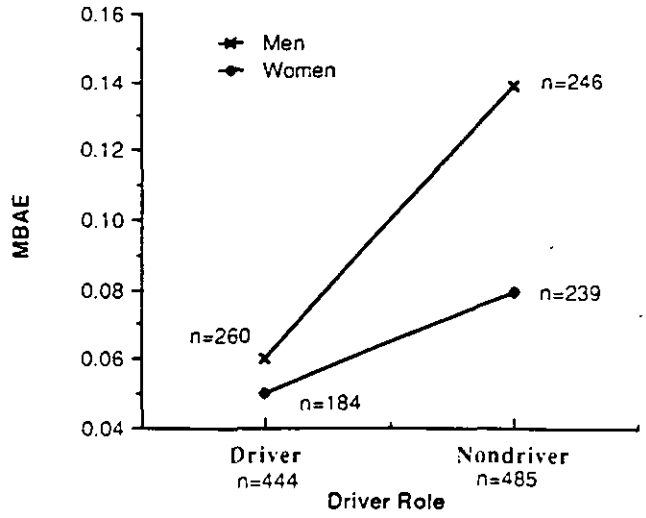

FIGURE 1. Mean MBAE for male and female drivers and nondrivers returning from the last occasion

From Table 2 it can be seen that there are both gender and driving-role differences. Men reported drinking significantly more than women, both on the last occasion and normally. Nondrivers drank more than drivers on the last occasion and were also those who drank more usually. There was no evidence for restraint in any of the groups, and some people apparently drank more on the last occasion than normally. There are also significant interactions between gender and driving role (Figure 1) (F = 31.347, 1/925 df, $p < .000$). Both male and female drivers had lower MBAEs than did nondrivers on the last occasion, but there were greater differences in the men than in the women. More men than women drove home.

Means of transportation to and from the last occasion were also considered. A three-way analysis of variance was used to compare mean MBAEs with means of travel to (driver to), means of travel from (driver from) and gender as main effects. There were the same simple and interaction effects for driver from and gender as were seen in Table 2, because those data were identical. The additional information of driver to allowed those who were "rescued" from the driving role (drove there, but did not drive home) or those who were "rescuers" (drove home, although did not drive there) to be identified. There was no difference in the MBAEs of those who did or did not drive to the occasion, and the three-way interaction was not significant, but there was a significant interaction between driver from and driver to (F = 7.376, 1/921 df, p = .007) (Figure 2).

It is clear from Figure 2 that those who drove home from the last event had been more restrained in their drinking than had those who did not drive home. This restraint was stronger in those who also drove to the event. The least restrained were those who were rescued from driving home, followed by the two-way nondrivers. The

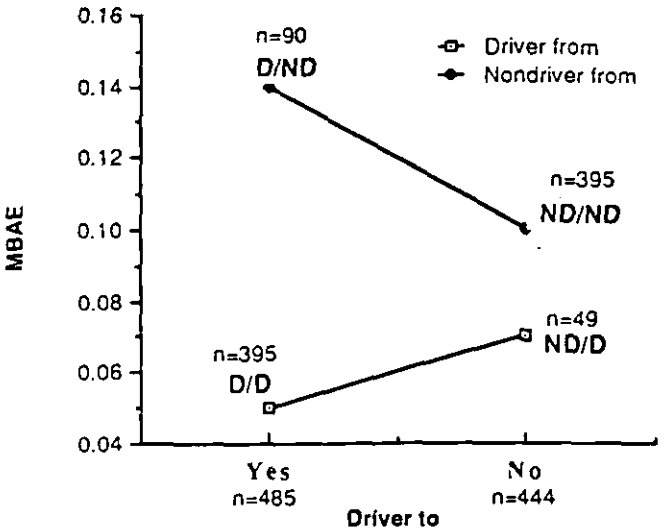

FIGURE 2. Mean MBAE for drivers and nondrivers to and from the last occasion (D/D: drove both ways; D/ND: drove there, driven home; ND/D: driven there, drove home; ND/ND: driven both ways)

rescuers had drunk less than had the nondrivers, but not as little as those drivers who appear to have known in advance that they would be driving home.

Gender differences have been added in Table 3, which shows mean MBAEs of men and women in the four possible driver combinations: two-way driver, drove to but driven from, driven to but drove from and two-way nondriver. The table shows that male and female two-way drivers were equally restrained in their drinking, and had the same average blood alcohol estimate. Men who were rescued from the driving role had a higher average MBAE than their female counterparts. Those women who switched roles to drive home (rescuers) had a slightly higher MBAE than the women who drove both ways, while male rescuers had the highest MBAE of all. There were more rescued than rescuers, but this perhaps reflects the driving roles of abstainers, who were not included in the analysis. Both male and female nondrivers had higher MBAEs than drivers, with the men having particularly high estimates.

Figure 3 and Table 4 are concerned with reduction in consumption on the last occasion as a function of

TABLE 3. Mean MBAE of drivers and nondrivers for the last occasion as a function of means of transportation to and from the event

	Men			Women		
	N	MBAE	%	*N*	MBAE	%
Drove both ways	254	0.05	50.2	141	0.05	33.3
Drove to, but driven home (rescued)	72	0.15	14.2	18	0.10	4.3
Driven to, but drove home (rescuers)	6	0.16	1.2	43	0.06	10.2
Did not drive at all	174	0.14	34.4	221	0.07	52.2
Total	506		100.0	423		100.0

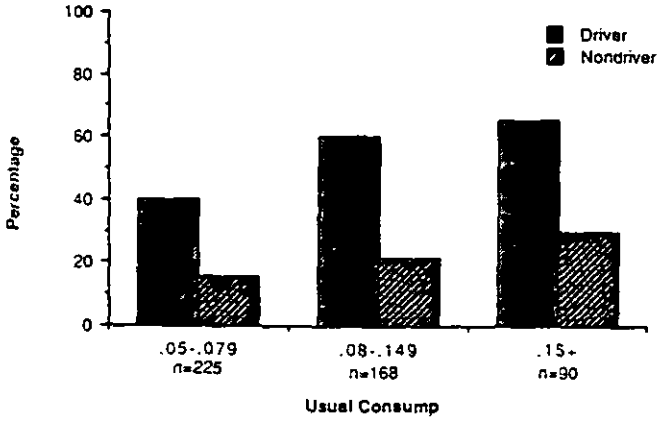

FIGURE 3. Cumulative percentage of drivers and nondrivers who drank less on the last occasion than usually

normal drinking patterns, in order to see whether those who normally drank the most were any more or any less likely than those who normally drank less to reduce their consumption if they were driving. Figure 3 shows the percentage of those drinkers whose usual alcohol consumption gave them an MBAE of greater than .05 who reduced their consumption on the last occasion. The drinkers are divided into three categories: usual MBAE of .15 or greater, from .08 to .149 and from .05 to .079.

Figure 3 demonstrates that many of the heavier and moderate drinkers who were driving reduced their consumption. These gross effects can be seen in more detail in Table 4, where the amount of reduction is analyzed. Here respondents are divided into four subgroups based on the MBAE of their usual consumption of their favorite beverage. This is used as the baseline measure, against

TABLE 4. Cumulative percentage of drivers and nondrivers who drank less than specified MBAEs on the last occasion as a function of usual alcohol consumption

		MBAE on last occasion less than:		
Usual MBAE	*N*[a]	.05%	.08%	.15%
MBAE .15+				
Drivers	26	15.4	42.3	65.4
Nondrivers	64	3.1	10.9[‡]	29.7[‡]
MBAE .08 – .149				
Drivers	65	41.5	60.0	93.8
Nondrivers	103	6.8[‡]	21.4[‡]	69.9[‡]
MBAE .05 – .079				
Drivers	115	40.0	81.7	96.5
Nondrivers	110	15.5[‡]	47.3[‡]	82.8[‡]
MBAE < .05				
Drivers	238	75.6	94.5	99.5
Nondrivers	208	61.5[‡]	79.8[‡]	93.3[‡]

[‡] $p < .005$.

[a]There were 929 in the total sample for the last occasion—this represents all of the drinkers minus those who did not have a last occasion within the last 12 months, those who did not drink on the last occasion and those who refused to give a body weight.

which people's reduction in consumption on the last occasion can be seen. Since those who did not drink alcohol at all on the last occasion were not included in the driver/nondriver analysis, no consideration is given to those whose MBAE on the last occasion was 0. A series of 2 by 2 chi-square tests were used to contrast each proportion with the proportion immediately below it.

Only a minority of those in the heaviest drinking category chose to drive home, but significantly more drivers than nondrivers reduced their consumption. A majority of the drivers in the next heaviest consumption group drank less if they were driving, and even within the groups where usual consumption would hardly place the driver at risk there is evidence of some restraint among drivers. There are, however, a number of those in lower drinking categories, both drivers and nondrivers, who drank more than usual on the last occasion.

Discussion

The findings of this study are similar to those found in America by Snortum and Berger (1989). Although the two studies cannot be compared directly, because of methodological differences, evidence of restraint and control on the part of drinkers who were driving suggests that drinking-driving legislation has served a similar educative and moralizing function in both countries. Our data suggest that many Australian drivers attempt to comply with drinking-driving legislation. Self-reports show that people appeared to be aware of the need to control the impact of alcohol on their driving, while the derived MBAE analyses suggest that the amount people drank on the last occasion on which they consumed alcohol other than in their homes was influenced by their choice of driving role, and that people who normally drank less tended to adopt the driving role, although this effect was stronger in men than in women. Those who may have planned to drive home (two-way drivers) drank less than those who did not drive home and, although there was no difference between these men and women in the amount drunk, a greater proportion of men than women fell into this category. On the other hand, those who had arranged alternative transport both to and from the event drank much more than normal and, although they were safe on the roads, one might speculate about other problems of intoxication. This has some relevance for the promotion of Skipper[3] schemes by the alcohol industry which claims that this is motivated by community responsibility, although data such as those presented here suggest that manufacturers are likely to enhance their profits by the increased consumption of those who are not driving. The women who were rescuers drank relatively little, but there was a small aberrant group of men who started out the evening as passengers, drank a great deal and then drove home. Finally, those who were rescued seemed to realize, or were made aware, that they were in no fit state to drive. The numbers in these last two groups, however, are very small and so care must be taken with these interpretations.

It is frequently suggested in the literature that heavy drinkers might be the most resistant to behavior change because of the uncontrolled nature of their drinking (Homel, 1988), so it is important to ascertain which types of drinkers are changing their drinking behavior before driving, and by how much. It has been demonstrated that, if they were driving, many heavy drinkers moderated their drinking on the last occasion on which they consumed alcohol away from home, although a majority of the heaviest drinkers elected not to drive. That even heavy drinkers do alter their behavior if they are driving is consistent with findings in New South Wales (Homel, 1988) and the United States (Snortum et al., 1986).

Compliance with drinking-driving legislation can take a number of forms. People's usual alcohol consumption can be such that they can legally drive a car. Drinkers can reduce their consumption if they are driving. People can find alternatives to driving such as finding someone else to drive them if they are drinking. A consideration of how drinkers coped with transportation on the last occasion at which they consumed alcohol away from home displays evidence of all three strategies, although in the case of the male rescued it is not clear whether the decision not to drive came from the individual or from those around him, in recognition of his very high alcohol consumption. There is also some suggestion that rescuers (those who adopted the driving role home, although they were nondrivers to the occasion) were likely to have higher BACs driving home than those who apparently planned to drive home. This supports the view that the decision about who is to drive home ought to be made at the beginning of the evening, rather than at the end, when judgment may be clouded. It may also be that the designation of the driver at the beginning of the evening would help to ensure that this designated driver would limit his/her drinking appropriately.

There was, however, a sizable minority of drinkers who claimed never to moderate their drinking because they were driving and who felt that it was morally acceptable to drive after four drinks in an hour. Nearly a third of the sample felt that they could personally handle that amount of alcohol, or more, and still drive safely, although evidence suggests that this amount of alcohol would put most women or men over the legal limit for driving (Blaze-Temple et al., 1988b). There was also a minority of drinkers in each drinking category who claimed not to reduce their drinking when driving. With the most generous interpretation of MBAE, more than 50% of the heaviest drinkers, 40% of the next heaviest and 20% of lighter drinkers may have been driving home with unsafe BACs.

Findings from studies such as these are always tempered by a consideration of the accuracy of self-report. A case in point is the reporting of usual consumption, given that for many people it was lower than consumption on the last occasion. The usual consumption calculation relied on a self-report of how much of the preferred alcoholic beverage was normally consumed in a single sitting. However, self-report of alcohol consumption is notoriously inaccurate, with such factors as forgetting and deliberate or defensive underreporting affecting veracity (Blaze-Temple et al., 1988a). If it is assumed that memory for the last occasion was more likely to be accurate, because it targeted a specific event, than memory for usual consumption, and these other factors are taken into consideration, it is likely that the reported usual consumption was an underestimate.

Usual consumption might, however, be genuinely lower than on the last occasion if the respondents recollected their usual consumption as "usual when driving" and they were nondrivers on the last occasion. Since the wording of the usual consumption question did not differentiate between driving and nondriving occasions, it is not possible to interpret what these differences mean. It may be relevant for future research to be aware of the need to specify the circumstances under which usual consumption takes place.

Even were the self-reports to be accurate, however, there is still a problem with recollection of glass and serving size. Respondents were asked how much they had consumed in terms of glass or pub-serving size but there is some evidence that, at least for those who drink at home, who are in the majority, the quantity poured is often unknown, and people tend to underestimate the amount of alcohol they are consuming, often by as much as 50% (Carruthers and Binns, 1987).

Further complications arise when the strength of the beverage is taken into account (Stockwell and Stirling, 1989). The calculations for this study assumed 11.4 grams of ethanol per standard drink, but this can vary widely: in Western Australia, for example, "full strength" beer can vary from 5% to 9% alcohol by volume and wine from 8% to 15%. Neither the research design nor the respondents were able to take these different strengths into consideration.

None of these unresolved questions, of course, cloud the comparisons between drivers and nondrivers, but suggest that compliance with the law may depend on more than just the intention to comply. People may truthfully report consumption that they believe to be within legal limits for driving, but they may have insufficient information about standard drink sizes or beverage strength to know how much alcohol they are really consuming. Drivers whose reported alcohol consumption suggests that they attempt to keep their consumption within legal limits, may, without realizing it, not be driving as safely as they believe.

Despite these cautions, it is encouraging to see evidence that so many people in Australia modify their drinking if they know they will be driving. Further modification of both formal and informal sanctions, however, as well as accurate education about the alcohol content of drinks, may be necessary so that people can be sure that their restraint is sufficient.

Acknowledgments

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Notes

1. Australian colloquialism: "A prudish teetotaler, a killjoy." *Macquarie Dictionary*, revised edition, 1985.
2. The relevant BAC formula is:

$$\frac{(11.4 \times \text{no. of standard drinks}) - (7 \times \text{length of time in hours})}{\text{Widmark factor}^* \times 10 \times \text{weight in kgs}}$$

*0.7 for men; 0.6 for women (Sloane and Huebner, 1980).

An analysis of variance for last occasion was performed using this formula: a similar pattern of male/female and driver/nondriver differences was found. These data are available from the first author.
3. Where a group of drinkers selects one person to stay sober and drive everyone else home.

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Young People, Alcohol, and Driving in Two Australian States

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ABSTRACT

Road traffic accidents are the single largest cause of death in Australia among people aged 15–24. The proposition that a broadly based deterrence measure, such as random breath testing (RBT), would be sufficient to change the behavior of young drivers was tested in a comparison of young drivers in New South Wales (NSW), which has had RBT for 6 years, with young drivers in Western Australia (WA), where there was no RBT. The results demonstrated that NSW young drivers were less likely to drink and drive and more likely to believe their peers would disapprove of drink-driving than were their counterparts in WA. It was concluded that RBT had altered the drink-driving behavior and possibly the beliefs about drink-driving of young people in NSW.

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Key words. Drink-driving; Random breath testing; Youth; Attitudes; Australia

INTRODUCTION

Australia presents a rare opportunity for "natural experiments" on law enforcement. While the land mass is huge, and the population is relatively homogeneous across it, the country is divided into six States and two Territories which have independent criminal codes. In traffic laws, for example, although there is much similarity, particular provisions such as legal countermeasures to prevent drink-driving vary from State to State (Table 1). This study makes use of this legal diversity to investigate young people's drinking and driving attitudes and practices.

While Australian countermeasures against drink-driving are stringent, the response that has been most identified with Australia has been the wholesale use of random breath testing (RBT) and random stopping of motorists. RBT involves check-points, usually varied daily, from which police can randomly stop cars and require drivers to be breathalyzed. Motorists returning a blood alcohol reading of over 0.05 g/100 mL in some States, or 0.08 in others, are arrested and taken to the nearest police station where they are further tested, and, if over this limit, charged. Random stopping of motorists differs in that cars can be randomly stopped for vehicle and licence checks, but drivers can only be breathalyzed if there is some reason to believe that they have been drinking. By 1989, random stopping had been replaced by RBT in all jurisdictions.

The reported study capitalizes on the differences between States in their timing of the introduction of RBT. Random breath testing was introduced into New South Wales (NSW), the most populous State, in late 1982, with an unprecedented degree of visible enforcement and sustained publicity. The results have justified this unprecedented allocation of resources. Not only did the average number of fatal crashes per week drop from 22.1 to 17.2 in the 5 years following RBT, but the average number of drivers killed with a blood alcohol concentration (BAC) of 0.05 has dropped by 36% (Homel et al., 1988). In fact, the percentage of drivers and riders killed in NSW with a BAC over 0.05 has dropped from 41% in 1981 to 32% in 1987 (Federal Office of Road Safety, 1988).

Prior to the introduction of RBT in Western Australian (WA) in October 1988, a random stopping program had been in operation, but evaluations suggested that this had only a minimal deterrent effect (Loxley and Lo, 1988). The proportion of motorists killed with BACs over 0.05 is much higher in WA than in NSW, and had risen to 47% in 1987 from a low of 40% in 1984 (Federal Office of Road Safety, 1988) (Fig. 1).

Table 1.

Drink-Driving Legislation in Australia[a]

State/ territory	RBT[b]	BAC[c] limits experienced drivers	BAC[c] limits novice drivers		Compulsory blood testing in hospitals after crashes
NSW	Yes	0.05	0.02	Provisional license and learners	Drivers, riders, and pedestrians over 15 years
VIC	Yes	0.05	0.00	Learners, provisional, and unlicensed drivers	All people over 15 years
QLD	Yes	0.05	0.02	Drivers under 18	Legislation passed but not proclaimed
WA	Yes	0.08	0.02	Provisional license	No legislation
SA	Yes	0.08	0.00	Learner and provisional	All people over 13 years
TAS	Yes	0.05	0.00	First year and learner drivers	No legislation
NT	Yes	0.08	0.00	Learner, provisional, and all drivers	Drivers, riders, and pedestrians over 15 years
ACT	Yes	0.08	0.00	Proposed for learner, first year, and unlicensed drivers	No legislation

[a] Taken from *Road Crash Statistics*, Federal Office of Road Safety, December 1988.
[b] Random Breath Testing.
[c] Blood Alcohol Concentration (g/100 mL).

A major concern in Australia, as in other countries, is the overrepresentation of the young in road accidents. Half of those who are killed on the roads in alcohol-related crashes are aged between 17 and 25, and road crashes are now the single largest cause of death for young Australians (Federal Office of Road Safety, 1988). There have been a number of suggestions for dealing with what has been called an epidemic of youthful road deaths (Stott, 1988/1989), including reducing the availability of alcohol to the young, reducing the exposure to risk of young drivers, increasing penalties and deterrents, or introducing

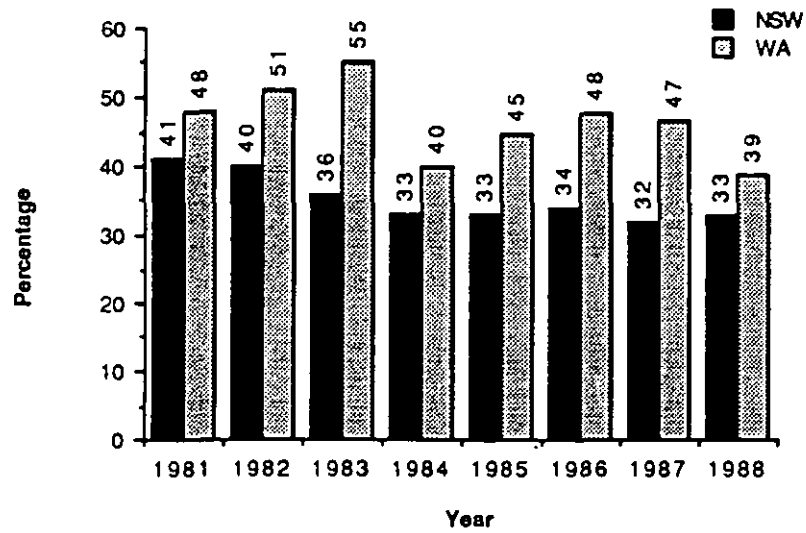

Fig. 1. Percentage of drivers and motorcyclists killed with a BAC over 0.05 g/100 mL in New South Wales and Western Australia 1981–1988.

engineering solutions, such as ignition interlock devices, that physically separate the intoxicated driver from his/her car. However, most of these proposals involve discriminatory practices that would be politically and/or socially unacceptable.

On the other hand, enforcement procedures, such as RBT, aimed at the whole community may be sufficient to reduce unwanted behavior within specific groups. Given that around half of all those who die on the roads with BACs over the legal limit are under the age of 25, the apparently permanent drop in alcohol-related road deaths in NSW means that many young drivers have taken to heart the deterrent message of RBT and have learned to alter their behavior accordingly. This is borne out by Homel's evaluation of RBT in NSW where it was found that young male drivers modified their traveling behavior more than the average after the introduction of this measure (Homel, 1988).

The reported study proceeds from the belief that broadly based enforcement procedures like RBT can have a specific effect upon a high-risk group, such as young drivers. The behavior and attitudes of young drivers (i.e., under the age of 25) in NSW are compared to those of young drivers in WA with data taken from a community survey of Australian drivers in four States (NSW, Victoria, Queensland, and WA) into the preventive and deterrent effects of RBT (Loxley et al., 1988). NSW and WA were selected for study because NSW had had RBT for 6 years, while it was introduced 3 months after

the study in WA. Differences between the two groups, then, would provide clues about the influence of a broadly based deterrence measure on young people.

METHOD

The survey was conducted in April to June 1988, before the introduction of RBT in WA. The target population was all licence holders, and there were 499 respondents from WA and 333 from NSW; of these, a total of 119 were under the age of 25. Respondents were selected from large metropolitan and regional centers such that 60% of the sample came from urban and 40% from rural centers. There were equal numbers of men and women. Only 1% had been disqualified from driving. The same market research organization conducted the survey in each of the four States, so that interviewing consistency was assured. Response rates were in the region of 70%.

Respondents were interviewed at home during evenings and on weekends on a range of issues covering their drinking and driving behaviors, their beliefs about drink-driving, and perceptions of legal sanctions. The survey instrument was developed by Berger and Snortum (1986) and was adapted for use in Australia. Interviews took an average of 20 minutes and were carried out by trained market research interviewers.

RESULTS

The data presented here refer to the self-reported behavior, perceptions, and opinions of the young drivers in the two States. In most cases, sex differences are not presented because the cell sizes would be too small.*

Table 2 demonstrates the "deterred behavior" of the young drivers in the study; that is, the extent to which they said they modified their behavior after drinking, or their drinking behavior, because of a fear of being stopped and tested.

Young drivers in NSW were more deterred than were the young drivers in WA. Not only were they more likely to arrange to have someone else drive them if they had been drinking, but they were also more likely to use police testing as an excuse to resist group pressure to drink.

Perceptions of the extent to which others are deterred from drinking and driving also varied between the two States (Table 3). Respondents were asked to give their observations of whether people at parties or gatherings where alcoholic drinks were served arranged not to drive when drinking, or to drink less when driving.

*For a similar reason, only univariate analysis is presented. Multiple responses have been reduced to a dichotomy for ease of presentation and tested by 2×2 chi square, using a correction for continuity. Alpha has been set at .05.

Table 2.

Evidence of "Deterred Behavior

	NSW, % ($n = 34$)[a]	WA, % ($n = 63$)[a]
When going somewhere to drink, arranges for someone else to drive, at least sometimes	94.1	76.2*
When with friends, uses police breath testing as an excuse to limit drinking, at least sometimes	64.7	33.3**

[a] Licence holders under the age of 25 who drink.
*$p < .05$, **$p < .01$ (chi square 1 *df*).

It is evident from Table 3 that there were differences in the reported social behavior of young people in the two States. The young drivers in NSW reported that up to half of drivers in NSW made arrangements either to avoid drinking or to avoid driving after drinking; in WA this was nearer a quarter.

Table 4 shows opinions about such issues as whether one's friends would disapprove of one driving after consuming four cans (375 mL each) of normal strength beer (5% alcohol by volume) and the extent to which random breath tests are favored.

A large majority of the young drivers in WA favored random testing as did almost all of the young drivers in NSW. Almost 70% of young drivers in NSW, compared to 42% in WA, believed that their friends would disapprove of them driving after drinking amounts likely to put them over the legal limit.

Table 5 looks at experiences with road block or random testing and perceptions of the likelihood of being tested. These data have to be interpreted in the light of police enforcement strategies that vary between the two States.

Table 3.

Perceptions of Others' Deterred Behavior

	NSW, % ($n = 45$)[a]	WA, % ($n = 74$)[a]
Believes that at least half of drivers at parties avoid all alcoholic drinks because they are responsible for driving	44.4	24.3*
Believes that at least half of parties, at least one person uses public transport or a taxi in order to feel free to drink alcohol	53.3	21.6***

[a] Licence holders under the age of 25.
*$p < .05$, ***$p < .001$ (chi square 1 *df*).

Table 4.

Opinions and Beliefs About Drink-Driving and RBT

	NSW, % (n = 45)	WA, % (n = 74)
Believes that friends would definitely or probably disapprove of driving on the highway after drinking four cans of beer in 1 hour	68.9	41.9**
Favors police stopping motorists at random to give them breath tests	97.8	81.7*

*$p < .05$, **$p < .01$ (chi square 1 df).

Table 5.

Likelihood of Being Tested, and Perceptions of Risk

	NSW, % (n = 45)	WA, % (n = 74)
Has been pulled over by the police for breath testing	57.8	17.6***
Believes that chances of being stopped by police for testing in the next month are even, quite likely, or extremely likely	59.1	33.8**
Believes that it is possible to reduce the chance of being stopped for testing	20.0	43.2**

**$p < .01$, ***$p < .001$ (chi square 1 df).

Young drivers in NSW were more likely to have been breath tested and had a greater expectation of being stopped for testing than those in WA. Almost twice as many drivers in WA as in NSW believed that it was possible to reduce the chance of being stopped.

There were no statistically significant differences between the young drivers in NSW and the young drivers in WA in alcohol consumption or distance driven per year, although WA is considerably larger in area. Self-reported frequency of driving while intoxicated during the previous year, expectations of driving after drinking during the following year, perceived ability to handle five or more drinks before driving, and opinions of the legal system were all more law abiding in NSW, although individually none of the differences reached significant (Table 6).

DISCUSSION

The results suggest that as well as reducing alcohol-related road traffic accidents, the introduction of RBT in NSW is beginning to change some

Table 6.

Comparison of Young Drivers in New South Wales and Western Australia

	NSW, % ($n = 45$)[a]	WA, % ($n = 74$)[a]
Drove one or more times while intoxicated last year	47.1	60.3
Feels able to handle five or more drinks before driving	36.4	52.1
Believes legal system favors the rich and powerful	66.7	78.4
Agrees will probably drive with illegal BAC in next year	35.6	47.3
Drove fewer than 15,000 km last year	71.1	58.1
In full- or part-time employment	71.1	60.8

[a] Samples were slightly smaller for some comparisons because of missing data.

aspects of young people's social lives. This is somewhat surprising because alcohol consumption in Australia is intricately woven into leisure and recreational activities in a way that gives rise to what might be termed a drinking culture, which is particularly found in young people who tend to engage in "binge drinking" (Binns et al., 1987). Drink-driving might almost be believed to be inevitable.

This apparent inevitability, and the recurring supposition in the literature that those who are most likely to offend are the most difficult to deter (Homel, 1988), make the modified attitudes toward drink-driving of the young drivers in NSW, compared to their WA counterparts, pleasurably surprising. At the same time, no claim is made that all changes in drink-driving attitudes and behavior can be attributed to the introduction of RBT; preexisting State differences will account for some of these.

It has been suggested (Berger and Snortum, 1986) that there are two major facets of compliance with a law: the "fear component," produced by the direct threat of legal sanctions, and the "moral component," "which brings compliance through the development of personal values in support of the law" (Berger and Snortum, 1986, p. 140). The development of the moral component in the community is to be encouraged because it obviates the necessity for people to be continually deterred by constant reminders of the law—e.g., by the constant high visibility of police on the roads.

While it would be premature to conclude from the simple data set presented here that the moral component of drink-driving law was operating in NSW, it does appear that some aspects of compliance through moral values were present. From the data presented in the paper, it appears that NSW young drivers not only feared being caught but also believed that others were drink-

driving less frequently and that their friends were likely to disapprove of them drink-driving. Individual young drivers in NSW were beginning to think twice before driving with dangerously high blood alcohol limits, it seems, and a new cultural norm might also be developing, a norm that disapproves of drink-driving not just because it is illegal and one is likely to get caught, but because it is wrong. Indeed, data provided by Homel et al. (1988) suggest that such values have become more prevalent in the general driving population since the introduction of RBT in NSW. The NSW young driver data assumes particular relevance when compared with the data from WA where there was less evidence of concern about drink-driving violations or a developing social disapproval of drink-driving.

If it is true that a broadly based deterrence measure such as RBT cannot only deter some of those who are most at risk of alcohol-related road trauma from drinking before driving, but also induce a shift in the moral climate among young people so that drink-driving becomes a socially disapproved behavior, we must ask, then, whether we also need preventive measures aimed specifically at young drivers. RBT as implemented in NSW has reduced alcohol-related road accidents, and since half of those killed with high BACs are young people, it is apparent that young people's driving habits have been modified by the introduction of RBT, at least as much as those of the rest of the driving community. The present study suggests that the introduction of RBT has apparently also changed some of the attitudes and perceptions of young drivers when they are compared with counterparts from a State which did not have this deterrent. Further changes in behavior may occur if a social climate of disapproval continues to develop.

WA now has RBT and it is to be hoped that the growing awareness that the community will no longer tolerate drink-driving, as is being displayed by NSW young drivers, will begin to be evident in WA. Since the implementation of RBT varies between the States, however (e.g., not all drivers stopped in WA are being tested), it may be that the effect will be less dramatic in WA than in NSW. Priorities for future research must be to explore the influence of legal sanctions on the development of societal values and norms; their differential adoption by subgroups, especially of young people; and the processes by which the subgroups influence their individual members.

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Drinkers and their Driving: Compliance with Drink-Driving Legislation in Four Australian States

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This paper was to discuss drivers and their drinking, using data from a *recent national study which investigated the behaviour, experiences, and* attitudes towards drink driving of Australian drivers. The reversal of the title is not merely a frivolous gesture, but reflects the author's conviction that the focus should be widened beyond a concern with the way in which some drivers consume alcohol, thereby placing themselves and the community at risk, to all *drivers who consume alcohol (75 per cent of this sample)* and the circumstances under which they find it easy or difficult to comply with drink driving legislation. This understanding is surely necessary if we are to design preventions that take human factors into account.

This paper, then, looks at compliance rather than offending, and asks the basic question 'How do people who drink manage their driving?'. Focusing on the drinker recognises that Australia is a country where alcohol is intricately entwined in almost every leisure, and many business activities, and where one of the worst epithets that can be levelled at an individual is that of 'wowser' (Horne 1971). At the same time, sprawling cities, vast hinterlands and poor public transport combine to make car ownership not only desirable but almost essential, so that a majority of people travel by car to and from their leisure and recreational pursuits. Small wonder, then, that driving after drinking appears to be an ubiquitous behaviour.

The Study

The data that are presented herelpre taken from a recent survey of drivers in four states - New South Wales, Victoria, Queensland and Western Australia. The study investigated the general deterrence and general prevention of drink driving

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and followed in a tradition of research initiated in the United States by Snortum and Berger in California (in press). Noting that H. L. Ross had argued that harsh legislative procedures had only a minimal and, as he put it, 'evanescent effect' on drink driving fatalities, Snortum suggested that more than a simple deterrence theory, which used fear of apprehension as the major variable, was needed to evaluate the efficacy of legal provisions. It had been pointed out that the law also serves an educative and moralising function, 'which fosters a change in moral outlook and promotes habitual law abiding behaviour' (Snortum & Berger in press, p. 2). This, however, would be longer term, and gains might be less dramatic than those immediately following legislative change. To explore this possibility, drivers in Norway and the United States were surveyed in 1983 on a range of attitudinal, knowledge and self-reported behavioural questions. In 1986 the survey was repeated with American drivers.

It was found that restraint and control were being exercised by some drivers - and by more drivers in 1986 than in 1983, during which period powerful new drunk driving legislation was enacted by many American states. By 1986, a significant proportion of drivers took steps to control their drinking or driving, even though the perceived chance of arrest was low. Moreover, these findings were supported by independent evidence, such as the Fatal Accident Reporting System that, over the period in question, alcohol related road fatalities had fallen. Snortum and Berger (in press) concluded that strict drink driving legislation, if not causal in these changes, at least acted as a catalyst.

In the Australian study, a similar questionnaire was used to that employed in the American and Norwegian studies, so that cross-cultural as well as inter-state comparisons could be made. While the total data set is complex, a small section has been extracted for the current analysis. Most of the data that is to be presented focuses on restraint and control, and looks at direct or self-report measures, and at estimates of maximum blood alcohol for the last occasion on which the driver consumed alcohol away from home, as well as similar estimates for usual consumption. This analysis is a partial replication of that done by Snortum and Berger (in press), who looked at compliance with drink driving legislation in the United States.

Method

The prevention/deterrence survey was conducted in June 1988, before the introduction of RBT in WA. There were 1504 respondents: 333 from NSW, 339 from Victoria, 333 from Queensland and 499 from WA. Respondents were selected from large metropolitan and regional centres such that 60 per cent of the sample came from urban, and 40 per cent from rural centres. There were equal numbers of men and women, and all respondents were over the age of 17 and had full drivers licences. Only 1 per cent had been disqualified from driving.

Respondents were selected by a stratified probability sampling frame with a cluster size of two. Three callbacks were allowed at each house. The same market research organisation conducted the surveying in each of the four states, so that consistency across states was assured. Respondents were interviewed at home during evenings and on weekends. Response rates were in the region of 80 per cent.

Four major areas of enquiry were covered by the questionnaire:

Behaviour: normal alcohol consumption and preferred beverage; details of alcohol consumed and travel arrangements on last occasion on which alcohol was consumed away from home; self-reported drink driving behaviour, and arrangements to separate drinking from driving;

experiences of police breath testing and convictions for drink driving; friends' experiences of testing and being charged.

Attitudes towards drink driving: perception of the risks of apprehension or accident; moral values about drink driving; opinions of breath testing; attitudes towards regulations and legal enforcement.

Knowledge: of penalties and regulations and understanding of the relationship between alcohol consumption and blood alcohol concentration.

Demographics: age; sex; education; employment status; occupation; marital status and postcode.

Results

Respondents were categorised into drinker types on a Quantity-Frequency measure (Caetano & Suzman 1982). Those respondents who said they never drank alcohol, or who reported drinking alcohol less than once a year were classified as abstainers and have been omitted from these analyses. This left a drinker sample of 1133.

Self-reported behaviour

Respondents were asked a series of questions about their drinking and driving behaviour. Sixty-seven per cent claimed not to have driven 'while slightly intoxicated' during the previous year; 30 per cent said they never drank before driving, and 30 per cent felt that they could handle more than four drinks before driving. Eighty-three per cent said that they drank less before driving, at least sometimes, and 67 per cent said they always did so. Nearly half always arranged for someone else to drive when they were drinking, but 24 per cent never did so.

On the more moral issues, 78 per cent said that it was wrong to drive after consuming four drinks in one hour, and 60 per cent thought that their friends, and 83 per cent their relatives, would probably or definitely disapprove of them doing so. Only 17 per cent thought that they could handle more alcohol than the average drinker, and 45 per cent said that they could handle less. Finally, 40 per cent said that they used roadside breath testing as an excuse to limit their drinking when they were with their friends.

In summary, what emerges is a picture of people who appear to be aware of the need to control the interaction of alcohol and driving. A majority claimed not to have driven while intoxicated, and/or to have taken some steps to reduce drinking while driving, or found another driver. A large majority felt it was wrong to drive when over the legal blood alcohol limit (BAL), and believed their friends and/or relatives would disapprove of this.

Derived measures

A Maximum Blood Alcohol Estimate (MBAE) was calculated for drinkers for the last occasion on which they consumed alcohol away from home. This calculation is similar to that done for the American studies referred to above (Snortum & Berger, in press) and uses a similar formula:

$$\text{MBAE} = 1.37 \times \frac{\text{No. of drinks}}{\text{Weight in kg}}$$

The formula assumes that all the drinks were consumed in one hour, and makes no allowance for the lower alcohol tolerance of women (Blaze-Temple et al. in

press). A Blood Alcohol Concentration (BAC) calculation was also performed using a formula which did allow for these variables:

$$BAC = \frac{\text{grams of ethanol consumed} - 7 \times (\text{period of consumption in hours})}{\text{Widmark factor} \times \text{body weight (kg)} \times 10}$$

The Widmark factor is the proportion of the body weight that is water - 0.7 for males, and 0.6 for females (Sloane & Huebner 1980).

MBAE was a more convenient measure to use for the present analysis because it enabled comparisons to be made with usual alcohol consumption, for which no length of session data were available. MBAE was therefore correlated with BAC to see whether it was a reasonable approximation: the Pearson Product correlation for the total sample was .94: for men this was .97 and for women .86.

Table 1 shows the MBAE for the last away-from-home drinking occasion for people who either drove home or were non-drivers (that is, were passengers or used public transport) and for women and men. 'Usual' MBAE's were calculated from normal quantity of favourite beverage consumed in a single session and compared across drivers and non-drivers, and women and men. The final section of the table looks at 'restraint' - that is, the difference between an individual's usual consumption and his or her consumption on the last occasion on which they consumed alcohol away from home. This is an approximate measure of restraint only, as it does not take into account usual consumption variation for driving or not driving.

Table 1

Mean MBAE for Last Away-From-Home Drinking Occasion, Usual Consumption and Drinking Restraint By Gender and Driving Role

	N*	MBAE	F
'Last Occasion'			
Men	506	0.10	
Women	423	0.07	41.27***
Driver	444	0.06	
Non-driver	485	0.11	104.34***
Usual Consumption			
Men	602	0.08	
Women	523	0.06	32.91***
Driver	444	0.06	
Non-driver	681	0.07	18.43***
'Restraint' (Usual Consumption Minus Last Occasion)			
Men	506	-0.02	
Women	423	-0.01	5.85*
Driver	444	0.00	
Non-driver	485	-0.03	37.83***

*There were 929 in the total sample - this represents all of the drinkers minus those who did not have a 'last occasion' within the last 12 months, those who did not drink on the last occasion, and those who refused to give a body weight.

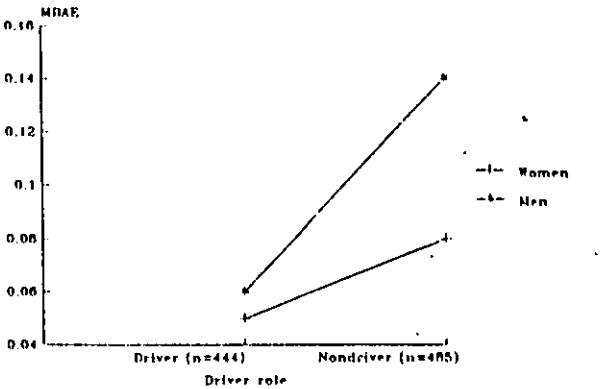
*p <.05 ** p < .01 *** p <.005

From Table 1 it can be seen that there are both gender and driving role differences. Men drank significantly more than women, both on the last occasion, and normally. Non-drivers drank more than drivers on the last occasion, and were also those who drank more usually. There was no evidence for restraint in any of the groups, and some people apparently drank more on the last occasion than normally, which may reflect some degree of under-reporting of usual consumption, or, in the case of the non-drivers, a degree of 'celebration' because they did not have to drive.

There are also significant interactions between gender and driving role (Figure 1). On the last occasion, men who were drivers (n=260) had a mean MBAE of 0.06, compared with 0.14 for non-drivers (n=246); there was less difference among the women: 0.05 for the drivers (n = 184) compared with 0.08 for the non-drivers (n = 239). (F = 31.21, p.<.005). More men than women drove home.

Figure 1

Mean MBAE For Male and Female Drivers and Non-Drivers from the 'Last Occasion'



A similar pattern is evident for usual consumption, with the male drivers having a mean MBAE of 0.06 compared to 0.09 for the non-drivers, while the women drivers had a mean MBAE of 0.06 whether they were drivers or non-drivers (F = 13.68, p<.005).

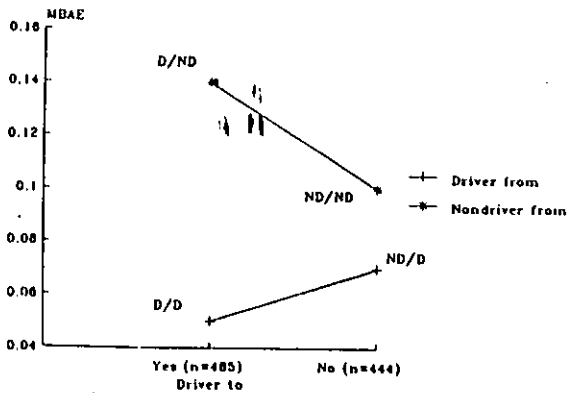
In summary then, although there is no evidence of people drinking less than they would normally because they were driving, there is evidence that people who normally drank less were those that adopted the driving role.

The analysis can be taken a step further when driver roles both to and from the last occasion are considered. A three-way ANOVA was used to compare mean MBAEs with means of travel to (driver to), means of travel from (driver from) and gender as main effects. There were the same simple and interaction effects for driver from and gender as were seen in Table 1, because those data were identical. The additional information of driver to, allowed who was 'rescued' from the driving role (drove there, but did not drive home) or who 'rescued' (drove home although did not drive there) to be assessed.

There was no difference in the MBAEs of those who did or did not drive to the occasion, and the three-way interaction was not significant, but there was a significant interaction between 'driver from' and 'driver to'. These means can be seen in Figure 2.

Figure 2

Mean MBAE For Drivers and Non-Drivers To and From the 'Last Occasion'



D/D Drove both ways
D/ND Driver there, driven home
ND/D Driven there, drove home
ND/ND Non-driver both ways

It is clear from Figure 2 that while those who drove home from the last event had been more restrained in their drinking than those who did not drive home, this restraint was stronger in those who also drove to the event: that is those who perhaps had anticipated that they would be two-way drivers. The least restrained were those who were rescued from driving home, followed by the two-way non-drivers who may have arranged to have an evening out without having to worry about driving. The rescuers were more sober than the non-drivers, which is appropriate, but not as sober as those drivers who appear to have known in advance that they would be driving home, and prepared accordingly.

The picture becomes a little clearer with the addition of gender differences as in Table 2, which shows mean MBAEs of men and women in the four possible driver combinations: two-way driver, drove to but driven from, driven to but drove from, and two-way non-driver.

Male and female two-way drivers were equally restrained in their drinking, and both had an average blood alcohol estimate at .05. The similarity between men and women ends there, however. Men who were 'rescued' from the driving role had an average MBAE of .15, and obviously needed rescuing. There were 72 of them, or 14 per cent of the male group. The women who were rescued were also over the legal limit with an average MBAE of .10, but had not drunk as much as their male counterparts and there were fewer of them. It is tempting to speculate that the rescued were, by and large, rescued by women - 10 per cent of the female group switched roles to drive home, although they had a slightly higher MBAE than those women who had started out driving. The male rescuers, however, had the highest blood alcohol estimates of any sample - .16 - and it is fortunate that they represent only a tiny group - there were, in fact, only six of

Table 2

Mean MBAE of Drivers and Non-Drivers for the 'Last Occasion' as a Function of Means of Transportation To and From the Event

	MEN (n=506) Mean	%	WOMEN (n=423) Mean	%
Drove both ways	0.05	(50.2)	0.05	(33.3)
Drove to, but driven home ('rescued')	0.15	(14.2)	0.10	(4.3)
Driven to, but drove home ('rescuers')	0.16	(1.2)	0.06	(10.2)
Did not drive at all	0.14	(34.4)	0.07	(52.2)
TOTALS		(100.0)		(100.0)

them. There were more 'rescued' than 'rescuers', but this perhaps reflects the driving roles of abstainers, who were not included in the analysis. Finally, those who did not drive at all apparently felt free to celebrate - both men and women had higher MBAE than the drivers, with the men having particularly high estimates.

In summary, then, there are differences between the driving roles people choose for themselves based on how much they have drunk, or, perhaps, intend to drink. Those who appear to have planned to drive home (two-way drivers) drank less than those who did not drive, and these blood alcohol levels were not affected by sex, although a greater proportion of men than women fell into this category. On the other hand, those who had arranged alternative transport both to and from the event drank much more - they kept themselves safe on the roads, although one might speculate about other problems of intoxication. The women who were 'rescuers' were relatively safe, and there was an aberrant group of six men who drank a great deal and then drove home. Finally, those who were 'rescued' apparently realised, or were made to be aware, that they were in no fit state to drive.

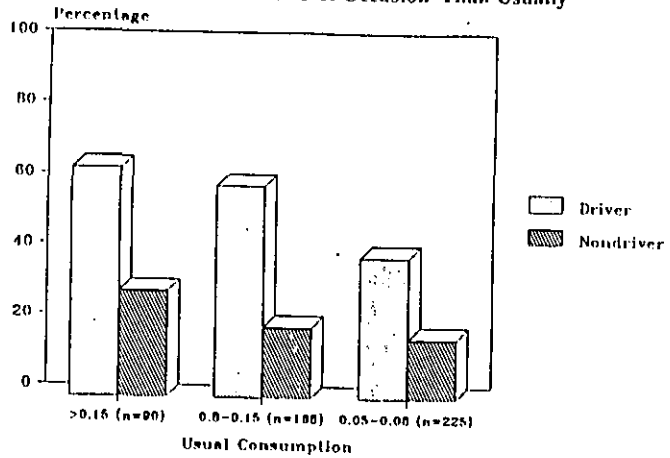
Figure 3 and Table 3 are concerned with the reduction in consumption on the last occasion as a function of normal drinking patterns, in order to see whether those who normally drank the most were any more or less likely than those who normally drank less to reduce their consumption if they were driving. This is important because of the increased risk to those who drive with higher blood alcohol levels. There is also some suggestion in the literature that heavy drinkers might be the most resistant to behaviour change (Homel 1988) so that it is important to ascertain what type of drinkers are changing their drinking behaviour before driving, and by how much.

Figure 3 shows the percentage of drinkers whose usual alcohol consumption gave them an MBAE of greater than .05 who reduced their consumption on the 'last occasion'. The drinkers are divided into three categories - usual MBAE greater than .15, between .08 and .015, and between .05

and .08. Reasonably, there were no drinkers whose usual consumption was less than .05 who reduced their consumption on the last occasion.

Figure 3

Percentage of Drivers and Non-Drivers Who Drank Less on the 'Last Occasion' Than Usually



It is clear from Figure 3 that many of the heavier and moderate drinkers who were driving were able to reduce their consumption, although fewer of the lighter drinking drivers apparently felt the need to do so. These gross effects can be seen in more detail in Table 3, where the amount of reduction is analysed.

Table 3

Cumulative Percentage of Drivers and Non-Drivers Who Drank Less Than Specified MBAEs on the 'Last Occasion' As a Function of Usual Alcohol Consumption

Usual MBAE	N	MBAE on Last Occasion Less Than .01%	.05%	.08%	.15%
MBAE .15%					
Drivers	26	0	15.4	42.3	65.4
Non-drivers	64	0	3.1	10.9***	29.7***
MBAE .08-.15					
Drivers	65	0	41.5	60.0	93.8
Non-drivers	103	0	6.8***	21.4***	69.9***
MBAE .05-.08					
Drivers	115	0	40.0	81.7	96.5
Non-drivers	110	0	15.5***	47.3***	82.8***
MBAE <.05					
Drivers	238	0	75.6	94.5	99.5
Non-drivers	208	0	61.5***	79.8***	93.3***

*p <05 ** p < .01 *** p <.005

Table 3 divides respondents into four subgroups based on the MBAE of their usual consumption of their favourite beverage. This is used as the baseline measure, against which people's reduction in consumption on the last occasion can be seen. To take those in the heaviest drinking category first, only a minority chose to drive home, but of those few who did so, 65 per cent modulated their consumption below .15, and 42 per cent reduced to below .08, which in some states would have put them within legal limits. (Given that these are maximum estimates, exact delineations of who might and who might not have been safe are difficult). Of the non-drivers, who function as a control group, however, only 30 per cent reduced their consumption on the last occasion, and only 11 per cent to within reasonably safe limits. Clearly, then, the knowledge that one was going to drive was salient to the heavy drinkers. There was a significant difference in modulation to below .15, and below .08 between the drivers and non-drivers.[1]

In the second group - those who usually drank to MBAEs of between .08 and .15 - 60 per cent of the drivers reduced their consumption to below .08, in what appears to be compliance to drink-driving legislation. Of these, almost 42 per cent managed to reduce to below .05, although it is a matter of concern that 40 per cent were still drinking at above .08 and driving home. This, however, represents a fairly small number of drivers, as there were only 65 drivers altogether in this group. Again, the differences between drivers and non-drivers are significant, with non-drivers less likely to reduce their consumption.

Even within the groups where usual consumption would hardly place the driver at risk, there is evidence of some restraint among drivers. Forty per cent of those who normally drank to no more than .08 reduced their drinking to below .05 - an effect that has been labelled prevention, given the increased risk of accident from .05 to .08 (Snortum & Berger, in press). This compares to only 16 per cent of non-drivers in this group who also reduced their consumption on the last occasion. There are, however, a number of those in lower drinking categories, both drivers and non-drivers, who drank more than usual on the last occasion, which suggests that there may be under-reporting of usual consumption for these drinkers.

Generally, then, there is evidence that many drinkers, even those who normally drank heavily, moderated their drinking on the last occasion on which they consumed alcohol away from home, although a majority of the heaviest drinkers elected not to drive. There are strong contrasts between drivers and non-drivers on these measures, suggesting that the driving role was very relevant. However, if a cut off line of .08, as the most generous point of being within legal limits is assumed, more than half of the heaviest, 40 per cent of the next heaviest, 20 per cent of the next to lightest and, 5 per cent of the lightest alcohol consumers still drank enough alcohol to put them over the legal limit, and drove home. This represents many people who were behind the wheel with too much alcohol in their bloodstreams.

Discussion

The overall impression to be gleaned from this analysis is that there is some good news and some bad news. The good news concerns the number of drinkers who appear to be complying with drink-driving legislation; the bad news, of course, concerns the number of drinkers who are still driving with dangerous blood alcohol concentrations. There are also some questions which are unresolved, and these have to do with the adequacy of self-report measures and the lack of understanding people display of serving sizes and the differing strengths of alcohol beverages.

To take the good news first then, it seems that many people do care about drink-driving laws, and do try to separate their drinking from their driving or, at least, to drink less when driving. Many people reported that they did not drive when intoxicated, or that they drank less when driving, and moreover, many felt that it was wrong to drive when they were likely to be over the legal BAL.

Compliance with drink-driving legislation can take a number of forms. People can generally consume no more alcohol than would allow them to legally drive a car. Drinkers can reduce their consumption if they are driving. People can find alternatives to driving such as using public transport, or finding someone else to drive them, if they are drinking. When we look at how drinkers coped with transportation on the last occasion on which they consumed alcohol away from home, we found evidence of all three strategies. Those whose usual consumption was the heaviest were less likely to drive home than those whose usual consumption was lighter. The choice of driving role appeared also to have been influenced by a consideration of how much alcohol had been consumed. Generally, drivers had drunk less than the non-drivers, and those who had driven to the event and then apparently drunk too much were likely to have been driven home. Finally, there is evidence that some drivers in all consumption categories - even the heaviest - moderated their drinking, often to within safe limits, when driving. That even heavy drinkers do alter their behaviour if they are driving is consistent with findings in NSW (Homel 1988) and the United States (Snortum & Berger in press).

What, then, is the bad news? There was a sizeable minority of drinkers who claimed never to moderate their drinking because they were driving, and felt that it was morally acceptable to drive after drinking four beers (as the question was asked) in an hour. Nearly a third of the sample felt that they could personally handle that amount of alcohol, or more, and still drive safely.

Although there was no evidence that the drivers drank less on the last occasion than normally, the heaviest drinkers did not drive. There is some suggestion that 'rescuers' (those who adopted the driving role home, although they were non-drivers to the occasion) had higher blood alcohol concentrations driving home that those who apparently planned to drive home. This suggests that the decision about who is to drive home ought to be made at the beginning of the evening, rather than at the end, when judgment may be clouded.

There was also a minority of drinkers in each category who did not reduce their drinking when driving. With the most generous interpretation, more than half of the heaviest drinkers, 40 per cent of the next heaviest, and 20 per cent of lighter drinkers were driving home with unsafe blood alcohol concentrations.

The latter finding raises questions about the accuracy of the self-report of 'usual' consumption, given that for many people it was lower than consumption on the last occasion. The 'usual consumption' calculation relied on a self-report of how much of the preferred alcoholic beverage was normally consumed in a single sitting. However, self-report of alcohol consumption is notoriously inaccurate (Blaze-Temple et al. 1988). In a community, the amount of alcohol consumed according to self-report is always less than the amount of alcohol sold, and it is known that such factors as forgetting and deliberate or defensive under-reporting affect self-reports. There are also difficulties inherent in catching the heaviest drinkers at home for inclusion in household surveys, which means that these drinkers are likely to be under-represented in such surveys (Blaze-Temple et al. 1988).

Even if our respondents were reporting accurately as far as they could remember, there is still the problem of glass and serving size. People were asked how much they had consumed in terms of standard drink, or pub serving, sizes but it is clear that for those who drink at home, who are in the majority, the quantity poured is often unknown, and people tend to underestimate the amount

how much they had consumed in terms of standard drink, or pub serving, sizes but it is clear that for those who drink at home, who are in the majority, the quantity poured is often unknown, and people tend to underestimate the amount of alcohol they are consuming, often by a factor of two (Carruthers & Binns 1987).

Further complications arise when the strength of the beverage is taken into account (Stockwell & Stirling, in press). The calculations for this study assumed 11.4 grams of ethanol per standard drink, but this can vary widely - in Western Australia, 'full strength' beer can vary from 5 to 9 per cent alcohol by volume and wine from 8 to 15 per cent. Even if our respondents, then, knew accurately how much they were drinking, neither they, nor the research design, were able to take these differing strengths into consideration.

None of these unresolved questions, of course, cloud the comparisons between drivers and non-drivers. They do, however, suggest that the 'good' news may not be quite as good as it sounds. People may truthfully report drinking within safe limits, but the environment hardly supplies them with enough information, such as knowledge about standard drink sizes, or accurate labelling of alcohol containers, to really know how much alcohol they are consuming. Drinkers who appear to be safe drivers, then, may, through no fault of their own, not be safe at all.

Having said that, it is encouraging to see strong evidence that so many people modify their drinking if they know they are driving. They need assistance and information, however, to enable them to ensure that the modification is sufficient.

FOOTNOTE

[1] Contrasts between drivers and non-drivers were tested with two by two Chi-square tables for the cumulative frequencies at each of the four last occasion MBAE categories.

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The Young, Delinquency, Drink and Driving

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The Queensland Drink Driving Project is an interdisciplinary educational research program funded by the Commonwealth Department of Community Services and Health. Active participants in the Project include staff from the Department of Social and Preventive Medicine at the University of Queensland, the Alcohol and Drug Programs Unit of the Queensland State Education Department and the Research Division of the Queensland State Department of Transport.

This paper presents some information obtained during the development of the PASS (Plan a Safe Strategy) drink driving program. This is a school-based education program for Year 10 students which is designed to prevent the onset of drink driving by young adults.

One key issue in the design of the program was the extent to which drink driving is a 'normal', or majority, behaviour determined by opportunity as is argued by Homel (1983) and Gusfield (1985) or is the aberrant behaviour of a socially discrete minority. This question needs to be addressed in any systematic attempt to design an education intervention. Norstrom (1981) stated a long recognised fact of drink driving interventions when he wrote 'it is unrealistic to conceive of general deterrence in terms of a uniform response by the whole community; rather different responses can be expected dependent upon distinctive qualities of the potential offenders. Conversely, a number of workers in the field have noted that it is inappropriate to design and implement interventions as though the community of drink drivers was homogenous (Wells-Parker et al. 1986; Lacey et al. 1979). The program designer working with either institutionalised actions, such as RBT, sentencing regulations, re-education programs for convicted drink drivers, or with prevention programmes such as pre-driving education packages or media campaigns, needs to define exactly who will be the target for the program. Such information helps to establish the effect to be expected and ultimately to provide a measure for its success or failure.

Evaluation of preventive approaches (McAlister 1981) suggests that the most effective models are designed to lessen the likelihood of the behaviour occurring rather than to change an already established pattern. Applying this to a school-based program for drink driving raises the need to determine the relative proportions of students who are likely to be engaged in drink driving at

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DETERRENCE AND PREVENTION OF ALCOHOL-IMPAIRED DRIVING IN AUSTRALIA, THE UNITED STATES, AND NORWAY

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Western Australia

A sample of 4,316 drivers from Norway, the United States, and Australia responded to national surveys probing individual, social, and legal factors that contribute to control of alcohol-impaired driving. These factors are considered within the framework of general deterrence (control in response to a fear of punishment) and general prevention (control through internalization of moral inhibitions and socialization of preventive habits). Striking differences in social norms, attitudes, and behaviors surrounding drinking and driving in the three countries suggest that Norway has progressed farthest toward general prevention, whereas Australia relies more on general deterrence. Both general deterrence and general prevention are relatively weak in the United States.

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This international survey of drivers explored individual, social, and legal factors that contribute to control of alcohol-impaired driving. These factors are considered within the framework of *general deterrence* and *general prevention*. General deterrence refers to control in response to a fear of punishment, whereas general prevention refers to a broader range of controls that includes moral inhibitions and socialization of preventive habits (cf. Andenaes 1952; Gibbs 1975). A special focus of the research is to examine general prevention in the context of different configurations of laws and cultural values.

Fear of punishment is typically assumed to be the primary mechanism by which laws exert control over behaviors. Laws also may influence behaviors in less direct ways, however. Andenaes and others have suggested that enactment of a law makes explicit a moral value of a society, which serves to educate people and to strengthen social norms for compliance (Andenaes 1977). International comparisons allow us to examine differences in behavior in the context of different moral attitudes and social norms.

Drinking-Driving Laws in the Three Countries

Australia, the United States, and Norway have enacted diverse packages of legal controls of alcohol-impaired driving. A distinctive feature of the Australian approach is a high reliance on random breath testing, especially in the large states of New South Wales and Victoria. In New South Wales, about one million tests are given annually for a population of three million drivers. When the survey was conducted (June 1988), random breath testing had not been instituted in the states of Queensland and Western Australia, although legislation was under discussion and since has been implemented. There is a per se limit of .05 percent blood alcohol concentration (BAC) in all states except South Australia and Western Australia, where .08 percent is the limit. Penalties for a first offense are relatively light, consisting typically of license suspension for three to six months and a fine of A$500 (about US$400). Imprisonment is rarely used.

The United States has a patchwork of diverse state laws, with wide variations in enforcement practices. The past 10 years have seen a burst of legislative activity and a general toughening of the laws. In response to federal prodding, most states had adopted per se limits of .10 percent BAC by April 1986, the time of the survey. Roadside sobriety tests are conducted in some states, commonly with restrictions to protect constitutional guarantees of "freedom from unreasonable search and seizure." Penalties for a first offense vary widely, but most states use a combination of fines and license suspension. Short-term imprisonment is used for first offenders in some states.

Norway has the toughest drinking-driving penalties of all Western democracies. Norway passed the world's first per se law in 1936, setting the per se limit at .05 percent BAC; that value is still in force. In 1983, when our survey was conducted, first offenders typically were imprisoned for a minimum of three weeks and had their licenses suspended for a minimum of two years. In September 1988 the minimum jail term was reduced from three weeks to two weeks and was reserved for recidivists or offenders with high BAC. In addition, a heavy fine of 1.5 months' gross salary was instituted. The government argued that the new penalties are more severe than the previous penalties, especially for recidivists and offenders with BAC levels of .15 percent or higher.

Thus in all three countries the drinking-driving laws continue to be a topic of debate as governments attempt to increase the effectiveness of controls. The general approach has been periodically to "tighten the screw" and toughen the standards and penalties for alcohol-impaired driving. Although the laws and their enforcement differ on many dimensions, it is reasonable to characterize the penalties as heaviest in Norway and lightest in Australia.

SURVEY INSTRUMENT AND PROCEDURES

A core of about 40 questions was asked in each country; some questions were added to the later surveys (United States and Australia). The core questions probed knowledge of the laws pertaining to drinking and driving, attitudes and opinions, perceptions of risk, group norms, and self-reported violations. A baseline of usual consumption of the preferred alcoholic beverage on a given occasion was obtained.

The Australian survey, completed in June 1988, included face-to-face interviews with 1,504 drivers from the four largest Australian states (New South Wales, Victoria, Queensland, and Western Australia). These states contain 85 percent of the national population. The sampling procedures are described by Loxley, Homel, Berger, and Snortum (in press). Because the state samples were not in proportion to the population, responses were weighted according to the number of licensed drivers in each state. In the United States, random-digit dialing telephone methods were used in April 1986 to obtain a representative national sample of 1,800 drivers in the 48 contiguous states plus the District of Columbia. The Norwegian survey was conducted face-to-face with a national

sample of 1,012 drivers in 1983. The sampling procedures in Norway and the United States are described by Snortum, Berger, and Hauge (1988). The variations in methods and time among the national samples demand caution in interpreting the patterns of differences that we observed among countries.

RESULTS

The data are organized around three main themes: profiles of drinking-driving behavior, indices of general deterrence (legal control), and indices of general prevention (social control).

Drivers who said they had not consumed any alcoholic beverages (other than communion wine) in the previous year were excluded from the analyses and descriptive summaries. Abstainers accounted for 25 percent of the Australian sample, 37 percent of the American sample, and 15 percent of the Norwegian sample, leaving respectively 1,132, 1,133, and 864 drivers who drink at least once a year.

Statistical tests of significance are not reported for each of the possible comparisons among countries on the various proportions shown in the tables. For comparisons using full national samples, differences of .06 or more in proportions are statistically significant with two-tailed $p < .01$.

Drinking-Driving Behavior

Two measures of self-reported violations are summarized in Table 1. Respondents were asked to state how many times in the past year they had been driving a car when they were "slightly intoxicated" and to report the largest number of alcoholic drinks they had "been able to handle and still manage to drive the car back home" in the past year.

Self-reported violations were considerably higher in Australia and the United States than in Norway. Nearly one-third of Australian and American drivers, compared to only 8 percent of the Norwegians, admitted driving in the past year "while slightly intoxicated." Similarly, only 2 percent of Norwegian drivers who drink admitted to driving in the past year after four or more drinks, compared to 28 percent of the Australians and 24 percent of the Americans.[1] These figures are consistent with data from random roadside checks. Wolfe (1986) sampled breath alcohol levels of U.S. drivers on Friday and Saturday nights between 10

[1] We examined other measures of drinking-driving, including an estimate of the maximum BAC level attained before driving in the past year. We observed the same pattern of national differences, with much lower rates in Norway than in Australia and the United States.

Table 1. Description of Drinking Drivers

	Australia N=1132	USA N=1133	Norway N=864
Total Sample of Drinkers			
Drove "slightly intoxicated" in past year	32	29	8
Drove after four or more drinks in past year	28	24	2
Usually consume 4+ drinks on one occasion	30	20	35
Drank away from home in past two weeks	62	43	29
Percentage Who Drove in the Past Year While "Slightly Intoxicated":			
Under age 30	48	52	13
Age 30 and over	25	19	6
Single/divorced/widowed	46	43	15[a]
Married	26	24	4
Male	36	39	12
Female	27	19	4
Usually consume 4+ drinks on one occasion	51	62	17
Usually consume fewer than 4 drinks	23	21	4

Note: The table entries are proportions, with decimal points omitted.
a Widowed persons were included with married in Norway.

p.m. and 3 a.m. His national estimates showed 8.3 percent of drivers at or above .05 percent BAC and 3.2 percent at or above .10 percent BAC. *In Norway only 1.0 percent of drivers were above* .05 percent BAC and 0.3 percent above .10 percent BAC between 10 p.m. and 2 a.m. (Christensen, Fosser, and Glad 1978). Comparable national data are not available from Australia, but a 24-hour *sample taken in South Australia in 1983 found 2.7 percent of drivers* over the legal BAC limit of .08 percent. In the city of Adelaide between 10 p.m. and 3 a.m. as many as 9 or 10 percent were over the limit (McLean et al. 1984).

Social norms surrounding drinking vary widely among the three cultures. A rough indication of exposure to opportunities for intoxicated driving can be obtained by considering usual drinking levels and frequency of attending a drinking occasion away from home. On a given drinking occasion, Australian and Norwegian drinkers are more likely to drink to levels of intoxication; 35 percent of Norwegian drinkers and 30 percent of Australian drinkers but only 20 percent of American drinkers estimated that they usually consume four or more of their preferred alcoholic beverage on a given drinking occasion. Australians go out to drink most often;

62 percent of the drinkers reported that they had traveled by motor vehicle to a drinking occasion within the past two weeks, compared to only 43 percent for Americans and 29 percent for Norwegians. Thus Australians have the greatest exposure to drinking-driving opportunities. These data are consistent with the fact that Australia has the highest per capita alcohol consumption of the three countries (National Campaign against Drug Abuse 1989). Australians cherish their hard-drinking, beer-swilling image, and drinkers are likely to consume large amounts of alcohol at frequent intervals. Although Norwegians are as likely as Australians to consume four or more drinks on an occasion, they do not go out to drink nearly as often. Alcohol is expensive and tightly regulated by the Norwegian government, and drinking in Norway often is concentrated on special occasions. Americans go out to drink more often than Norwegians, but are much less likely than either of the other groups to drink heavily. Americans generally view alcohol as a social lubricant rather than as an intoxicant.

The lower panel of Table 1 compares major demographic groups on the rates of driving in the past year while "slightly intoxicated." In each of the three countries, self-reported violations were especially high for persons who were young, single, or male, or who consume at least four drinks on an occasion. In each demographic group, the violation rate was markedly lower in Norway than in either Australia or the United States; rates in the two latter countries were roughly comparable.

Indices of General Deterrence

If potential offenders are deterred because they fear punishment from the legal system, we would expect 1) some knowledge of the relevant law, 2) a perception that an offender is likely to be detected, and 3) an expectation that costly penalties actually are imposed.

As Table 2 shows, knowledge of the relevant law was much higher in both Norway and Australia than in the United States. Almost all Norwegians (96%) and Australians (90%) knew whether their state had a per se law, compared to only 69 percent of the Americans. Over 80 percent of the Australians and the Norwegians knew the exact legal limit on BAC, whereas knowledge among Americans was much lower at 29 percent. Similarly, few Americans knew the maximum time for jail or license suspension for a first offender with a BAC level above .15 percent, whereas a majority of Norwegians had this knowledge. Knowledge of maximum penalties in Australia could not be computed because no maximum jail term or period of license suspension is

Table 2. Knowledge of Law and Credibility of Sanctions

	Australia n=1132	USA n=1133	Norway n=864
Knowledge of the Law			
Knows if per se law applies	90	69	96
Knows legal BAC limit	83	29	85
Knows term of maximum license suspension	—[a]	22	52
Knows term of maximum jail sentence	—[a]	12	56
Credibility of Sanctions			
Believes arrest risk ≤ 1% for drunk man	72	71	70
Knows someone arrested in past year	43	43	22
Knows someone jailed in past year	5	19	23
Believes smart lawyer can "get you off"	41	58	—[b]
Believes ≤ 25% get proper punishment	29	41	—[b]
Actual penalties for me would "hurt badly"	54	47	—[b]
Fear of arrest is main reason for control	39	15	—[b]

[a] No maximum term is specified in some Australian states.
[b] This question was not asked in Norway.

specified in the states of Victoria and Western Australia. About half of the Australian respondents estimated the maximum period of license suspension to be at least as long as the mandated minimum (mostly six months); 64 percent said that no jail term is required, which is descriptive of usual practice. We evaluated the perceived likelihood of detection by asking how likely it is that a man would be arrested if he had drunk six shots of whiskey in the last couple of hours and had a long way to drive home. In all three countries about 70 percent of the respondents assessed the risk of arrest at no higher than .01 for the drunk man.

We measured personal experience with the law by asking whether the respondent knew of anyone who had been arrested or had served jail time in the past year for a drinking-driving violation. Australians and Americans were twice as likely as Norwegians to know someone who had been arrested, whereas Australians were much less likely to know someone who had served time in jail for such a violation. The low rate of jail among Australians reflects the fact that jail is not normally used for first offenders. In Norway the rate of jail (23%) is as high as the rate of arrest (22%), showing close correspondence between arrests and punishment.

Many Americans and, to a lesser extent, Australians are cynical about the fairness and effectiveness of their legal system in regard to drinking-driving. A majority (58%) of Americans and 41 percent of Australians thought a smart lawyer probably could get them off from most drinking-driving penalties; and 41 percent of Americans and 29 percent of Australians believed that fewer than half of first offenders receive penalties required by law. We did not ask these questions in Norway because they did not apply. A study of implementation of the drinking-driving laws in Norway found that among 1,053 drivers convicted in 1975-1976, 100 percent had their license revoked for at least a year and 85 percent were sentenced to prison, two-thirds of these offenders for more than the minimum of 21 days (Christensen and Fosser 1980). A similar study of 15,000 drivers in the Australian state of New South Wales found that 98 percent of those arrested in 1982 were found guilty in court, although a special "first offenders" law allowed about five percent of the guilty to have no conviction recorded (Homel 1988). Australians' perceptions of the legal system perhaps are more jaundiced than is justified.

As a summary measure of the credibility of sanctions, we asked Australians and Americans to assess the effect on their personal lives of the penalties they thought they would actually receive for a first offense conviction of driving with a BAC over .15 percent. Responses were scaled as (1) no great problem, (2) hurt quite a bit, (3) hurt badly, and (4) almost ruin my life. Australians were more likely than Americans to rate the consequences as "hurt badly" or worse, 54 percent versus 47 percent. Similarly, when asked why they might cut down on drinking before driving, Australians were much more likely than Americans to mention fear of arrest as a primary reason (39% vs. 15%).

Indices of General Prevention

Andenaes (1952) introduced the term "general prevention" to incorporate the moral or educative effects of laws. As he explained, an advantage of creating moral inhibitions is that they may work "even when a person need not fear detection and punishment" (Andenaes 1977: 51).

In a key question designed to tap moral inhibitions against alcohol-impaired driving, we asked respondents whether they felt it was morally acceptable for them to drive after four drinks. Norwegians were virtually unanimous (98%) in their view that this behavior was definitely wrong. A strong majority of Australians (78%) and Americans (71%) also said it was morally wrong. In support of the view that Norwegians may be more sensitized to the

Table 3. Personal Attitudes and Perceptions of Social Control

	Australia n=1132	USA n=1133	Norway n=864
Personal Attitudes			
Morally wrong to drive after 4+ drinks	78	71	98
Believes accident risk ≥ 10% for drunk man	59	63	70
Support random breath testing	88	60	94
Support jail for first offenders	19	44	70
Perceptions of Social Controls			
Almost all drivers abstain at parties	10	6	75
Almost all groups designate sober driver	35	16	75
At almost all parties someone leaves their car home and uses public transport*	16	8	63
Friends disapprove driving after 4+ drinks	62	54	89

* Restricted to respondents who went by motor vehicle to drinking occasions and said public transportation was available in their area (Australia n = 1096; USA n = 804; Norway n = 768).

extralegal consequences of alcohol-impaired driving, they were found to judge the accident risk for an intoxicated man as somewhat higher than did Australians and Americans (Table 3).

Agreement with strong laws might be taken as another indicator of inculcation of moral values. Comparisons across cultures, however, are confounded by differences in the existing laws. Support for jail for first offenders and endorsement of random breath testing followed national differences in the current laws. By far, Norwegians were most supportive of jail and Australians least supportive. Random breath testing was approved by about 90 percent of both Norwegians and Australians, and by 60 percent of the Americans.

We obtained perceptions of social norms for control by asking about the behavior of others at drinking occasions: specifically, how many drivers abstain from all drinking, how many groups appoint a person to stay sober, how often at least one person will leave his or her car at home and come by public transportation, and whether friends would disapprove of driving after four drinks (bottom panel of Table 3). On all four of these indices Norwegians showed the highest levels of control. Although Norwegians were most likely to drink to high levels of intoxication, 75 percent of Norwegian respondents reported that at parties away from home

almost all drivers abstain from alcohol. In contrast, only 10 percent of Australians and 6 percent of Americans reported such high levels of abstention.

DISCUSSION AND CONCLUSIONS

A note of caution is appropriate as we interpret data from the three surveys. Precision of comparisons is limited by differences in procedures and by an unknown amount of response error, especially where sensitive questions are at issue. It is encouraging that the remarkable differences among Australia, the United States, and Norway in social norms, attitudes, and behaviors surrounding drinking and driving are consistent with other sources of data.

Australians have the highest level of exposure to "opportunities" for intoxicated driving because of a combination of frequent drinking occasions away from home and a social norm whereby many people drink to levels of intoxication. Although self-reported driving while "slightly intoxicated" is the highest of the three countries, there is clear evidence of general deterrence. Fear of arrest is salient, and often is cited as a main reason for limiting drinking before driving. Australians are knowledgeable about the relevant laws; most expect significant legal penalties to be imposed if they are arrested. A majority of Australians expect that the penalties they would actually receive for alcohol-impaired driving would "hurt badly" or would "almost ruin my life." In keeping with these indications of general deterrence in Australia, Homel (1988) found that after implementation of random breath testing in New South Wales, most drinkers took steps to reduce driving after drinking.

General prevention has a clear foothold in Australia, although the level is weaker than in Norway. A strong majority (78%) of Australians believe it is morally wrong to drive after heavy drinking. We found almost universal support for random breath testing, especially in the states of Victoria and New South Wales, which have had the longest experience with these laws.

In the United States there is less exposure to drinking occasions away from home, and fewer drivers usually consume more than three drinks on any given occasion. Yet drivers exercise fewer controls on driving after drinking; consequently the self-reported rate of intoxicated driving among drinkers is nearly as high in the United States as in Australia.

Americans are relatively cynical about the effectiveness of their laws governing alcohol-impaired driving. A common view is that a good lawyer could get one off from most penalties, and that

many people who are arrested do not receive the penalties required by law. Evaluation studies have shown that in fact courts often fail to impose mandated penalties (e.g., Ross and Foley 1987). In this context it is not surprising that the level of knowledge of the relevant laws is very low. Other plausible reasons for poor knowledge in the United States are the complexity of the law in many states and the variability in laws among neighboring states (Snortum, Berger, and Hauge 1988).

Evidence for general prevention in the United States also is relatively weak. Americans are least likely to say that it is morally wrong to drive after drinking or to feel that their friends would disapprove of their driving after four or more drinks. Although some Americans attempt to control alcohol-impaired driving by tactics such as designating a driver to remain sober, the levels of control are the weakest of the three countries.

Norwegians attend drinking occasions away from home less frequently than do Australians and Americans, but when they attend such occasions, they are the most likely to drink "to get drunk." Although many potential drivers drink heavily, Norwegians are highly successful at separating drinking from driving. Self-reported intoxicated driving and random roadside checks indicate a much lower violation rate than in Australia and the United States. Intoxicated driving is concentrated heavily among drivers who usually consume four or more drinks on one occasion, but even for these heavy drinkers the violation rates for Norwegian drivers are far below those in the other two countries (see Snortum, Hauge, and Berger 1986).

Knowledge of drinking-driving laws is prevalent among Norwegian drinkers. Penalties are enforced rigorously; thus it is implied that the law has a high level of credibility. General prevention seems to be well established in Norway. Moral opposition to driving after drinking is practically universal among Norwegian drivers, and tactics to avoid driving after drinking are observed routinely at drinking occasions.

General Deterrence, General Prevention, and Drinking-Driving Laws

Studies of the deterrent effects of new drinking-driving laws have generally found no effects or only weak and "ephemeral" changes in behavior (Ross 1982). The most pronounced effects were found where a new law was accompanied by extensive publicity and discussion by the media, but even these diminished

quickly over time as publicity faded. Yet there is at least circumstantial evidence that people respond to the body of drinking-driving law and allow it to exercise some continuing control over their behavior. Many drivers, especially in Norway and Australia, have detailed knowledge of the relevant laws, including legal BAC levels and penalties; and fear of arrest commonly is regarded as a major reason for controlling alcohol-impaired driving (see also Snortum 1988).

An exceptional example of a continuing deterrent effect of a law is found in the experience with random breath testing in New South Wales, Australia. Evaluations of the massive and well-publicized random breath testing program show a sharp suppression of alcohol-related accidents, which has been maintained since implementation of the law in December 1982. Drivers frequently cite the law as a reason why they limit drinking before driving (Homel 1988). The law has a high level of credibility among drivers, maintained through vigorous enforcement and special publicity campaigns.

The role of law in promoting general prevention remains unclear, although there is evidence of general prevention in Australia and the United States as well as in Norway. A majority of respondents in all three countries agreed that driving after four or more drinks is morally wrong; most felt that their friends also would disapprove; and there was general approval of existing laws. These indices of general prevention are much stronger in Norway than in Australia or the United States. Norway has the toughest drinking-driving laws and penalties; these basic laws have been in effect for many years, giving ample opportunity for the laws to shape social norms. The difficulty for interpretation, of course, is that laws also reflect preexisting social norms. Any preventive effects of a law act through, and interact with, the social norms of a society over a period of time. The relationships among law, attitudes, and behavior are complex, and clearer understanding will require study of the simultaneous changes in all of these factors over time. We believe that our research, which incorporates international comparisons, provides a useful starting point for empirical research of this issue.

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