Effectiveness of Legislative and Fiscal Restrictions in Reducing Alcohol Related Crime and Traffic Accidents

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The adverse effect which even low levels of alcohol consumption can have on traffic safety has been documented in a wide variety of studies. Typically one finds that 40 per cent to 50 per cent of all driver and motorcyclist fatalities have elevated blood levels (BALs). This has led to considerable research activity as to the most effective means of preventing alcohol related traffic accidents, especially in the legislative area.

By international standards, Australia has a high level of alcohol consumption, and it is therefore not surprising to find that alcohol is apparently a factor of some importance in the occurrence of crime (Smith in press(a)). For instance, for Western Australia from 1968 to 1984, there was a close relationship between alcohol consumption and homicide, serious assault, rape, breaking and entering and motor vehicle theft. The significant correlations between alcohol consumption and the less serious offences were probably related to the use of alcohol as a source of 'dutch courage', especially by young offenders. That is, the effect of the alcohol consumption may have been to promote or facilitate the planning of executing of the crime, rather than inducing the occurrence of the offence (Cordilia 1985). Additional analyses revealed significant correlations between (a) Western Australian alcohol consumption and hospital admissions for injury purposely inflicted by other persons and (b) Australian alcohol consumption and mortality due to homicide and injury purposely inflicted by other persons.

From a prevention point of view, the above significant results have the important implication that any initiative which reduces total absolute alcohol consumption can be expected to have a beneficial effect on alcohol related crime (Smith 1988). Decreasing the availability and increasing the price of alcoholic beverages are examples of measures which can be used to reduce consumption.

The purpose of this paper is to review the effectiveness of legislative and fiscal restrictions in reducing alcohol related crime and traffic accidents. The material is drawn extensively from two more detailed review papers (Smith 1988a; Smith 1989). Availability restrictions, pricing and taxation of alcoholic beverages, and drink driving legislation are the areas which will be reviewed in this paper, due to their particular relevance to the Australian scene.
Legal Minimum Drinking Age

During the 1970s a considerable number of American states and Canadian provinces lowered the legal minimum drinking age at which people could drink in licensed premises or purchase alcohol for off-premise consumption. Subsequently, most of the jurisdictions raised their drinking ages. In the case of Australia, two states (Queensland and Western Australia) lowered their drinking age from 21 to 18 years, while two other states (South Australia and Tasmania) lowered their drinking age from 21 to 20 years, and then from 20 to 18 years. (New South Wales has had an 18 year drinking age since 1905, Victoria since 1906 and the ACT and the Northern Territory since approximately 1929). As a consequence of the above legislative changes, researchers have been able to study the effect of lowering and raising the drinking age on traffic accidents, alcohol consumption, school problems, juvenile crime, and emergency hospital admissions (Smith 1989; Smith 1983).

Traffic accidents

The effect on traffic safety of lowering the drinking age in South Australia, Western Australia and Queensland (Smith & Burvill 1986) can be summarised as follows:

- The only fatality comparison to give significant results in the predicted direction was the South Australian 21 to 20 years analysis for male and female drivers and motorcyclists. The annual percentage increase was from 75.6 per cent to 96.5 per cent, depending upon whether one used a between state or a within state control group.
- Significant increases (16.6 per cent to 23.1 per cent) in the number of male drivers and motorcyclists injured, occurred following the lowering of the drinking age in South Australia from 20 to 18 years, and these increases were still significant in the second three-year after period.
- By contrast, the significant increase (9.7 per cent to 14.9 per cent) for young Queensland male drivers and motorcyclists injured did not extend into the second three-year period. The initial increase was greater in Queensland rest-of-state area (12.1 per cent) than in the Brisbane City Council area (4.6 per cent).
- There was 20.8 per cent increase in the number of 18 to 20-year-old traffic accident casualties admitted to public hospitals in Perth following the reduction in the Western Australian drinking age.
- A significant 4.7 per cent increase in male drivers and motorcyclists age 16 to 20 years involved in reported accidents occurred, following the lowering of the drinking age from 20 to 18 years in South Australia.
- After the drinking age was reduced in Queensland, 17 to 20-year-old drivers and motorcyclists involved in accidents had significantly more positive breathalyser and blood alcohol test results, and were charged with significantly more drink driving offences.

The drinking age was lowered from 20 to 18 years in Tasmania as from 22
January 1974, but in order to reduce the size of the original study (Smith & Burvill 1986) Tasmania was not included. Subsequently, a separate report evaluated the effect on traffic accidents and juvenile crime of introducing the 18-year-old drinking age in Tasmania. The report (Smith 1987b) showed that the number of drivers and motorcyclists age 20 years or less killed or injured in traffic accidents in Tasmania increased significantly after the drinking age was lowered. In comparison to a control group of the same age in another state, the increase was 15.1 per cent, and in comparison to an older Tasmanian control group, the increase was 12.7 per cent.

**Juvenile Crime**

The possibility that lowering the drinking age may effect juvenile crime was subject of two evaluation studies (Smith 1987b; Smith & Burvill 1987). In Queensland, South Australia and Tasmania the legislative changes increased male juvenile crime by 20 to 30 per cent. The limited data available for Western Australia yielded similar results. Particularly as the above increases were over and above those for between-state control groups of the same age, and older control groups within the same state, the findings appeared to be valid. For females the results varied from state to state.

A number of offence categories for males were noticeably more likely to be significantly increased, in comparison to between state control groups of the same age. Burglary increased in three states by 37 to 64 per cent. Larcency of motor vehicles increased by 37 per cent in Western Australia and 42 per cent in South Australia. Of particular interest was the finding that in South Australia and Queensland drunkenness increased by 49 per cent and 57 per cent respectively. Generally alcohol related crime is viewed as having at least an element of violence, but this does not apply to the above offence categories. Indeed, only one of the analyses for assault and robbery gave a significant result in comparison to a between state control group of the same age. Possibly the effect of lowering the drinking age was to promote or facilitate the planning or executing of less serious juvenile crime, rather than inducing the occurrence of serious crime (Cordilia 1985). Due to their relative inexperience in drinking and difficulty of obtaining supplies, perhaps the juvenile crime offenders not reaching the higher blood levels often found in adult serious crime offenders.

It appears that the above studies have some quite important implications for the prevention of juvenile crime. Since lowering of the drinking age in the four states significantly increased male juvenile crime, it does not seem unreasonable to suggest that raising the drinking age should lead to a reduction in male juvenile crime. Support for such an assertion is to be found in North American studies of the effect on traffic accidents of changing the drinking age. A reduction in the drinking age was usually found to result in an increase in traffic accidents, whereas a raising of the drinking age had the opposite effect (Smith 1988a; Smith 1983). The fact that lowering of the drinking age in the above four Australian states had the same adverse effect on both traffic accidents (Smith & Burvill 1986; Smith 1987b) and male juvenile crime also attests to the likelihood that
raising the drinking age to 20 or 21 years would significantly reduce male juvenile crime.

The finding of an adverse effect on male juvenile crime of lowering the drinking age to 18 years is consistent with the two studies (Hammond 1973; Smart and Schmidt 1975) which reported an apparent increase in school problems following a reduction in the drinking age. But a further two studies (Anon 1980; Vingilis & Smart 1981) reported an apparent decrease in school problems when the drinking age was raised, and gives added reason to believe that raising of the drinking age should significantly decrease male juvenile crime.

Emergency hospital admissions for injury purposely inflicted by other persons

In the three years before the drinking age was lowered in Queensland, 15 to 17-year-old females had 22 hospital admissions for homicide and injury purposely inflicted by others. By contrast, during the three years after the drinking age was lowered, the corresponding number was 58 (Smith in press(a)). This was a significant increase of (a) 145.5 per cent in comparison to a control group of females of the same age in another state, and (b) 155.1 per cent in comparison to 21 to 24-year-old females in Queensland. This means that for both the between-state and within-state analyses, significant results were obtained for the 15 to 17-year-old females. Thus, it appears reasonable to conclude that the lowering of the drinking age in Queensland was the factor responsible for the significant increase, as the experimental design allows to effectively rule out alternative explanations of change in the dependent variable.

Of some interest is the finding that for 15 to 17-year-old females a significant increase occurred, but for 18 to 20-year-old females there was not a significant increase. Possibly the 15 to 17-year-old results reflect a pre-selection factor. Among those females who were at risk of admission due to injury purposely inflicted by other persons, there may have been considerable violation of the previous 21 year limit. Consequently, when the drinking age was lowered the 18 to 20-year-old females did not experience an increase due to their already high rates of admission, whereas the 15 to 17-year-old females were now able to obtain alcoholic beverages and so had a significant increase in the number of admissions.

Other dependent variables

Although this is a traffic safety-crime paper, mention should also be made of other Australian studies which have documented the adverse effect of lowering the drinking age with respect to emergency hospital admissions for (b) non-traffic accidents, (Smith 1986b), and attempted suicide (Smith 1988b).

Policy implications for the drinking age in Australia

Lowering of the drinking age in North America was frequently found to result in significant more young people being killed and injured in traffic accidents. There was also evidence of an increase in school discipline problems and alcohol consumption. By contrast, raising the drinking age produced the opposite effects
(Smith 1988a). One United States study reported that a state which raised its drinking age could expect a 28 per cent reduction in night-time fatal accidents among drivers in the age group affected by the law change. Six years after the drinking age was raised from 18 to 21 in Michigan, an evaluation found that it was having the same effect on reducing traffic accidents as in the first year after the 21 years drinking age became operative. In the case of Texas, and New York, even a one-year increase in the drinking age from 18 to 19 years had a significant beneficial effect on injury and property damage accidents.

Since lowering the drinking age in Queensland, South Australia, Tasmania and Western Australia had the same adverse effect on traffic accidents as in North America, it is reasonable to predict that raising the drinking age in Australia will have the same beneficial effects as in North America.

Rather than return to the previous 21 year drinking age, the following six factors (Smith 1988b) appear to favour a 20-year limit:

- For four states and the two territories there would be a three year interval between the minimum legal driving age and the minimum legal drinking age. For Victoria there would be a two-year difference, and for South Australia a four-year difference.
- The age limit for drinking would coincide with a 'natural' change from being called a 'teenager' to being an adult.
- By having a 20-year-old drinking age there would be no suggestion that young people were not mature enough to sign contracts or do the many other legal activities which were associated with the previous 21 years age of majority. Rather, there would be a clear statement that the drinking age, and only the drinking age, was raised to 20 years because there was empirical evidence to justify the action.
- A 20-year drinking age would ensure that alcohol is removed from the secondary schools. This was apparently one of the main reasons why the drinking age was raised from 18 years in Ontario, Canada (Vingilis & Smart 1981).
- Presumably for safety reasons, for articulated vehicles and buses the minimum drinking age throughout Australia is at least 20 years. Thus, not only is there a precedent for using the age 20 years, but it also shows that 18 and 19-year-olds who can automatically vote cannot legally do all the activities of older persons.
- A recent United States study found evidence that the major positive effects on traffic safety are achieved by raising the drinking age to 20 years. A further increase to 21 years only appeared to have a much smaller effect, although the researchers were careful to point out that for this point the statistical analysis was not conclusive (Du Mouchel et al. 1987).

**Days and Hours of Sale of Alcoholic Beverages**

Of all the various alcohol control measures available, legislators are inclined to change the days and hours of sale of alcoholic beverages more so than any other
measure. Should the days and hours of sale be a factor which influences alcohol consumption and related problems, then there is an important opportunity for prevention. By contrast, if the days and hours of sale have little or not effect on consumption and related problems, then there would be no need to be concerned about such legislative changes (Smith in press(b)).

The following is a summary of the results of eight Australian studies of changing the days and hours of sale of alcoholic beverages:

- Following the introduction of Sunday alcohol sales in Perth, there was a 63.8 per cent increase in the number of persons killed on Sundays in comparison to the other six days of the week (Smith 1978). For casualty accidents, the corresponding increase was 17.2 per cent.

- The number of reported property damage accidents on Sunday in the Brisbane City Council area for the noon to 1.59 p.m. period increased by 52.8 per cent after the introduction of 11.00 a.m. session. For the two-hour period after the 4.00 p.m. to 6.00 p.m. session, the corresponding annual increase was 85.4 per cent for reported property damage accidents and 129.8 per cent for casualty accidents. The above three significant increases still applied in the second three-year after period (Smith 1988c).

- During the two years after the introduction of a ten-hour Sunday hotel session in New South Wales for the 12-hour period from noon to 11.59 p.m., there was a 22.2 per cent increase in Sunday fatal accidents. For accidents which resulted in at least one person being admitted to hospital, there was 28.2 per cent increase from 6.00 p.m. to 11.59 p.m. on Sundays. The corresponding figure for accidents which resulted in at least one person being injured, but not requiring admission to hospital, was 20.9 per cent. By contrast, none of the analyses for the control period of midnight to 11.59 a.m. gave significant results in the same direction as for the above three types of accidents. The experimental design used for the study enabled causality for the above increases to be attributed to the Sunday hotel session (Smith 1988c).

- After 6.00 p.m. Monday to Saturday hotel closing was replaced by 10.00 p.m. closing in Victoria, there was a 10.6 per cent increase in the number of casualty accidents from 6.01 p.m. to 2.00 a.m. (Smith 1988d).

- The replacing of 10.00 p.m., Monday to Saturday hotel closing in New South Wales with 11.00 p.m. closing was the factor responsible for a significant 13.2 per cent increase in the number of fatal and serious injury accidents from 10.00 p.m. to 11.59 p.m. (Smith 1987d).

- Following the introduction of flexible trading hours in Tasmania, hotels stayed open for approximately the same duration, but closed later than the previous 10.00 p.m. closing time. In the year after the legislative change there was a significant 14.9 per cent increase in the number of casualty traffic accidents in the period from 10.00 p.m. to 6.00 a.m. With the later closing the accidents were significantly more likely to occur after midnight than before midnight (Smith 1988a).

- Following the introduction of two two-hour Sunday sessions by a small
number of hotels and clubs in Victoria, there was apparently no increase in casualty traffic accidents. By contrast, after the subsequent introduction of an eight-hour Sunday session from noon to 8 p.m., there was a 32.6 per cent increase during the four hours after the session finished (Smith in press(b)).

- The early opening of hotels in Perth was apparently facilitating problem drinking (Smith 1986b).

The above studies demonstrate the legislative changes to the days and hours of sale of alcoholic beverages can have an adverse effect on traffic safety. However, just as increases in availability can increase alcohol related problems, so decreases in availability can have beneficial effects. For instance, Saturday closing in alcohol stores in Sweden, (Olsson & Wikstrom 1982) Finland (Saile 1978) and to a lesser extent, Norway, (Nordlund 1985) has been found to reduce alcohol consumption and related problems. This highlights the importance of ensuring that changes in the days and hours of sale of alcoholic beverages are in the direction of reducing availability.

Number and Type of Alcohol Outlets

Many studies have been conducted overseas of the effect of changing the number and type of alcohol outlets, (Smith 1989; Smith 1983) but it appears that the following (Smith 1987e, Smith, in press(c); Smith, in press(d)) are the only Australian papers on this aspect of availability.

A longitudinal study with a six-year before period and an nine-year after period was conducted to determine the effect of changing the number and type of alcohol outlets in Western Australia relative to a control state (Queensland).

During the 1974 to 1981 period, Western Australia had a significant 15.4 per cent increase in the hotel, tavern and store rate in comparison to the control state but a significant 15.8 per cent decrease in the rate of licences for licensed clubs, restaurants and all other licences.

The above changes were associated with significant increases in Western Australia for male homicide mortality (+91.3 per cent), male charges of homicide (+82.4 per cent), and male hospital admissions due to injury purposely inflicted by other persons (+24.2 per cent).

However, the same changes in the number and type of alcohol outlets in Western Australia were also associated with significant decreases in male driver and motorcyclist mortality (-23.8 per cent); pedestrian mortality (males: -6.7 per cent; females: -16.2 per cent); all types of road users admitted to hospital (males: -26.5 per cent; females: -19.6 per cent); female homicide mortality (-91.7 per cent), hospital admission due to injury purposely inflicted by other persons (females: -46.8 per cent) and due to fights and brawls and rape (males: -47.3 per cent; females: 29.9 per cent), charges of attempted homicide (males: -54.2 per cent; females:- 32.1 per cent), and female charges of homicide and attempted homicide (-90.8 per cent).
On the basis of the experimental design used for the analyses, it was possible to conclude that the above changes in the number and type of outlets apparently contributed to, rather than merely correlated with, the changes in the dependent variables.

The above significant increases and decreases in the dependent variables were interpreted as due to the following three consumption changes resulting from the variations in the rates for the various types of alcohol outlets in Western Australia in comparison to Queensland:

- There was an increase in the total amount of absolute alcohol consumed per adult in Western Australia. (This explains the male homicide findings in particular (Smith in press(a)).

- The proportion of alcohol sold in packaged form increased in Western Australia. (The subsequent reduction in driving after drinking contributed to the significant reductions in traffic accident morbidity and mortality, as presumably also did the extra number of hotel, tavern and store licences).

- The various changes facilitated the purchase of packaged alcohol by women in Western Australia, and so enabled women to consume alcohol without company, or at least unwanted company. A significant reduction in female homicide mortality and charges against females for homicide and attempted homicide were the apparent outcome.

These findings highlighted a potential conflict of interest, for they showed both positive and negative outcomes of the changing of the number and type of outlets in Western Australia during the after period. With a view to maximising the beneficial effects and minimising the adverse effects licensing authorities should, firstly, reduce the total number of outlets whether they be for on- or off-premise consumption (Smith in press(c)). This should decrease the total amount of alcohol consumed, and so reduce those problems which are related to total consumption (for example, male homicide and liver cirrhosis mortality). Secondly, irrespective of how many outlets are permitted in total, for as many of them as possible to be for off-premise consumption, with the aim of minimising traffic accidents for drivers, motorcyclists and pedestrians, and female alcohol related violence.

**Server Intervention**

Alcohol licensing legislation throughout Australia usually contains a section which states that it is an offence to supply alcohol to a person who is in a state of intoxication, or is visibly affected by alcohol to the extent that any further consumption of alcohol by the person would be liable to induce a state of intoxication.

The Senate Standing Committee on Social Welfare (Baume 1977) recommended that the state and territory licensing laws be more strictly enforced, and in particular, drew attention to the problem of intoxicated persons being served in hotels and clubs. More recently, Nieuwenhuysen (1986) stressed the need for enforcement of legislation which specifies that is and offence to serve an
intoxicated person.

In the United States 'Server Intervention' programs have gained considerable momentum, and can be broadly broken into three complementary activities (Smith 1988). The legal liability of servers of alcohol, while community activities focus attention on the number and type of alcohol outlets at the local level. As noted by Saltz (1985), the activity which has received most attention is the environment of the licensed outlet itself. At this level, server intervention involves developing a coherent set of policies and procedures within the outlet and then training employees to carry out the policies. For instance, the Alcohol and Drug Dependence Services, Queensland Department of Health and the Queensland Hotels Association have jointly developed a 'Hotel Patron Care Program'. This is a very interesting example of co-operation between hoteliers and health workers (Higgins & Carvolth 1983).

While server intervention programs are relevant to the sale of packaged alcohol, most attention has been given to the development of procedures and staff training for 'on-premise' drinking situations (for example, hotels, taverns, clubs).

Papers reporting on the evaluation of server intervention program (Saltz 1987; Russ & Geller 1987) and the enforcement of the alcohol licensing laws (Jeffs & Saunders 1983) have given very encouraging results. For instance, Saltz (1987) found that there was a 50 per cent decrease in the likelihood of intoxication in patrons leaving a Navy Club with a comprehensive program. Staff who had been trained in server intervention were more likely to intervene, reported Russ and Geller (1987).

Pricing and Taxation of Alcoholic Beverages

One way of changing drinking patterns and the level of consumption is through the use of pricing and taxation as a control instrument. It is now clear that alcohol behaves like other commodities in the sense that price increases reduce consumption (Smith 1988), although the elasticities for, beer, wine and spirits are different (Ornstein 1980).

While normally taxation is regarded as a blunt instrument of government policy, such a criticism is not applicable to increases in licence fees. The research of Cook in particular, supports this assertion. Cook (1981; 1982) examined changes in liquor taxes among 30 licence states in the United States between 1961 and 1975 in order to ascertain whether state liquor tax increases led to statistically discernible changes in consumption, liver cirrhosis mortality and traffic accident deaths. The results indicated that even relatively small changes in prices may have an effect on decreasing consumption, and in particular, those portions of total consumption associated with the above two indices. Subsequently, Cook and Tauchen (1982) found that increases in state liquor taxes gave rise immediate and rather sharp reductions in both apparent liquor consumption and the liver cirrhosis mortality rate. Similar results have also been reported for Canada (Seeley 1960) and Scotland (Kendell et al. 1983).

When a particular type of alcoholic beverage has appeared to be more closely
related to liver damage than other types of alcoholic drinks within a given area, the former beverage has proven to be a relatively inexpensive form of alcohol (Smith 1988). These finding highlight the importance of ensuring that the taxation policies of the Commonwealth, State and Territory governments do not give preferential treatment to particular beverage. This is especially so as in most studies of alcohol related problems it has been found that the responsible factor is the overall level of consumption, rather than the type of beverage or the alcohol strength of the beverage (Grant 1979).

Consumption of alcoholic beverages almost invariably rises when the real price of alcohol falls (Kendell et al. 1983). Consequently it is important that excise duty and liquor licensing fees should be regularly adjusted so that the real price of the various beverages does not fall (Baume 1977).

Heavy been drinkers are especially unlikely to consume the low alcohol content beers (Smith 1987e). The use of pricing and taxation policies to encourage the substitution of low alcohol content drinks for high alcohol content drinks is therefore recommended.

**Low Blood Alcohol Levels for Probationary Drivers**

The adverse effects of even low BALs on skills to be relevant to safe driving have been demonstrated in a wide variety of laboratory studies and experiments in which subjects with low BALs have been requested to drive motor vehicles, usually under controlled conditions without other traffic (Smith 1987e). Young drivers in particular, appear to be susceptible to the influence of low BALs. For instance, in the Grand Rapids study, 16-year-old drivers with a BAL of 0.02 per cent or higher had a significantly higher accident involvement ratio than drivers of the same age having a zero BAL (Borkenstein 1974).

Findings, such as those noted above, have been interpreted by traffic authorities in various Australian states to mean that the alcohol related accident involvement of newly-licensed drivers could be reduced by proscribing a lower BAL for probationary or first-year drivers than that applicable to other drivers.

Effective from 1 February 1971, first-year drivers in Tasmania were not permitted to drive with any alcohol in their blood in contrast to a 0.08 per cent level for all other drivers. During the year after the zero BAL was introduced, there was a significant reduction of 18.3 per cent in the number of 17 to 20-year-old Tasmanian drivers and motorcyclists injured, in comparison to the Queensland control group (Smith 1986b).

A 0.05 per cent BAL for probationary drivers was introduced in South Australia on 6 June 1981. For all other drivers the 0.08 per cent BAL still applied. There was a significant reduction of 40.4 per cent in the number of 16-year-old male driver and motorcyclist casualty accidents not requiring hospitalisation (Smith 1986b).

The introduction of the 0.02 per cent BAL probationary drivers in Western Australia as from 9 December 1982 produced a significant decrease in the total
number of male and female drivers and motorcyclists injured aged 17 to 20 years but, as in the case of South Australia, had no significant effect on the number of such casualties admitted to hospital. For male drivers and motorcyclists injured, but not admitted to hospital, the reduction was 17.1 per cent, while the corresponding figure for the females was 23.1 per cent. However, some caution should be applied to the interpretation of the female results as the significant findings were as much due to a control group increase in the after period as due to an experimental group decrease (Smith 1986b).

The finding that in each state the evaluations gave significant results for at least one category of drivers and motorcyclists highlights the potential value of low proscribed BALs for newly-licensed drivers, although in the paper (Smith 1986b) newly-licensed was interpreted as being a maximum of three-years older than the minimum driving age. Corresponding reductions might not apply to persons who first obtain their driver's licence at an older age as there is not the same combination of youth and inexperience. Similarly, we are not able to say whether all drivers and motorcyclists with less than say, three years driving experience should be subjected to low BALs. Possibly with increasing age and experience the beneficial effect of low BAL decreases, while it should be noted that the above accident reductions applied to drivers and motorcyclists who were required to display P plates during their first 12 months of driving. It is not inconceivable that at least some of the effectiveness of low proscribed BALs was due to the conspicuousness of the probationary drivers to the police. Unless drivers with one to three years' driving experience were also required to display P plates, low proscribed BALs may have little, if any, effect on accident involvement. Possibly the only way to resolve this question would be for a state or country to introduce low proscribed BAL for drivers with more than one year's experience and have the countermeasure evaluated.

**0.05 Per Cent Blood Alcohol Level for all Drivers**

Drivers in the Grand Rapids study (Borkenstein et al. 1974) with a BAL of 0.05 per cent to 0.07 per cent had and 18.4 per cent greater chance of being in the accident rather than the control group, using drivers with a BAL of 0.02 per cent to 0.04 per cent as the standard. Similar calculations for the Adelaide controlled study (McLean & Holubowycz 1981) revealed that the drivers with a BAL of 0.05 per cent to 0.07 per cent had a 73.0 per cent greater chance of being in the accident than the control group. These two studies indicate that with a BAL of 0.05 per cent, the group of drivers who would be just legally entitled to drive (0.04 per cent and below) would apparently have significantly fewer accidents than the group of drivers who are just entitled to drive legally (0.05 per cent to 0.07 per cent) with a BAL of 0.08 per cent. The higher percentage for the Adelaide study is probably related to it only including accidents to which an ambulance was called, and therefore having a greater proportion of alcohol related accidents than the Grand Rapids study which included all accidents, regardless of severity (Smith 1987e).

*New South Wales*
The maximum legal BAL was reduced from 0.08 per cent to 0.05 per cent in New South Wales as from 15 December 1980. As alcohol is especially likely to be a factor in night-time accidents, the evaluations focused on the extent to which night-time accidents decreased in comparison to daytime accidents.

The introduction of the lower BAL in New South Wales apparently did not affect the number of fatal accidents. By contrast, for the other three accident categories there were significant reductions in night-time accidents after the legislative change. On an annual basis, and after allowing for the slight changes in the number of daytime accidents, the percentage reductions were 6.2 per cent for accidents in which at least one person was injured, but not admitted to hospital, 7.2 per cent for towaway accidents, and 9.7 per cent for accidents in which a person was admitted to hospital (Smith 1987f).

The short-term effect of traffic law enforcement blitzes on alcohol related accidents has been previously documented (Hurst & Wright 1981). Thus, if the significant decreases in night-time injury and property damage accidents in Queensland were due to increased enforcement rather than to the introduction of the 0.05 per cent BAL, one would have expected the accident reductions to be of relatively short duration. This was clearly not the case, for all three similar surveys in Western Australia before and after the introduction of RBT.

However, due to a concomitant increase in drink driving enforcement it was not possible to attribute all of the New South Wales accident reductions to the lower BAL. Of particular interest was the finding that the BAL distribution for breathalyser offenders during the after period was significantly different from that for the before period. When the 0.08 per cent BAL applied, only 57.3 per cent of the BAL readings were in the range of 0.05 per cent to 0.159 per cent. By contrast, the corresponding figure after the 0.05 per cent BAL was introduced was 65.0 per cent.

**Queensland**

The BAL in Queensland was lowered from 0.08 per cent to 0.05 as from 20 December 1982. A three-year before period (January 1 1980 - 31 December 1982) and a three-year after period (1 January 1983 - 31 December 1985) were used for the analyses.

In comparison to Queensland daytime accidents, after the introduction of the 0.05 per cent BAL in Queensland, there were significant reductions of 11.3 per cent in night-time accidents in which a least one person was admitted to hospital, 15.9 per cent in night-time injury accidents not resulting in a hospital admission and 11.5 per cent in reported property damage accidents. Additional analyses revealed that for each of the three years in the after period, the number of Queensland night-time accidents for the above three accident categories was significantly less than for the total of the before period (Smith 1988e).

In contrast to New South Wales, the increase in the number of drink driving convictions in Queensland did not commence until some time after the 0.05 per cent BAL was introduced. It would therefore appear reasonable to attribute most
of the significant reduction in hospitalisation and property damage accidents in 1983 to the 0.05 per cent BAL. The significant result for non-hospitalisation accidents meant that some caution had to be exercised in interpreting the apparent decrease.

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Conclusion

In response to Hurst’s (1985) question 'Blood alcohol limits and deterrence: Is there a rational basis for choice?', it appears that the Queensland experience, and to a lesser extent the New South Wales experience, show that a 0.05 per cent BAL will significantly reduce injury and property damage accidents over and above the presumed accident reducing effectiveness of a 0.08 per cent BAL. Furthermore, the Queensland evaluation showed that in contrast to many other alcohol related countermeasures, the 0.05 per cent BAL apparently had an accident reducing effectiveness beyond its first year of operation.

Random Breath Testing

When enforced and publicised, random breath testing has been demonstrated to reduce the number of alcohol related traffic accidents (Smith 1988b). Surveys have indicated that random breath testing is of particular value in changing the drinking driving habits of young males (Smith 1988a).

In the case of Western Australia, random breath testing was introduced as from 1 October 1988 for a trial period of 18 months. The first year of its operation is currently the subject of a major evaluation study by the Police Department and the WA Alcohol and Drug Authority (Smith et al. 1988). The study has four parts:

- Evaluation using reported accident data for fatal casualty and reported property damage accidents;
- Evaluation using emergency hospital admissions for traffic accidents;
- Analyses of Police enforcement data; and
- Before and after mail surveys of samples of Western Australian drivers.

During the introduction and subsequent operation of RBT in New South Wales, a number of community surveys were undertaken. These added considerably to the knowledge by the various authorities as to why RBT has both such a substantial initial impact and a continued effectiveness in reducing the number of alcohol related traffic accidents. Consequently, it was decided to conduct similar surveys in Western Australia before and after the introduction of RBT.
While the principal impetus for the evaluation of RBT in Western Australia arose from the requirement of the Act which introduced RBT, the evaluation will also be of theoretical interest. This is because there were considerable differences between Western Australia and other states on a number of drink driving related variables at the time when RBT commenced in each state. For instance, 0.05 per cent BAL applied in Victoria when RBT was introduced with periodic enforcement blitzes. Tasmania introduced RBT and a 0.05 per cent BAL from the same date, and had the advantage of a relatively small area in which to co-ordinate their enforcement resources. South Australia had minimal enforcement with RBT for the first few years, although the position has now changed. But as can be seen from Table 1, the greatest differences are to be found between New South Wales and Western Australia, indicating that caution should be exercised in the possible extrapolation of the New South Wales experience with RBT to Western Australia.

Table 1

Comparison of New South Wales and Western Australia on a Number of Drink Related Variables When Random Breath Testing was Introduced in Each State

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<th>Item</th>
<th>New South Wales</th>
<th>Western Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAL</td>
<td>0.05% for all drivers</td>
<td>0.02% for probationary drivers, 0.08% for all other drivers</td>
</tr>
<tr>
<td>Drink driving enforcement prior to RBT</td>
<td>No RBT enforcement</td>
<td>Reasonably high level of de-facto RBT enforcement in the of driver's licence and vehicle checks</td>
</tr>
<tr>
<td>Other changes in drink driving legislation when RBT introduced</td>
<td>Yes - penalties increased and compulsory blood tests to drivers admitted to hospital</td>
<td>No</td>
</tr>
<tr>
<td>Excise on regular strength beer decreased</td>
<td>No</td>
<td>Yes - could be expected to increase consumption and hence adversely affect traffic safety</td>
</tr>
<tr>
<td>Sunday hotel tavern trading hours</td>
<td>No change</td>
<td>Increase of 50% six to nine from February 1, 1989</td>
</tr>
</tbody>
</table>

Conclusions
Alcohol related crime and traffic accidents are major health and social problems in Australia, as in many overseas countries.

Increasingly it is being recognised that emphasis has to be given to effective prevention programs if any worthwhile reduction is to be made in the number of drink drivers and the number of person who commit alcohol related offences.

As noted by the Commonwealth Youth Bureau, (Smith et al. 1988a) raising the legal minimum drinking age to 20 years in each state and territory should be a priority measure for reducing the number of young people killed and injured in traffic accidents, and for reducing juvenile crime.

Changes in the days and hours of sale of alcoholic beverages should reduce, rather than increase, alcohol availability.

An Australian study has highlighted the value of minimising the total number of alcohol outlets, but irrespective of whatever the total number is, having as many of the outlets as possible for off-premise sales only.

Encouraging results have been reported which indicate that server intervention programs can reduce alcohol availability by enforcement of the licensing laws.

Increasing the price of alcoholic beverages, and using price as a means to encourage the substitution of low alcohol content drinks for high alcohol content drinks should be priority measures to reduce those alcohol related problems which are closely associated with consumption levels. Note in particular, the co-variation of consumption and crime in Western Australia and Australia, as referred to in the Introduction.

Legislation which introduced low blood alcohol levels for probationary drivers in three Australian states was apparently effective in reducing the number of young people killed and injured in traffic accidents.

The Queensland experience, and to a lesser extent the New South Wales experience, shows that a 0.05 per cent BAL will significantly reduce injury and property damage accidents.

When enforced and publicised, random breath testing has been demonstrated to reduce the number of alcohol related traffic accidents, and is currently being evaluated for its effectiveness in Western Australia.

Alcohol education programs can impart knowledge, change attitudes, but have little or no effect directly on alcohol consumption. By contrast, social policy changes can reduce consumption, and hence alcohol related crime and traffic accidents. Realistically however, such legislative changes are unlikely to be implemented without community pressure from an informed electorate. It can therefore be seen that educational programs have a very important role to play in ensuring that people understand, appreciate and call for legislative and fiscal restrictions to reduce alcohol consumption and associated problems (Smith 1988).

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