

From .00 to .05 BAC: Do graduated BAC laws simply delay the young drink-driving problem by a few years?

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ABSTRACT

Analysis of Victorian Police crash data has shown 21-26 year-old drivers were over-represented in alcohol-related fatal crashes during 1993-1996. This age range generally represents the period when Victorian probationary drivers progress to a full licence. Correspondingly, their legal Blood Alcohol Concentration (BAC) limit increases from zero to <.05g/100ml. The present study sought to examine whether this change in BAC limit impacts on the crash involvement of 21-26 year-old drivers by comparing their drinking and driving patterns to probationary drivers (18-20 years) and an experienced driver group (31-40 years). First, current crash data was examined to identify any recent changes in the crash trend. Second, a telephone survey was conducted throughout Victoria ($N=696$) to explore differences in the use of strategies to avoid drink-driving and rationalisations for and against drink-driving by the three age/experience groups. Analyses of 1993-2000 Police-reported fatal crashes based on both recorded BAC level and High Alcohol Hours (HAH) showed consistent results. From 1994-1997, 21-26 year olds had the highest level of involvement in alcohol-related fatal crashes despite an overall decreasing trend. In 1998, 31-40 year olds recorded the highest level; however, the trend has since reversed, with 21-26 year olds' involvement increasing both in 1999 and 2000. Self-reported strategy use and rationalisations showed differences by age/experience, gender, and metro/rural divisions. The findings are discussed in terms of their implications for road safety policy and practice.

INTRODUCTION

While countermeasure programs have been successful in reducing injuries and fatalities caused by drink-driving, analyses by VicRoads found that during 1993 to 1996, there was a higher level of involvement in alcohol-related fatal crashes among drivers aged 21-26 years than among older or provisional drivers. This age range generally represents the period when Victorian probationary drivers progress to a full licence. Correspondingly, their legal BAC limit increases from .00 to <.05g/100ml.

Zero BAC laws have applied to Victorian probationary drivers (currently three years following the learner period) since 1984 (Christie, 1997). According to Christie (1996), a longer period of zero BAC is advantageous (2-3 years rather than 1 year). However, as true of nearly every national and international graduated licensing system (Whelan & Senserrick, 2002), following the probationary period, transition to a full licence does not require any additional education/training or an exit test. Therefore, the removal of P-plates and other additional restrictions may convey a message that the driver is now adequately experienced. Perceptions and attitudes towards drink-driving may be relaxed at a time when drivers may not be fully aware of their personal tolerance for alcohol or how many drinks they can personally consume and still remain under the .05 BAC limit.

The current project, conducted as part of MUARC's Baseline Research Program, aimed to further examine the involvement of 21-26 year-old drivers in alcohol-related fatal crashes and whether a link could be identified between crash patterns and changes in BAC limits. There has been some speculation that the 1993-1996 trend may have declined in recent years. Therefore, with an additional four years of data now available (1997-2000), the project first examined current crash data to identify any changes. This was undertaken by comparing data for fully-licensed 21-26 year olds (termed novices) to data for 18-20 year-old probationary drivers and 31-40 year-old experienced drivers.

A telephone survey was then developed to compare strategies used to avoid drink-driving by the three age/experience groups. Particular attention was given to gender and metro-rural differences. Survey items were identified from the road safety literature, although not specifically regarding 21-26 year olds. Very little research specifically addressed this driver group. Novice drivers were generally aged 18-25 years. Therefore, more general research was reviewed.

Strategies were identified from several papers (Christie, 1997; Kulick & Rosenberg, 1999; Mitchell-Taverner 2000; Turrisi & Jaccard, 1991). Christie (1997) found that more probationary drivers (83%) planned to avoid any combination of drinking and driving compared to fully-licensed drivers (52%). By gender, Mitchell-Taverner (2000) found females were more likely to plan to avoid drinking and driving, whereas males were more likely to use alcohol-restriction and driving strategies. However, females have been found more likely to be the passenger of a drinking driver (Harre, Field, & Kirkwood, 1996). Recent US research also suggests that while there is increased knowledge and

use of designated drivers (Foss, Halladay, Bartley, & Marchetti, 2000), often the driver is the person who has drunk the least, rather than a pre-chosen non-drinking driver.

Haworth and Bowland (1995) found that use of public breath-testing machines can result in behaviour change. They found 16% of Melbourne drivers surveyed changed their minds about driving home when recording a BAC $>.05$ on such a machine. A further 63% decided to modify their subsequent drinking behaviour, even though the machines were commonly used for fun or curiosity rather than for safety reasons.

Other important factors surveyed were exposure variables. For driving, distance travelled has been found to vary by driver group. In Victoria, Harrison and Pronk (1998) reported higher levels of driving exposure for males than females, and for males and younger drivers at night-time than for females and more experienced (older) drivers. For drinking, young males were found to engage in higher rates of drinking and driving, higher BACs, and more drink-driving arrests (Harrison & Pronk, 1998; Foss et al, 2000). In addition, Australian rural drivers of all ages were found to have higher BACs than metropolitan drivers (Harrison, 1996). These findings also confirm the importance of identifying gender and metro-rural differences when examining survey results.

CURRENT VICTORIAN CRASH STATISTICS

Alcohol involvement in fatal crashes was identified via two approaches. The first and most direct method entailed selecting crashes based on the highest BAC reading of drivers. However, this criterion may not reflect true proportions as not all *surviving* drivers involved in a fatal crash are BAC tested (ATSB 2001). Furthermore, analyses revealed that, on average, only 60% of drivers involved in a fatal crash had been BAC tested throughout 1993-2000. Given the high percentage of unknown BACs, a second method using a surrogate measure, termed alcohol hours or High Alcohol Hours (HAH), was employed. HAH are an indication of the times of the week when alcohol is more likely to be a factor in crashes. They are considered a good surrogate measure given they were derived from proportions of drivers killed or seriously injured in crashes with known illegal BAC readings. (Notably, using this measure assumes that the alcohol involvement patterns of the three age groups do not differ from the average pattern.) Alcohol hours, based on the update described in Shtifelman (1998), differ for metropolitan and country regions. Hence, separate analyses were conducted for these regions with this measure. Gender differences were also examined. All crash analyses were confined to drivers of passenger cars or passenger car derivatives (including station wagons, taxis, panel vans, utilities and mini-buses). The analyses presented in this section are descriptive in nature.

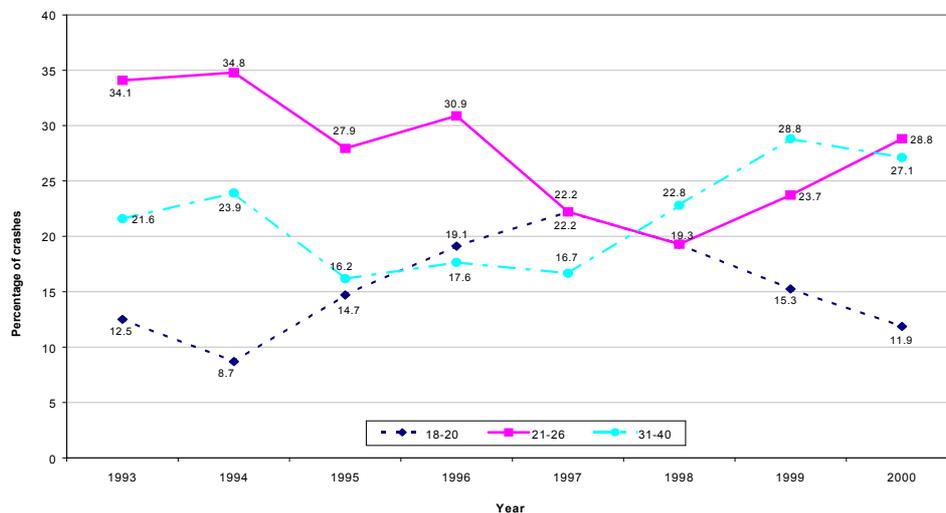


Figure 1. *Percentage distribution of fatal crashes by age group involving a driver with a BAC $>.05$*

Using a BAC $>.05$ as an indicator of alcohol involvement, it was shown that between 1993-1996, fully-licensed drivers aged 21-26 years had the highest level of involvement in alcohol-related fatal crashes compared to the younger and older driver groups. Despite this level of involvement, the proportion of fatal crashes involving drivers in this age group decreased from 34% in 1993 to 19% in 1998, as depicted in Figure 1. In 1998 and 1999, it was drivers aged 31-40 years who had the highest level of involvement in alcohol-related fatal crashes. From 1998, however, the downward trend

observed for most of the 1990s for 21-26 year-old drivers, reversed, reaching similar proportions in 2000 to those observed in the mid-1990s (i.e. around 30%). Owing to the small number of fatal crashes with a recorded BAC, gender and metro-rural differences were not examined.

Using alcohol hours as an indicator of alcohol involvement, the analysis clearly showed that fully-licensed drivers aged 21-26 years had the highest level of involvement in metropolitan fatal crashes in HAH from 1993-1997. Despite this, the proportion of 21-26 year-old driver fatal crashes in HAH declined steadily from 1993-1998, decreasing by almost half during this period (from 30% to 17%). The analysis also showed, however, that there was a reversal in trend for this group, indicated by successive percentage increases in 1999 and 2000 (20% and 21% respectively, up from 17% in 1998). These results show similar trends to the BAC >.05 analysis. For rural fatal crashes during HAHs, 31-40 year-old drivers had the highest level of involvement throughout much of the evaluation period. However, the incidence of fatal crashes involving 21-26 year-old drivers was very similar. Moreover, in 1998 and 2000, 21-26 year olds experienced a higher level of involvement than the 31-40 year olds (23% and 25% respectively, compared with 20% and 21%). In all comparisons, males in metropolitan and rural areas had the highest level of involvement in serious casualty crashes during HAH compared to their female counterparts.

In summary, results obtained using BAC levels in fatal crashes and in HAH were similar. Both found 21-26 year-old drivers were over-represented in alcohol-related fatal crashes compared to 18-20 and 31-40 year-old drivers. Both measures displayed similar trends during 1993-2000 for 21-26 year-old drivers; specifically, an increasing trend from 1998, following a steady decrease during 1993-1997. In all cases, males had higher levels of involvement than females.

TELEPHONE SURVEY METHOD

The survey items reported here were part of a 10-minute questionnaire (available on request) that explored several factors likely to contribute to drink-driving behaviour, including knowledge and awareness (effects of alcohol, legislation, enforcement, advertising, and public breath-testing machines), general planning variables and personal rationalisations for and against drink-driving. Present items are limited to strategy use and exposure variables (driving, drinking, and drink-driving). Item structures and response scales varied, as discussed in the results.

Roy Morgan Research conducted the survey using population sampling and random-digit dialling. Respondents were current drivers, aged 18-26 or 31-40 years, who had ever consumed alcohol. A total of 762 surveys were completed from 3,408 eligible calls (22.4%). In order for the three age groups to represent probationary, novice, and experienced driver groups, some data was recoded or discarded. The final sample comprised 696 drivers. The distribution by age and gender is summarised in Table 1. Half of the sample was male and half female.

Table 1. Summary of participants by age group and gender

Age group	Male	Female	Total
18-20 years	136	135	271
21-26 years	101	97	198
31-40 years	111	116	227
TOTAL	348	348	696

Approximately 72% of the sample resided in metropolitan Melbourne and 28% in rural Victoria. Again, males and females were represented equally in both metro and rural groups. (Details on education, occupation, country of birth, crash and drink-driving history are available on request.) To account for the spread in numbers, all survey analyses were weighted by equivalent numbers of licensed drivers in Victoria by age, gender, and probationary/full licence type.

TELEPHONE SURVEY RESULTS & DISCUSSION

Exposure

Table 2 summarises the results for exposure variables by age/experience group.

Driving: As shown, participant estimates of how many hours they would spend driving in an average week differed significantly by age group. Overall, 21-26 year olds reported fewer hours than the other groups, with 18-20 year olds reporting the highest average. Examination of gender differences revealed this finding was influenced by the significantly fewer hours reported by 21-26 year-old females ($M=9.62$): $F_5=2,859$, $p=.000$. In fact, 21-26 year-old males reported the highest average ($M=12.30$). For 31-40 year olds, males also reported more hours than females, while there was no difference between 18-20 year-old males and females. Metro-rural differences were also found overall [$F_5=1,112$, $p=.000$] and by gender [$F_{11}=2,377$, $p=.000$]. Within each age group, metro drivers reported 1-2 hours more

than rural drivers, and males reported more hours than females. Rural 18-20 year-old females were the one exception, reporting a small but significantly higher average ($M=10.98$) than their male counterparts ($M=10.56$).

Table 2. Recent strategies used to avoid drink-driving (during past month)

Strategy	Age group			$p=.000$
	21-26	18-20	31-40	
Hours driving in average week	10.99	11.73	11.07	$F_2=461$
Driven when (potentially) over BAC limit in past year (%)	23	21	16	$\chi^2_4=7,889$
Ever been passenger of driver (potentially) over BAC limit (%)	41	45	39	$\chi^2_4=2,194$

Drinking: Less than 1% of respondents replied they no longer drank alcohol when asked “How often do you consume alcohol?” For fixed response categories, 31% of 21-26 year-olds selected “a few times a week”, 26% “once a week”, and 18% “less than once a month”. In comparison, 24% of probationary drivers responded “once a week” and 23% “a few times a month”. Of experienced drivers, 35% reported “a few times a week” and 20% “a few times a month”. In addition, a small but significantly higher percentage (4%) were more likely to drink “daily” than the younger groups (both <2%). These findings were significantly different: $\chi^2_{14}=40,036, p=.000$. Therefore, experienced drivers reported the most frequent drinking; a finding inflated by significantly greater reporting of “a few times a week” by female metro 31-40 year olds: $\chi^2_{35}=.77,577, p=.000$. For 21-26 year olds, significantly more males reported drinking a few times a week, while females were more likely to drink once or less than once a month: $\chi^2_{35}=121,174, p=.000$. We also asked “On a typical drinking occasion, how many alcoholic drinks would you have?” Probationary drivers by far reported the heaviest drinking (27% 6-9 drinks, 22% 10+): $\chi^2_{14}=132,545, p=.000$. Experienced drivers were most likely to report 1, 2 or 3 drinks (14%, 26%, 24% respectively); however, by gender, significantly more males reported 6-9 drinks (in particular, rural males: $\chi^2_{35}=183,618, p=.000$) with more females reporting 1-3 drinks: $\chi^2_{35}=235,464, p=.000$. The 21-26 year olds fell somewhat between the two with 22% reporting 6-9 drinks (mostly males) and 19% only 2 drinks (mostly females).

Drink-driving: We asked participants whether they had driven when they thought they “were over the limit or might be over the limit” in the past year. Novices were the most likely group to agree, with probationary drivers also reporting a higher incidence than experienced drivers. For all groups, over two-thirds of cases were male, a significant gender difference: $\chi^2_{10}=47,037, p=.000$. Cases reported by male 31-40 year olds were more attributable to metro males (25%) than rural males (19%): $\chi^2_{10}=39,021, p=.000$. Notably, there were no recorded cases for rural 18-20 year-old females. In addition, we asked whether respondents had ever been a passenger of a driver who was most likely over the legal alcohol limit. All groups reported high incidences. Significant gender difference were also found for all groups: $\chi^2_{10}=24,481, p=.000$; a higher incidence by male 21-26 year olds (52% compared to 29% females), and male 18-20 year olds (50% compared to 40% females). However, for 31-40 year olds the pattern was reversed with males reporting a somewhat lower incidence than females (37% compared to 40%). Metro-rural differences showed this was true for metro 31-40 year-olds (35% males compared to 45% females), but not rural 31-40 year olds (42% males compared to 27% females): $\chi^2_{10}=18,572, p=.000$. Metro-rural distinctions also showed that 21-26 year-old males reported the highest incidence both among metro groups (51%) and rural group (55%), followed by 21-26 year-old males (34%; females 11%).

The above findings clearly show that exposure variables can at least partly explain the over-representation of male 21-26 year-old drivers in alcohol-related crashes. They reported more driving than others (particularly metro males), and typically drank heavily a few times a week. Perhaps not surprisingly therefore, they also reported a high level of driving when potentially over the BAC limit. They were also much more likely than females or any other age/experience group to be a passenger of a drinking driver, contrary to US findings of female over-representation (Harre et al, 1996). For female 21-26 year olds, the pattern was less clear. They actually drove the least of all groups, drank on fewer occasions and typically drank fewer drinks. However, moderate proportions reported having driven when potentially over the BAC limit (14%) and having been a passenger of a driver over the limit (29%) during the past year.

Strategies to avoid drink-driving

Successful and unsuccessful: We first asked respondents “Think of a time when you planned to avoid drink-driving but *did* drink drive. How had you planned to avoid drink-driving?” (unsuccessful). (Open) responses were coded into several categories, the most common of which (>10% use) are listed in Table 2. We then asked them to think of such an occasion when they “*did* avoid drink-driving” (successful). Common responses are also presented in Table 3.

As show in Table 3, limiting drinks was the most common strategy unsuccessfully applied by 21-26 year olds, as well as 31-40 year olds, but not probationary drivers. Use by 21-26 year olds was somewhat equal for males and females, but was not reported by any rural novices. Notably, a moderate proportion had also used the strategy successfully, although this was more likely true of 31-40 year olds, and rarely reported by 18-20 year olds. More male novices had used the strategy successfully than females ($\chi^2_5=28,553, p=.000$), and more metro males than rural males ($\chi^2_5=24,255, p=.000$).

Table 3. Unsuccessful and successful strategies used to avoid drink-driving

Strategy	UNSUCCESSFUL				SUCCESSFUL			
	Age group (%)			$\chi^2(2)$	Age group (%)			$\chi^2(2)$
	21-26	18-20	31-40	$p=.000$	21-26	18-20	31-40	$p=.000$
Limit alcohol consume	27.5	11.3	27.3	2,454	12.3	1.4	17.1	25,574
Get someone else to drive	27.0	15.4	24.8	1,098	35.4	38.2	38.9	901
Not drink any alcohol	13.7	26.1	13.8	2,177	29.7	38.5	27.9	6,399
Take a taxi	13.3	10.3	10.9	260	26.0	24.4	26.1	193
Not take my car	10.7	14.0	3.8	4,968	12.1	10.1	10.2	749

In contrast, not drinking any alcohol was one of the most commonly reported successful strategies used by 21-26 year olds, and was only moderately unsuccessful; although it was more likely to be reported by probationary drivers in both situations. This would be expected when the aim is a zero BAC. Successful use was more likely for females than males ($\chi^2_5=31,000, p=.000$), and rural than metro novices ($\chi^2_2=5,818, p=.000$). Similar usage patterns were reported for unsuccessful use, with rural female 21-26 year olds reporting the highest use ($\chi^2_5=7,133, p=.000$).

These results support the findings of Christie (1997) and Mitchell-Taverner (2000), that more probationary and more female drivers avoid combining drinking with driving whereas older driver groups and males tend to restrict their alcohol intake. For 21-26 year-old males, this pattern of strategy use was more often unsuccessful in avoiding drink-driving, whereas for females, it was more often successful, suggesting avoiding any alcohol rather than restricting it was a more effective strategy overall.

Notably, getting someone else to drive was both the most successful and one of the most unsuccessful strategies for novices, potentially indicating that Foss et al's (2000) US findings of imperfect use of designated drivers may apply to Victorian drivers. Given this was also one of the most common successful strategies of probationary drivers (who were least at risk in current crash statistics), these results suggest this strategy can be one of the most effective if used correctly (i.e. with a responsible, sober driver).

Also notable were findings that walking was reported by <5% per age group as unsuccessful and ≤4% as successful. Public transport was only reported as successful, but by few and mostly 18-20 year olds (7%; others <4%).

Recent use: We also asked respondents whether they had used any of a list of strategies (in random order) to avoid drink-driving in the past month. The strategies and their reported use are presented in Table 4. While there are many marked differences, only a few can be reported here. The most common recent strategy used by 21-26 year-olds was getting someone else to drive. From the previous section, we know that this is currently problematic, but has the potential to be particularly effective. It is also promising that another very common strategy currently used by the group was not consuming any alcohol before driving; however, limiting drinks was also common.

Counting or spacing drinks was far more likely to be reported by 21-26 year olds than the other groups – a strategy previously promoted in education campaigns. Drinking low-alcohol beer was also a moderately applied strategy. In addition, novices made the most use, although low, of courtesy buses. There was similarly low reported use of public breath-testing machines, even though these have been found to deter drink-driving (Haworth & Boland, 1995).

Gender and metro-rural differences of note, were that proportionally fewer 21-26 year-old metro males chose to not drink any alcohol ($\chi^2_5=12,898, p=.000$); rural female 21-26 year-olds were less likely to count or space their drinks ($\chi^2_5=54,665, p=.000$); and males were more likely to drink low-alcohol beer than females ($\chi^2_5=91,610, p=.000$), particularly metro males ($\chi^2_5=83,8446, p=.000$).

Table 4. Recent strategies used to avoid drink-driving (during past month)

Strategy	Age group (%)			$\chi^2(2)$ <i>p</i> =.000
	21-26	18-20	31-40	
Got someone else to drive	74.7	73.9	52.5	49,087
Not drunk any alcohol while you were out	62.4	68.9	49.4	25,170
Limited the amount of alcohol you drank	61.3	24.6	52.5	55,700
Not taken you car	60.3	65.0	39.9	48,172
Drunk at home or close to home	60.0	61.0	52.6	5,962
Taken a taxi	57.3	64.2	36.0	57,100
Drunk more water or non-alcoholic drinks	54.2	48.1	42.6	9,844
Stayed overnight after drinking	46.0	58.6	22.7	90,665
Counted or spaced your drinks	41.1	16.0	27.5	32,134
Walked	38.5	46.0	26.5	26,801
Used Public Transport	32.0	45.4	25.2	71,770
Limited amount of money you took to spend on alcohol	20.9	23.6	7.8	40,667
Drunk low-alcohol beer	18.0	5.4	22.7	24,524
Used a breath-testing machine to check blood alcohol level	3.7	3.0	2.4	1,231
Used a special courtesy bus	3.4	10.5	3.9	13,466
Slept in your car	3.4	6.7	2.5	6,495

Probationary vs first year licensed: To further highlight transitional issues, we asked the two older groups “As a *probationary* driver, if you wanted to drink alcohol when you went out, did you do any of the following to avoid drink-driving?” All strategies listed in Table 4 were presented in (random order). We then repeated the question, this time beginning “In your first year as a fully-licensed driver...”. The most common and contrasting results appear in Table 5.

While these are retrospective questions, potentially drawing on a long period for experienced drivers, and, therefore, should be interpreted with caution, they were included to try to specifically target the transitional period for BAC limits. The greatest contrast for both groups was increased tendency to drink low-alcohol beer. From the previous section, it can be seen that more experienced drivers appear to have since adopted this strategy, whereas the comparable number of 21-26 year olds has fallen substantially.

Table 5. Strategies used to avoid drink-driving as probationary and newly licensed driver

Strategy	PROBATIONARY			FIRST YEAR LICENSED		
	Age group (%)		$\chi^2(1)$ <i>p</i> =.000	Age group (%)		χ^2_2 <i>p</i> =.000
	21-26	31-40		21-26	31-40	
Got someone else to drive	77.4	53.2	44,276	81.7	63.8	26,999
Not drunk any alcohol while you were out	71.2	57.0	15,286	-	-	-
Drunk more water or non-alcoholic drinks	50.8	37.2	13,674	58.9	42.3	19,933
Limited the amount of alcohol you drank	32.5	35.1	512	56.0	52.2	1,050
Counted or spaced your drinks	20.7	20.0	48	42.2	35.2	3,762
Used a special courtesy bus	15.3	6.7	15,446	10.9	8.0	1,801
Slept in your car	18.6	17.5	164	11.8	14.7	1,272
Drunk low-alcohol beer	7.9	11.4	2351	17.6	17.1	31

Recall of this transition for both groups also indicated greater use of other drivers, restriction of alcohol, water/non-alcoholic drinks, and counting/spacing drinks in the first year as a fully-licensed driver, and a decreased tendency to use courtesy buses or sleep in their car. Similar gender and metro-rural differences applied as in the previous section. Comparisons to the previous section, however, suggest the tendency of 21-26 year olds to drink more water/non-alcoholic drinks is not maintained, while restricting, counting and spacing drinks increases. Regrettably, data for use of the strategy ‘to not drink any alcohol’ when first fully-licensed was not surveyed due to technical errors.

CONCLUSIONS & IMPLICATIONS

Victorian crash data analyses consistently showed that while alcohol-related fatal crashes involving 21-26 year-old drivers displayed a decreasing, albeit high level of involvement from 1993-1998, there were indications that this level is increasing. The telephone survey results indicated that differences in exposure variables and strategy use to avoid

drink-driving are likely to impact on this trend. Notwithstanding the limitations of the survey, the highly significant differences detected, at least, provide some indication that the increase from a zero BAC limit to .05 is a difficult transition for a number of 21-26 year olds and, therefore, is a likely contributing factor to their over-involvement in alcohol-related fatality crashes. The results warrant further investigation of this issue.

The over-involvement of 21-26 year-old males could be partly accounted for by greater exposure to driving, drinking, and drink-driving. They also tended to limit their alcohol intake rather than to avoid consuming any alcohol before driving, which was likely to be less successful in avoiding drink-driving. In addition, there was some indication that they initially drank more low-alcohol beer following the BAC increase, but that this was not maintained. For female 21-26 year olds, the pattern was less clear; although a moderate number reported having driven when potentially over the BAC limit and having been a passenger of a driver over the limit during the past year. They also used the strategy of getting someone else to drive less successfully than males, although generally their strategy use was likely to be more effective in avoiding drink-driving.

Overall, the use of other drivers had the potential to be a very effective strategy, yet was not reliable. Use of other forms of alternative transport likely to be successful (public transport, courtesy buses) and public breath-testing machines, which have previously been found to be effective, were low. In contrast, counting or spacing of drinks was a common strategy for 21-26 year-olds (although not rural females). These findings indicate clear gaps (including the role of designated drivers) and strengths of education campaigns. An obvious way to target this education at novices, is through the licensing system. This study suggests that, as licensing systems continue to be evaluated and refined, greater attention should be given to drink-driving-related issues in the transition from probationary to full licence.

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