Social and psychological predictors of young people's involvement in fatal and serious injury crashes

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ABSTRACT

The present paper reports preliminary findings from a longitudinal study of early adolescent drink driving and later involvement in fatal and hospitalised injury crashes. The study covers a period of over ten years and the predictive models and relevant variables and measures draw on the longitudinal studies of related behaviours by Farrington (1986), Bachman, Johnston and O'Malley(1978) and Jessor and Jessor (1977). The paper explores the extent to which selected social and psychological factors which drew on these studies were associated with drink driving and other at risk behaviours and ultimately could predict later involvement in serious traffic crashes.

Five thousand students were surveyed from 41 randomly selected Queensland state high schools at the end of the first semester in grade ten in 1988. The final sample involved 4545 respondents [90.9% response rate]. In 2000 there were 113 people from this sample who had Queensland Transport Department records of being involved in crashes, 80 males and 33 females. Measures included *Social background, Religiosity, Parental modelling and control, Underage drinking, Underage driving, Drink driving, Delinquency and Crash involvement*.

The strongest associations with heavier drinking were the familial variables of parental modelling of drink driving and access to parents' cars for underage driving. There were small but significant correlations between drink driving and delinquency and subsequent crash involvement. Drink driving and delinquency were jointly significantly predictive in a logistic regression on crash involvement. The theoretical implications of these findings are discussed.

INTRODUCTION

The present paper reports on selected preliminary findings from a longitudinal study of early adolescent involvement in drink driving and associated behaviours and examines the participants later involvement in fatal and hospitalised injury crashes. As reported by Siskind in an associated paper the study covers a period of over ten years which includes an initial base and three follow up data collections. The first self report survey took place in 1988, a second re-survey was undertaken in 1991-2 and separate follow up data collections of traffic offence and involvement in a serious crash, one leading to death or hospitalisation, were completed in 1998 and 2001, respectively.

The first data collection of a longitudinal study such as this and the questions and issues perceived as relevant are necessarily grounded in the empirical data and theoretical issues defined as most pertinent at the time when the initial base data measures are developed. In the present study this meant that the predictive models proposed and relevant variables and measures used drew on the research literature of the time and in particular on the longitudinal studies of related behaviours which were established or ongoing during the 1970's and 80's. These influential studies included the work of Farrington (1986) with primary school children on the development of criminality in the UK, and the Bachman, Johnston and O'Malley (1978) study following high school students to examine psychosocial predictors of the use of tobacco, alcohol and other drug use in the United States. Finally, the study drew on longitudinal studies of high school children of Jessor and Jessor (1977) that identified clusters of so-called problem behaviours including unsafe driving. Whilst the work of a number of other researchers, including Zuckerman (1979), informed this study the present paper is concerned with linking this Australian study with the findings of the three former researchers who have continued to maintain and publish findings from their longitudinal research programs over that period. The other theoretical framework that influenced the design of the study and items used was the Ajzen and Madden (1986) theory of Planned Behaviour which had been included to inform the development of the Plan a Safe Strategy drink driving education program (Queensland Department of Education, 1988). The present study was also based on the planning survey used as a background to inform the design of these educational materials and to guide the selection of variables for the main base data collection.

Briefly, these studies at the time were focused around issues of vulnerability, risk factors and the prediction of delinquency and anti-social behaviours. A core issue for the Queensland study at that [pre-RBT time] was whether drink driving by Australian young people and adolescents could be considered a non-normative behaviour and if so, whether there were subgroups of adolescents who could be predicted to be at particularly high risk of involvement in drink driving and associated injury crashes. The Farrington (1986) study was a comprehensive and in-depth study of boys in a low socio-economic area of London. It included not only self report surveys but interviews with parents and teachers and intensive follow up of life events and scholastic and employment experiences. The study at the time was particularly concerned with the role of poverty, low socio-economic status, school type and the relative advantage and disadvantage of school(s) attended as well as with family stability and disruption on the subsequent development of young people's criminality and delinquency. The Bachman, Johnston and O'Malley (1978) study was concerned with the relationship and linking of drug and alcohol use with associated delinquency and the personal and psychological factors that would mediate such influences, such as attitudes to drug and alcohol use, peer and family influences and church attendance and religiosity. Jessor and Jessor (1977) had completed the first of many analyses of national survey data which found significant linkages in a variety of so-called adolescent problem behaviours including sexual promiscuity, alcohol and drug use and unsafe driving. They proposed a problem behaviour syndrome that reflected non-conformity and premature adult behaviours and which was negatively associated with among other variables, school performance and religiosity. The more recent findings from these ongoing research programs will be examined in the discussion section in association with the findings from the present study.

As noted previously the design of the items for the present survey was also influenced by the Ajzen and Madden (1986) work. This was much more concerned with the personal and interpersonal determinants of a particular behaviour and concentrated on attitudes to, behavioural outcomes of and normative influences upon the specifically identified behaviour, in this case drink driving. This theory was not inconsistent with the longitudinal studies but defined a narrow subset of the predictive behaviours as the most relevant and pertinent factors in predicting a specific behavioural outcome.

The present study explores the extent to which selected social and psychological factors which drew on these studies were associated with drink driving and other at risk behaviours and ultimately could predict later involvement in serious traffic crashes in an Australian setting.

Hypotheses

The findings of the planning survey (Queensland Drink Driving Project, 1990) indicated that underage drinking was a common or normative behaviour among high school students (70%) and that the frequency and quantity of such drinking was a background to the likelihood of further involvement in other problem behaviours. Drawing on this and the work of the related studies the present paper explores the hypotheses that:

1. Low socio-economic status, family type and parental modelling of anti social behaviour are psychosocial predictors of heavy drinking;
2. Heavy drinking by young adolescents will be positively associated with relevant problem behaviours of underage driving, drink driving and other delinquency; and
3. Early adolescent involvement in these problem behaviours will predict later involvement in serious injury and fatal crashes.

METHOD

Participants

Forty one randomly selected high schools were drawn from a sample of all Queensland schools stratified to obtain equal representation of metropolitan, provincial and rural students. Of the final sample of 5,000 students there were 4,545 respondents [90.9% response rate] and 4,529 of these were eligible to be included in the data analyses. The mean age of the sample was 14.9 years [SD = 0.71, range 13 – 17yrs] and there were 2,238 females [49.4%]. Of this sample (3,738, 82.5%) were able to be identified in the Queensland Transport client database and this sub-sample is used in the relevant analyses.

Measures

The items and indicators used in this survey drew on the planning survey that had been conducted in 1986.

Social background. Social and economic status of the community in which the school was located was measured using a school indicator. This was an index based on census economic and cultural measures and used by government to provide additional funds to schools in socially disadvantaged regions (Queensland Department of

Education, personal communication, 1989) at three levels. The region in which the school was located was categorised as metropolitan, provincial or rural. Parent's socio-economic status was measured using the ASCO code for each parent's occupation and the SES indicator was the higher level of occupation of the two parents. Finally the family type was measured by the parent(s) the child lived with.

Religiosity. This was measured using church attendance where 0 = not at all, 1 = sometimes, 2 = once or twice a month, and 3 = about once a week or more.

Parental modelling and control. Parent modelling of anti-social behaviour was measured by combining the score on 2 items which included whether mother would drink and drive and whether father would drink and drive. Both items rated from 1 to 10 where 1 = certainly wouldn't and 10 = certainly would and the range on the combined items was from 2 to 20. Parent control was measured by whether or not the respondent reported having driven their parents' cars where 1 = yes and 2 = no.

Underage drinking behaviour. Respondents were asked to indicate on a diagram the number of alcoholic drinks they had consumed on each day of the previous week. Separate measures of weekday and weekend drinking were constructed by adding the numbers of drinks reported for the Monday to Thursday and for Friday to Sunday. Weekend drinking had the higher number of involved students and is used in this analysis.

Underage driving behaviour. A series of items explored the variety of situations in which an adolescent might be involved in driving. These included frequency of driving a motor vehicle in the past year, any driving experience on a public road in the past year and driving a specified person's car, motorbike or other vehicle on a public road in the past year. A composite score was calculated which ranged from 0 – 9 where 9 indicated highest level of driving experience and 0 indicated no driving experience.

Drink driving. A composite score was calculated using a series of items which included the number of times that the respondent had ever been involved in driving after drinking two or more glasses of an alcoholic drink, whether they had driven or ridden a car, motorcycle or other vehicle in the past year after drinking and whether they had driven or ridden a specified person's car, motor cycle or other vehicle after drinking in the past year. Scored 0 – 8 where 8 indicates highest level of drink driving and 0 indicates no drink driving.

Delinquency. This was indicated by the composite score on the Bachman, Johnston and O'Malley (1978) delinquency scale and had a Cronbach's alpha of 0.78.

Crash involvement. Measure based on the data from Queensland Transport crash database to identify involvement in fatal or serious injury crashes where 1 = involvement and 0 = no involvement. There were 113 people who had records of being involved in serious injury crashes, 80 males and 33 females.

Procedures

The survey was conducted at the end of the first semester in grade 10 in 1988. The administration of the survey was in accord with the requirements of the University of Queensland Ethics committee. The overwhelming majority of students were surveyed in a classroom setting by members of the research team using a systematic, structured format. Two follow up visits were arranged at each school during the survey month to obtain data from those students who were not able to participate on the day scheduled for the survey administration

The survey was designed and piloted to be completed by the majority of students in thirty minutes in order to fit with the school program. Arrangements were made with school administration staff to ensure that students who took longer to complete the questionnaire could continue until it was completed to the student's satisfaction.

Data Analysis

Initially, correlations were examined for possible associations. Secondly, multiple linear regression was used to examine the associations between the social and parental measures and underage drinking which was hypothesised as a prior and necessary predictor of later involvement in drink driving and the associated problem behaviours of underage driving and delinquency. Finally, the relationship between these problem behaviours and subsequent crash involvement was examined using multiple logistic regression analysis. Analyses involving crash data exclude those respondents who could not be identified in the Transport database. SPSS software was used for all analyses.

It should be noted that because of the nature of the data sources, measures of association with crash risk will tend to be underestimated.

RESULTS

a) Correlation analysis

The full correlation matrix is provided in attachment 1. Many of the correlations were significant but very small and whilst they have meaningful interpretive value they explain very little variance. They are reported for interest.

Social background Low *School socio-economic status* was significantly related to the provincial location of the school, lower parental occupational status, church attendance, underage driving a motor vehicle and parental drink driving. *Rurality* was significantly associated with living with both parents, higher parental occupational status, church attendance, parental drink driving, driving a parent's car, lower levels of weekday drinking, higher frequency of underage driving a motor vehicle, and lower reported delinquency. Lower *parental occupational status* was also associated with lower church attendance, frequency of underage driving and delinquency. *Living with a step parent* was also associated with living in a provincial region, low church attendance, higher parental drink driving, higher weekend drinking, drink driving, delinquency and later crash involvement. *Living with a single parent* was inversely related to living in a rural region, low church attendance, higher parental drink driving, higher weekend drinking, drink driving and delinquency but not with later crash involvement *Church attendance* was also associated with lower parental drink driving, lower weekend drinking, lower drink driving, lower underage driving and lower delinquency.

Parental modelling

Parental drink driving was also associated with the adolescent driving their parents' car, higher weekend drinking, higher weekday drinking, underage driving, drink driving and delinquency. *Driving the parents' car* was also associated with higher weekend drinking, higher weekday drinking, higher delinquency, underage driving, drink driving and delinquency.

Problem behaviours

There was a strong association between all related problem behaviours. *Level of weekend drinking* was also associated with a higher level of weekday drinking, driving a motor vehicle, drink driving, and delinquency. *Level of weekday drinking* was also associated with driving a motor vehicle, drink driving, and delinquency. *Frequency of driving* was also associated with drink driving and delinquency. *Drink driving* was also associated with delinquency and crash involvement and finally, *Delinquency* was also associated with crash involvement.

b) Multivariate analyses

Social and psychological predictors of weekend drinking

The results of the multiple linear regression used to predict level of weekend drinking is given in Table 1. Parental occupational status was excluded from the analysis because of a large number of missing values. The strongest predictors were the parental modelling and control variables of *Parent drink driving* and *Driving parents' car*. Other significant contributors were *not living with parents* and *lower levels of church attendance*.

Problem behaviours

As noted in the earlier summary of the correlation analysis there was a significant and strong association between the four problem behaviours of *Weekend drinking*, *Driving a motor vehicle, Drink driving* and *Delinquency*.

Problem behaviours as a predictor of crash involvement.

In this final analysis a logistic regression model was used, with *Drink driving* and *Delinquency* as independent variables and crash involvement as the dependent variables. *Underage driving* is not included because it was not significantly correlated with crash involvement. This analysis excluded those respondents who were not located in Queensland Transport records with a resultant sample of 3,738. The two included variables jointly predicted subsequent crash involvement, (χ^2 (2 df) = 8.82, , $p < 0.05$).

Table 1 Regression coefficients for the model predicting weekend drinking

Variable	B	β	Significance Level
School socio-economic status	.117	.023	0.148
Provincial	.010	.010	0.572
Rural	-.400	-.042	0.027
Live with step parent	.770	.053	0.001
Live with single parent	.706	.050	0.002
Live with other	1.350	.039	0.013
Church attendance	-.198	-.045	0.006
Parental modelling	.139	.134	0.001
Parental control	1.304	.134	0.001

DISCUSSION

The study reported here examined the association of socio-economic factors and family and parental environment on concurrent young adolescent drinking levels. Based on significant standardised beta weights the strongest associations with heavier drinking were the familial variables of parental modelling of drink driving and access to parents' cars for underage driving. The next strongest predictors were the set of variables that indicated the adolescent was not living with both parents. These findings are consistent with the more recent work of both Farrington (1996) and Jessor (2002) whose analyses strongly support the protective power of family involvement and surveillance if children are to avoid high risk situations and behaviours. What is of interest here is that the present study is probably unique in examining parental modelling of [or failure to model] road safety behaviours and the negative impact that such failure has on the associated and more general high risk behaviour of early adolescent drinking. The remaining social variables were less strongly associated once these variables were taken into account. Church attendance provided a small but significant association with lower drinking levels, a finding that is consistent with many studies of adolescent drug use over many decades. Overall, what emerges is that drinking in this cohort of Australian high school children is determined by similar variables as in other studies. In particular parental modelling of unsafe and illegal behaviour and their lack of control over young peoples' anti-social behaviour in the area of driving are risk factors for higher levels of underage drinking.

The current study also supports the work of Jessor and Jessor (1977) and Farrington (1986) on the existence in high risk adolescents of general syndromes of problem behaviours as distinct from a unique or isolated anti-social behaviour. In this analysis there were highly significant correlations between levels of drinking, underage driving, drink driving and delinquency. The recent work of Bachman and colleagues (2002) may have particular relevance here in that one of the correlates of adolescent and young adult heavy drinking and drug use they found was high levels of involvement in parentally unsupervised social events. A related association found by Farrington (1996) was that there were very high levels of unsupervised peer group associations and activities in those young people that continued with a life of delinquency and criminality. These findings are confirmed by Jessor's (2002) recent work on the protective role of parental supervision and control. Finally, whilst there were very small but significant associations between adolescent drink driving and delinquency with crash involvement these did not remain individually predictive in the logistic regression.

This study suggests that the experiences young people are exposed to as they move from adolescence to young adulthood can be protective. In Farrington's (1996) in-depth study he found that the peak of involvement in delinquent behaviour occurred in the London sample at 17 years and offending decreased as the young person aged into their twenties. It is also the case that whilst the possibility of involvement in serious crashes remains the core

concern for road safety professionals the reality of the current data is that they remain, fortunately, a relatively rare event.

An important issue raised by the current study relates to the unknown but undoubtedly positive effects of the two major relevant community interventions that took place in the period following the survey. RBT was introduced in Queensland in 1988 and in 1991 all drivers under twenty-one years of age, or during the first three years of licensed driving, were required to have a zero BAC. As Farrington (1996) notes "risk factors tend to overlap and reducing one risk factor might yield a spectrum of different benefits" (p.28). RBT and associated legislature represented community interventions that effectively constrained both alcohol use and driving by young adolescents. They would seem to be initiatives that Farrington (1996) designates as "situational crime prevention strategies" (p24). That is, from a state and national perspective these were interventions that "aimed at specific types of offence and are designed to change the environment to decrease criminal opportunities" (p.24). These Australian road safety interventions retrospectively met the criteria of responding to particular community based patterns of crime, fitted with local circumstances and were targeted to a local problem. It may be possible that the introduction of RBT and the associated likelihood of being stopped by police acted as a control on underage driving and drink driving and also provided a mechanism for control of the drinking previously associated with involvement in drink driving. There is probably no way of measuring the impact of RBT on other delinquent activities but it is possible to hypothesise that because of the strong associative relations with other offences it had a beneficial effect. Specifically, in the case of those young people in this study, who appeared to have been insufficiently protected by their parents, RBT and associated legislature provided them with societal controls and protection.

REFERENCES

Ajzen, I., & Madden, T. (1986). Prediction of goal-directed behavior: Attitudes, intentions and perceived behavioral control, *Journal of Experimental Social Psychology, 22*, 453-474

Bachman, J.G., Johnston, L. D., & O'Malley, P. M. (1978). *Youth in Transition, Volume VI*. Michigan: I.S.R.

Bachman, J.G., O'Malley, P.M., Schulenburg, J.E., Johnston, L.D., Bryant, A.L. & Merline, A.C. (2002). *The decline of substance use in young adulthood: Changes in social activities, roles and beliefs*. New Jersey: Lawrence Erlbaum

Farrington, D.P. (1996). *Understanding and preventing youth crime*. England: Joseph Rowntree Foundation

Farrington, D.P. (1986) Stepping stones to adult criminal careers. In D. Olweus, J. Block, & M. Radke-Yarrow (Eds). *Development of antisocial and prosocial behaviour: Research, theories and issues.* Orlando: Academic Press

Jessor, R. (2002). Risk and protective factors in adolescent health, behavior and developments: Implications for risky driving. *Plenary Session of 16th International Conference on Alcohol, Drugs and Traffic Safety, Montreal, August*

Jessor, R., & Jessor, S. L. (1977). *Problem behavior and psychosocial development: A longitudinal study of youth.* New York: Academic Press

Queensland Department of Education (1988). *PASS: Plan a Safe Strategy Drink Driving Prevention Program*. Brisbane: Queensland Department of Education, Production Services Branch

Queensland Drink Driving Project, (1990). *Development and Implementation of the Plan a Safe Strategy Drink Driving Prevention Program*, NCADA Monograph Series No. 13. Canberra :A.G.P.S

Zuckerman, M. (1979). *Sensation seeking: Beyond the optimal level of arousal*. New York: John Wiley and Sons

ISBN 1-876346-46-9 © RS2002 Conference

Attachment 1 Correlations between the measures

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. SSES	-														
2. Provincial	.113***	-													
3. Rural	-.013	-.501***	-												
4. SES	-.063***	-.035*	.049**	-											
5. Religiosity	.048***	-.090***	.108***	-.063***	-										
6. Live with step parent	-.018	.052***	-.041**	-.004	-.058***	-									
7. Live with single parent	-.033*	.005	-.079***	.005	-.047**	-.144***	-								
8. Live with other	-.009	-.015	.015	.001	.002	-.051***	-.063***	-							
9. Parental DD	-.027	.039*	.054***	.007	-.170***	.076***	.084***	.019	-						
10. Drive parents' car	-.024	-.004	-.170***	-.018	.033*	-.007	.021	.029	-.157***	-					
11. Weekend drinking	.017	.041**	-.026	.000	-.071***	.064***	.044**	.014	.168***	-.150***	-				
12. Weekday drinking	-.005	.016	-.038**	.002	-.027	.007	.005	.015	.081***	-.069***	.329***	-			
13. Driving	.042**	-.010	.209***	.045**	-.064***	.030*	-.006	-.002	.213***	-.723***	.290***	.135***	-		
14. Drink driving	.013	.058***	.004	.026	-.128***	.047***	.047**	.019	.248***	-.256***	.450***	.224***	.480***	-	
15. Delinquency	.018	.049***	-.062***	.037*	-.130***	.053***	.030*	.027	.242***	-.221***	.302***	.166***	.386***	.483***	-
16. Crashes	-.007	.001	-.012	.019	-.005	.042**	.007	.025	.012	-.023	.019	-.003	.022	.051**	.044**

* $p < .05$, **$p < .01$, ***$p < .001$